

**FINAL**

**AMENDMENT 5a TO THE 2006 CONSOLIDATED  
ATLANTIC HIGHLY MIGRATORY SPECIES  
FISHERY MANAGEMENT PLAN**



**Including:**

**A Final Environmental Impact Statement,  
A Final Regulatory Impact Review,  
A Final Regulatory Flexibility Analysis,  
A Final Social Impact Analysis**

**2013**

**Highly Migratory Species Management Division  
Office of Sustainable Fisheries  
National Marine Fisheries Service  
1315 East-West Highway  
Silver Spring, Maryland 20910**



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Atlantic Highly Migratory Species  
Fishery Management Plan

April 2013

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## **Amendment 5a to the 2006 Consolidated Atlantic Highly Migratory Species Fishery Management Plan**

- Actions:** Implement management measures consistent with recent stock assessments for sandbar, scalloped hammerhead, Gulf of Mexico blacktip, and Atlantic and Gulf of Mexico blacknose sharks; establish a rebuilding plan for Atlantic blacknose and scalloped hammerhead sharks; implement commercial quota limits consistent with stock assessment recommendations to prevent overfishing and rebuild overfished stocks; and, modify recreational measures or prohibit the retention of overfished stocks.
- Type of Statement:** Final Environmental Impact Statement; Final Regulatory Impact Review; Final Regulatory Flexibility Analysis; Final Social Impact Statement
- Lead Agency:** National Marine Fisheries Service
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- Abstract:** The National Marine Fisheries Service is amending the 2006 Consolidated Atlantic Highly Migratory Species Fishery Management Plan based on several shark stock assessments that were completed from 2009 to 2012. The assessments for Atlantic blacknose, dusky, and scalloped hammerhead sharks indicated that these species are overfished and experiencing overfishing. The assessment for sandbar sharks indicated that this species is overfished, but not experiencing overfishing. The assessment for Gulf of Mexico blacktip sharks indicated that the stock is not overfished and not experiencing overfishing. NMFS did not accept the assessment for Gulf of Mexico blacknose sharks; therefore, the overfished and overfishing statuses have been determined to be unknown. After considering comments received during scoping and on a Predraft document, the Notice of Availability of the Draft Environmental Impact Statement (DEIS) for Amendment 5 and the proposed rule published in the Federal Register on December 7, 2012 (77 FR 73029), and November 26, 2012 (77 FR 70552), respectively. The DEIS and proposed rule considered measures to reduce fishing mortality and effort in order to rebuild overfished Atlantic shark species while ensuring that a limited shark fishery can be maintained, consistent with all legal obligations. The Final Environmental Impact Statement (FEIS) describes a range of alternatives that could impact shark fishermen and dealers, including new commercial quota limits consistent with stock assessment recommendations to prevent overfishing and rebuild overfished stocks and

modification of recreational measures to limit the retention of overfished stocks. The DEIS also considered measures for dusky sharks to end overfishing and rebuild the stock based on a recent stock assessment, but after considering public comment, NMFS has decided that these measures require further analyses, which NMFS will conduct in an upcoming, separate proposed action.

## EXECUTIVE SUMMARY

Atlantic Highly Migratory Species (HMS) are managed under the dual authority of the Magnuson-Stevens Fishery Conservation and Management Reauthorization Act (Magnuson-Stevens Act) and the Atlantic Tunas Convention Act (ATCA). Under the Magnuson-Stevens Act, NMFS must manage fisheries to achieve optimum yield on a continuing basis while preventing overfishing. Under ATCA, we are authorized to promulgate regulations, as may be necessary and appropriate, to implement recommendations from the International Commission for the Conservation of Atlantic Tunas (ICCAT). The measures established in this amendment and associated rulemaking are taken under the authority of the Magnuson-Stevens Act and consistent with ATCA. Currently, Atlantic sharks, tunas, swordfish, and billfish are managed under the 2006 Consolidated Atlantic HMS Fishery Management Plan (FMP), and its amendments.

Based on a 2009 stock assessment published in a peer-reviewed journal, we determined that scalloped hammerhead sharks are overfished and that overfishing is occurring on the stock (76 FR 23794; April 28, 2011). We also made stock status determinations for Atlantic and Gulf of Mexico blacknose, sandbar, and dusky sharks, which were assessed in 2010/2011, and announced our intent to prepare an Environmental Impact Statement for Amendment 5 to the 2006 Atlantic Consolidated HMS FMP (76 FR 62331; October 7, 2011). This notice also requested comments on potential future actions for this amendment and announced six scoping meetings to provide opportunity for public comment. During the scoping meetings, we described the results of the recent stock assessments, issues that need to be addressed concerning shark management, options or alternatives that could be implemented to achieve objectives, and consulted with the five Atlantic Fishery Management Councils (New England, Mid-Atlantic, South Atlantic, Gulf of Mexico, and the Caribbean) and the two Atlantic Interstate Marine Fisheries Commissions (Atlantic States and Gulf States), and the HMS Advisory Panel. The comment period ended on December 31, 2011.

We released a Predraft of Amendment 5 to the 2006 Consolidated HMS FMP, which incorporated comments received during scoping, and a summary of the scoping comments to the HMS Advisory Panel on March 14, 2012, and it was made available on the internet ([http://www.nmfs.noaa.gov/sfa/hms/FMP/am5\\_predraft/a5\\_predraft\\_final\\_031212\\_web.pdf](http://www.nmfs.noaa.gov/sfa/hms/FMP/am5_predraft/a5_predraft_final_031212_web.pdf)). The Predraft included, among other things, the outcome of stock assessments for sandbar, dusky, and scalloped hammerhead, Atlantic blacknose, and Gulf of Mexico blacknose sharks as well as potential management measures for these species/stocks. We requested comments on the Predraft by April 13, 2012.

Following review of comments on the Predraft, we published a Federal Register notice on May 29, 2012 (77 FR 31562) considering the addition of Gulf of Mexico blacktip sharks to the amendment. This addition was proposed because Gulf of Mexico blacktip sharks were undergoing a stock assessment as part of the Southeast Data, Assessment, and Review (SEDAR) 29 process, and that process would be completed before this amendment was finalized. Therefore, we believed that the addition of Gulf of Mexico blacktip sharks to this amendment would facilitate administrative efficiency by optimizing our resources, and would allow us to address new scientific information in the timeliest manner. We also expected that this addition

would provide better clarity to and understanding by the public regarding any possible impacts of the rulemaking on shark fisheries by combining potential management measures resulting from recent shark stock assessments into one rulemaking. We invited public comments on this addition to the amendment and accepted comments on the proposal until June 21, 2012.

The Notice of Availability of the Draft Environmental Impact Statement (DEIS) for Amendment 5 and the proposed rule published in the Federal Register on December 7, 2012 (77 FR 73029), and November 26, 2012 (77 FR 70552), respectively. These documents considered a range of management measures including implementing commercial quota limits consistent with stock assessment recommendations to prevent overfishing and rebuild overfished stocks; modifying time/area closures and/or creating bycatch caps to reduce fishing mortality of overfished/overfishing stocks; and, modifying recreational measures or prohibiting the retention of overfished stocks. The public comment period ended on February 12, 2013. We held eight public hearings and two conference calls/webinars during that time, and consulted with the five Atlantic Regional Fishery Management Councils, the Atlantic States Marine Fisheries Commission, and the HMS Advisory Panel. A summary of public comments received, both spoken and written, and NMFS' response to those comments is included as Appendix A of this document and will also be in the final rule implementing the regulations. Copies of all the written comments received can be found at <http://www.regulations.gov> (search for NOAA-NMFS-2012-0161).

During the comment period, we received numerous comments on the proposed dusky shark measures regarding the data sources used and the analyses of these data. We also received many comments requesting consideration of approaches to dusky shark fishery management that were significantly different from those we analyzed in the proposed rule and Draft Amendment 5. After reviewing all of the comments received, we concluded that further analyses are needed for dusky sharks. In order to ensure that other shark measures are finalized as expeditiously, we decided to conduct the additional dusky shark analyses in an upcoming, separate proposed action. Comments received on the dusky shark portions of the November 2012 proposed rule will be considered in that action. Moving forward, this Final Environmental Impact Statement (FEIS) and final rule will be referred to as "Amendment 5a" to the 2006 Consolidated HMS FMP and its analyses address the need to: 1) maintain rebuilding of sandbar sharks; 2) end overfishing and rebuild scalloped hammerhead and Atlantic blacknose sharks; and 3) establish a total allowable catch (TAC) and commercial quota and recreational measures for Gulf of Mexico blacknose and blacktip sharks. The dusky shark action will be referred to as "Amendment 5b."

For National Environmental Policy Act (NEPA) purposes, we considered a full range of alternatives in the DEIS and carried forward those considered to be reasonable for full consideration in the FEIS. Consistent with the regulations published by the Council on Environmental Quality (CEQ), 40 CFR §§ 1501-1508 (CEQ Regulations), we have identified our preferred alternatives. The alternatives in this document considered the comments received from the public, the Advisory Panel, and consulting parties during the scoping, Predraft, and Draft stages. Table 0.1 below provides the list of the changes in the FEIS from the DEIS. A summary of the issues addressed and other alternatives considered are also included. A full description and analysis of the different alternatives can be found in Chapters 2 and 4 of this document. We have identified a preferred alternative suite in this document to rebuild overfished Atlantic shark

stocks, end overfishing of Atlantic sharks, balance the needs of the fishermen and communities with the needs of the resource, and maximize sustainable fishing opportunities, consistent with the Magnuson-Stevens Act and other domestic laws.

The CEQ regulations direct Federal agencies to the full extent possible to integrate the requirements of NEPA with other planning and environmental review procedures required by law or by agency practice so that all procedures run concurrently rather than consecutively. To that end, this document integrates the FEIS required by NEPA with the fisheries planning and management requirements of the Magnuson-Stevens Act, the Final Regulatory Flexibility Analysis required under the Regulatory Flexibility Act, 5 USC § 601-603; and the Regulatory Impact Review prepared in accordance with Executive Order 12866, “Regulatory Planning and Review.”

**Table 0.1 The preferred alternatives at the draft and final stage of Amendment 5a to the 2006 Consolidated HMS FMP**

<b>TAC and Commercial Quota Measures</b>	<b>Preferred Alternatives in DEIS <i>Alternative Suite A2</i></b>	<b>Preferred Alternatives in FEIS <i>Alternative Suite A6</i></b>
Scalloped Hammerhead Shark TAC and Commercial Hammerhead Quotas	Scalloped hammerhead shark TAC: 79.6 mt dw  Atlantic hammerhead shark quota: 28.3 mt dw  Gulf of Mexico hammerhead shark Quota: 23.9 mt dw  Hammerhead shark group consists of great, scalloped, and smooth hammerhead sharks	Scalloped hammerhead shark TAC: Same.  Atlantic hammerhead shark quota: 27.1 mt dw  Gulf of Mexico hammerhead shark quota: 25.3 mt dw  Hammerhead shark group - Same.
<b><i>Reason for Changes:</i></b> Including the final 2011 dealer data in our calculations changed the average percentage of hammerhead sharks landed in the regions, while including the final 2011 logbook data in our calculations changed the dead discard mortality estimates.		
Aggregated Large Coastal Shark (LCS) Quotas	Atlantic aggregated LCS: 168.2 mt dw Atlantic aggregated LCS consists of blacktip, bull, lemon, nurse, spinner, silky, and tiger sharks  Gulf of Mexico aggregated LCS: 157.3 mt dw Gulf of Mexico aggregated LCS consists of bull, lemon, nurse, spinner, silky, and tiger sharks	Atlantic aggregated LCS: 168.9 mt dw Atlantic aggregated LCS - Same.  Gulf of Mexico aggregated LCS: 157.5 mt dw Gulf of Mexico aggregated LCS - Same.
<b><i>Reason for Changes:</i></b> Including the final 2011 dealer data in our calculations changed the species landings percentage of the total LCS landings slightly; therefore, the aggregated LCS was updated appropriately.		
Gulf of Mexico Blacktip Shark TAC and Quotas	Gulf of Mexico blacktip shark TAC: 413.4 mt dw  Gulf of Mexico blacktip shark quota: 256.7 mt dw	Gulf of Mexico blacktip shark TAC: Same.  Gulf of Mexico blacktip shark quota: 256.6 mt dw
<b><i>Reason for Changes:</i></b> Including the final 2011 dealer data in our calculations changed the species landings percentage of the total LCS landings slightly; therefore, the Gulf of Mexico blacktip shark quota was updated appropriately.		
Blacknose Shark TAC and Quotas	Atlantic blacknose shark TAC: 21.2 mt dw Atlantic blacknose shark quota: 18.0 mt dw  Gulf of Mexico blacknose shark TAC: 34.9 mt dw Gulf of Mexico blacknose shark quota: 2.0 mt dw	Atlantic blacknose shark TAC: Same. Atlantic blacknose shark quota: Same.  Gulf of Mexico blacknose shark TAC: Same. Gulf of Mexico blacknose shark quota: Same.
<b><i>Reason for Changes:</i></b> No changes from the DEIS to FEIS.		
Non-blacknose Small Coastal Shark (SCS) Quotas	Atlantic non-blacknose SCS quota: 197.9 mt dw  Gulf of Mexico non-blacknose SCS quota: 23.7 mt dw	Atlantic non-blacknose SCS quota: 176.1 mt dw  Gulf of Mexico non-blacknose SCS quota: 45.5 mt dw
<b><i>Reason for Changes:</i></b> Including the final 2011 dealer data in our calculations changed the average regional landings for non-blacknose SCS species; therefore, the non-blacknose quota was updated appropriately. Additionally, we used the 2011 landings instead of average landings from 2010-2011 to account for the fact		

<b>TAC and Commercial Quota Measures</b>	<b>Preferred Alternatives in DEIS</b> <i>Alternative Suite A2</i>	<b>Preferred Alternatives in FEIS</b> <i>Alternative Suite A6</i>
that much of the Gulf of Mexico region was closed to fishing in 2010 because of the Deepwater Horizon/BP oil spill.		
Quota Linkages and Inseason Quota Transfers	<p>Link Atlantic hammerhead shark and Atlantic aggregated LCS quotas</p> <p>Link Gulf of Mexico hammerhead shark, Gulf of Mexico Aggregated LCS, and Gulf of Mexico blacktip shark quotas</p> <p>Link Atlantic blacknose and Atlantic non-blacknose SCS quotas</p> <p>Link Gulf of Mexico blacknose and Gulf of Mexico non-blacknose SCS quotas</p> <p>Allow inseason quota transfers between non-blacknose SCS regions</p>	<p>Link Atlantic hammerhead shark and Atlantic Aggregated LCS quotas - Same.</p> <p>Link Gulf of Mexico hammerhead shark and Gulf of Mexico Aggregated LCS quotas. Gulf of Mexico blacktip shark quota has no direct linkage to other quotas, but NMFS would have inseason authority to close the blacktip shark management group after the Gulf of Mexico hammerhead shark and Aggregated LCS management groups close.</p> <p>Link Atlantic blacknose and Atlantic non-blacknose SCS quotas - Same.</p> <p>Link Gulf of Mexico blacknose and Gulf of Mexico non-blacknose SCS quotas - Same.</p> <p>Allow inseason quota transfers between hammerhead regions and between non-blacknose SCS regions.</p>
<b>Reason for Changes:</b> Based on public comment, we re-evaluated the quota linkages between the species groups. In the Gulf of Mexico, the hammerhead and aggregated LCS quotas would be linked because directed shark fishermen frequently catch these species together when targeting LCS. The Gulf of Mexico blacktip shark quota would not be linked to the aggregated LCS or hammerhead shark quotas, mainly because aggregated LCS and hammerhead sharks are caught in small amounts on trips targeting Gulf of Mexico blacktip sharks, but we would have additional authority to close the Gulf of Mexico blacktip management group through an inseason action after, or at the same time, the Gulf of Mexico hammerhead and aggregated LCS management groups close depending on several criteria. Based on public comment and because the scalloped hammerhead shark stock assessment was based on a single stock for the Atlantic and Gulf of Mexico regions, Alternative Suite A6 would also provide the flexibility to perform inseason transfers of the hammerhead quota between regions.		
<b>Recreational Measures</b>	<b>Preferred Alternatives in DEIS</b> <i>Alternative Suite A2</i>	<b>Preferred Alternatives in FEIS</b> <i>Alternative Suite A6</i>
Minimum size	Increase minimum recreational size to 96" fork length for all sharks except sharpnose and bonnethead	Increase the minimum recreational size limit to 78" fork length for all hammerhead sharks; maintain current size limits for all other shark species.
<b>Reason for Changes:</b> In the DEIS, the 96 inch fork length minimum size was designed for dusky shark rebuilding, which will be addressed in a separate rulemaking. In the FEIS, increasing the minimum recreational size limit to 78" would assist with rebuilding scalloped hammerhead sharks.		
Reporting Requirements	Require mandatory reporting of all hammerhead sharks landed recreationally to NMFS through the non-tournament landing system	No reporting of recreationally landed hammerhead sharks
<b>Reason for Changes:</b> Estimates of recreational mortality for hammerhead shark will continue to occur via existing surveys (LPS/MRIP), which NMFS has determined is sufficient for immediate rebuilding purposes, as set out in Alternative Suite A6 (the Preferred Alternative). Recreational shark reporting measures could be addressed in Amendment 5b.		

<b>TAC and Commercial Quota Measures</b>	<b>Preferred Alternatives in DEIS <i>Alternative Suite A2</i></b>	<b>Preferred Alternatives in FEIS <i>Alternative Suite A6</i></b>
Public Outreach	Outreach to recreational community regarding dusky shark identification and prohibition	Outreach to recreational community regarding shark identification and recreational regulations
<b><i>Reason for Changes:</i></b> The public outreach would be tailored towards all shark identification and regulations instead of just dusky sharks.		

## **TAC and Commercial Quota Measures**

We considered several alternatives relating to TACs and commercial quotas to rebuild overfished stocks and end overfishing and manage these fishery resources in a manner that maximizes sustainability, while minimizing, to the greatest extent possible, the social and economic impacts on affected fisheries while complying with all legal requirements. The alternatives to rebuild overfished stocks and end overfishing for the Atlantic shark fisheries range from maintaining the status quo under the No Action alternative, to restructuring the species management groups by regions, to changing the LCS and SCS quotas, to closing all shark fisheries.

In the DEIS, Alternative Suites A2 – A4 were based on managing some species individually while managing others within newly-identified management groups and implementing commercial quota limits consistent with stock assessment recommendations. In this action, we focus on the non-sandbar LCS and SCS fisheries. Under Alternative Suite A2, we proposed to remove all hammerhead sharks (great, scalloped, and smooth) from the non-sandbar LCS management group to form regional hammerhead shark quotas of 28.3 mt dw in the Atlantic and 23.9 mt dw in the Gulf of Mexico based on the TAC of 79.6 mt dw recommended by Hayes et al. (2009). The analysis grouped all hammerhead sharks for TAC and quota purposes due to the difficulties identifying the different hammerhead species. Gulf of Mexico blacktip sharks were removed from the Gulf of Mexico non-sandbar LCS management group and a TAC of 413.4 mt dw and a commercial quota of 256.7 mt dw was proposed. The TAC and quota were calculated by using the proportion of the 2008-2011 Gulf of Mexico blacktip shark landings that make up the Gulf of Mexico non-sandbar LCS quota multiplied by the Gulf of Mexico non-sandbar LCS quota that will be in effect in 2013. Based on SEDAR 29, the stock assessment showed that current removal rates are sustainable, and the subsequent projections, which were completed outside the SEDAR process, indicate that current removals are unlikely to lead to an overfished stock by 2040 (i.e., had a 70% chance of being above anticipated MSY levels in 2040). For the non-sandbar LCS management group, we proposed to change the species composition of the Atlantic and Gulf of Mexico non-sandbar LCS management groups, to establish a new name for the groups, and adjust the commercial quotas by region based on the species remaining in each group. In Alternative Suite A2, we proposed to remove all three hammerhead sharks from the Atlantic non-sandbar LCS management group to establish a new quota for the aggregated LCS management group of 168.2 mt dw. In the Gulf of Mexico, we proposed to remove blacktip sharks as well as all three hammerhead sharks from the current Gulf of Mexico non-sandbar LCS management group to establish a quota of 157.3 mt dw for the aggregated LCS management group.

In the SCS fisheries, we proposed to change the blacknose shark quota based on the recent stock assessments and establish regional non-blacknose SCS quotas under Alternative Suite A2. The

Atlantic blacknose shark stock assessment recommended a TAC of 7,300 blacknose sharks, while the Gulf of Mexico blacknose stock assessment did not provide a TAC recommendation because the assessment was rejected (see Chapter 1 for additional stock assessment information). In the Atlantic region, we proposed a quota of 18.0 mt dw, which has a 70 percent probability to rebuild by 2043 according to the stock assessment. Since the Gulf of Mexico stock had an unknown status, we proposed a TAC of 34.9 mt dw by adding Gulf of Mexico blacknose shark mortality from the 2011 commercial shark fishery to average recreational and discard mortality since the implementation of blacknose shark measures from Amendment 3 to the 2006 Consolidated HMS FMP in 2010. The proposed Gulf of Mexico blacknose shark quota of 2.0 mt dw would allow some incidental landings of blacknose sharks, while minimizing discards. For the non-blacknose SCS fishery, we proposed separating the current quota of 221.6 mt dw into two separate regions (Atlantic and Gulf of Mexico) for quota linkage purposes with blacknose sharks based on the percentage of non-blacknose SCS regional landings since implementation of the Amendment 3 to the 2006 Consolidated HMS FMP. Under Alternative Suite A2, the Atlantic regional quota would be 197.9 mt dw, while the Gulf of Mexico quota would be 23.7 mt dw.

During the public comment period, we received comments that questioned the stock assessment results for scalloped hammerhead, because the assessment was conducted outside the SEDAR process; that questioned the Gulf of Mexico blacktip shark assessment, because its projections were done outside of the SEDAR process; and that expressed issues with the timeliness of the data used in the Gulf of Mexico blacknose shark stock assessment. Comments regarding TAC and commercial quota measures generally supported the TACs and quotas in Alternative Suite A2. Some comments on the hammerhead shark quotas expressed concerns with linking the Gulf of Mexico hammerhead shark quota to the Gulf of Mexico blacktip shark and Gulf of Mexico aggregated LCS quotas, and how the hammerhead shark quota could limit the harvest of the larger Gulf of Mexico blacktip shark and aggregated LCS quotas. In addition, there was support for removing hammerhead sharks from the non-sandbar LCS management group and establishing regional quotas. Many comments suggested setting a Gulf of Mexico blacktip shark quota greater than average landings because the stock assessment indicated that the stock is not overfished and overfishing is not occurring. We also received comments that supported prohibition of the retention of hammerhead and blacknose sharks due to the stock assessment results.

In response to public comments on the DEIS, we reviewed the stock assessments and confirmed that they are the best scientific information available and should be used for management purposes. Based on public comments, updated data, and subsequent analyses, we also revised the alternatives in the FEIS and identified a new preferred alternative suite, Alternative Suite A6. The revised Alternative Suites A2 – A4, and the new preferred Alternative Suite A6, still consider managing species within newly created management groups and implementing commercial quota limits consistent with stock assessment recommendations. The data used in the FEIS is the final 2011 commercial logbook and dealer data. The DEIS used preliminary 2011 commercial landings data because the finalized data were not available at the time. As explained below and in Chapter 2, the calculations to determine the commercial quotas for Alternative Suites A2 – A4 were the same from DEIS to FEIS. The only difference is the use of updated data. The hammerhead shark quota between the Atlantic and Gulf of Mexico regions

changed slightly due to the final 2011 dealer data that were used to determine the average percentage of hammerhead sharks landed by region. In addition, the overall hammerhead shark quota available for commercial harvest increased because dead discard estimates from the final 2011 commercial logbook data were less than estimates calculated with the preliminary data. For the aggregated LCS and Gulf of Mexico blacktip shark quotas, the final 2011 dealer data changed the species landings percentage of the total LCS landings slightly; therefore, the aggregated LCS and Gulf of Mexico blacktip quotas were updated appropriately. For the non-blacknose SCS quotas, the final 2011 dealer data changed the average regional landings for non-blacknose SCS species, and we used the 2011 landings instead of average landings from 2010-2011 due to the Deepwater Horizon/BP oil spill closing a large amount of the Gulf of Mexico region to fishing during 2010. The final 2011 data did not change blacknose shark quotas in the Atlantic and Gulf of Mexico.

The preferred alternative, Alternative Suite A6, is a new alternative suite that followed logically from the final 2011 data and comments received during the DEIS public comment period, which resulted in a re-evaluation of the proposed commercial quotas. We believe that this new preferred alternative better reflects the intent of the previous preferred alternative, and remains a reasonable alternative capable of meeting the purpose and need of the action. It is within the range of the management approaches fully analyzed in the DEIS, and is mostly a combination of measures that were included in Alternative Suites A2 and A3. Alternative Suite A6 would establish a new hammerhead shark (great, scalloped, and smooth) management group with regional quotas of 27.1 mt dw in the Atlantic region and 25.3 mt dw in the Gulf of Mexico region, calculated from the average annual landing percentage of hammerhead sharks by region from 2008 through 2011. The Gulf of Mexico blacktip shark quota of 256.6 mt dw would be established based on average blacktip shark landings from 2008-2011. Because hammerhead and Gulf of Mexico blacktip sharks are removed from the non-sandbar LCS management group in Alternative Suite A6, new regional aggregated LCS management groups that do not include those species, as appropriate, would be created and would have regional quotas of 168.9 mt dw in the Atlantic and 157.5 mt dw in the Gulf of Mexico (Figure 0.1). The blacknose shark quota did not change from the preferred alternative suite in the DEIS; therefore, the Atlantic blacknose shark quota would be 18.0 mt dw and the Gulf of Mexico blacknose shark quota would be 2.0 mt dw. The non-blacknose SCS quotas would be 176.1 mt dw in the Atlantic and 45.5 mt dw in the Gulf of Mexico, which is the regional split based on 2011 landings (Figure 0.2).

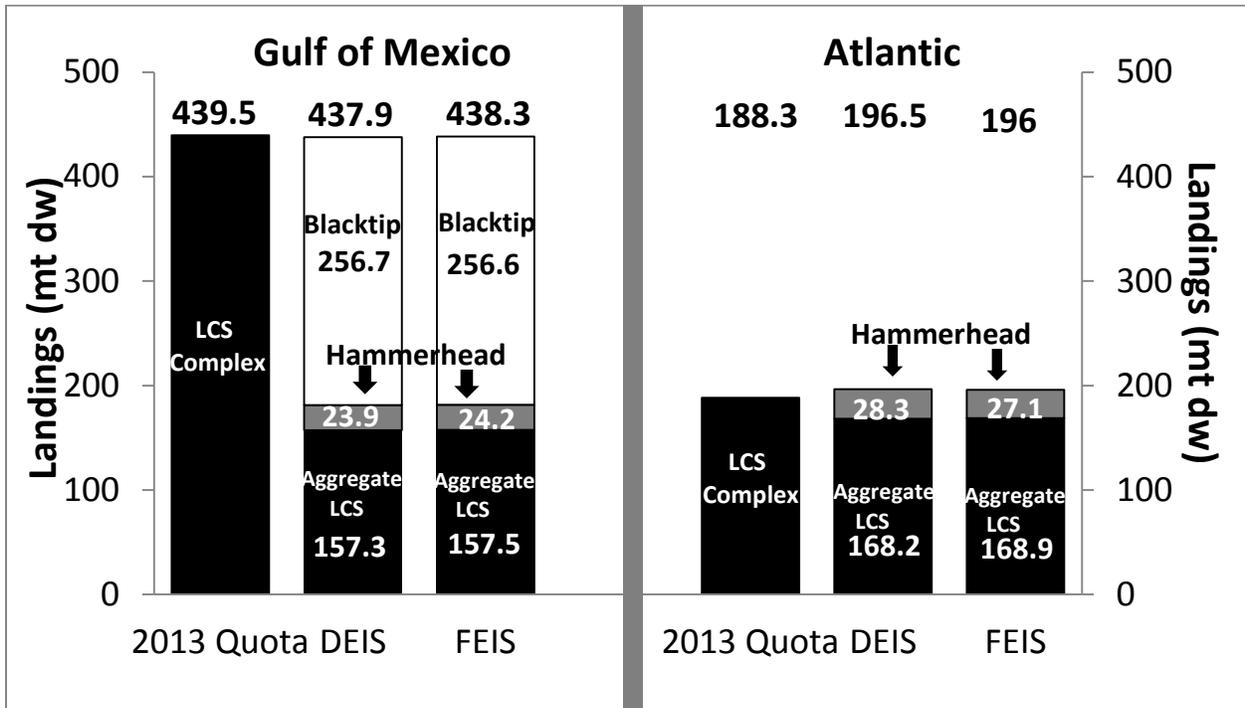


Figure 0.1 Comparison of the impacts to the LCS fisheries based on the current 2013 LCS quotas, and the preferred alternative quotas from the DEIS and FEIS

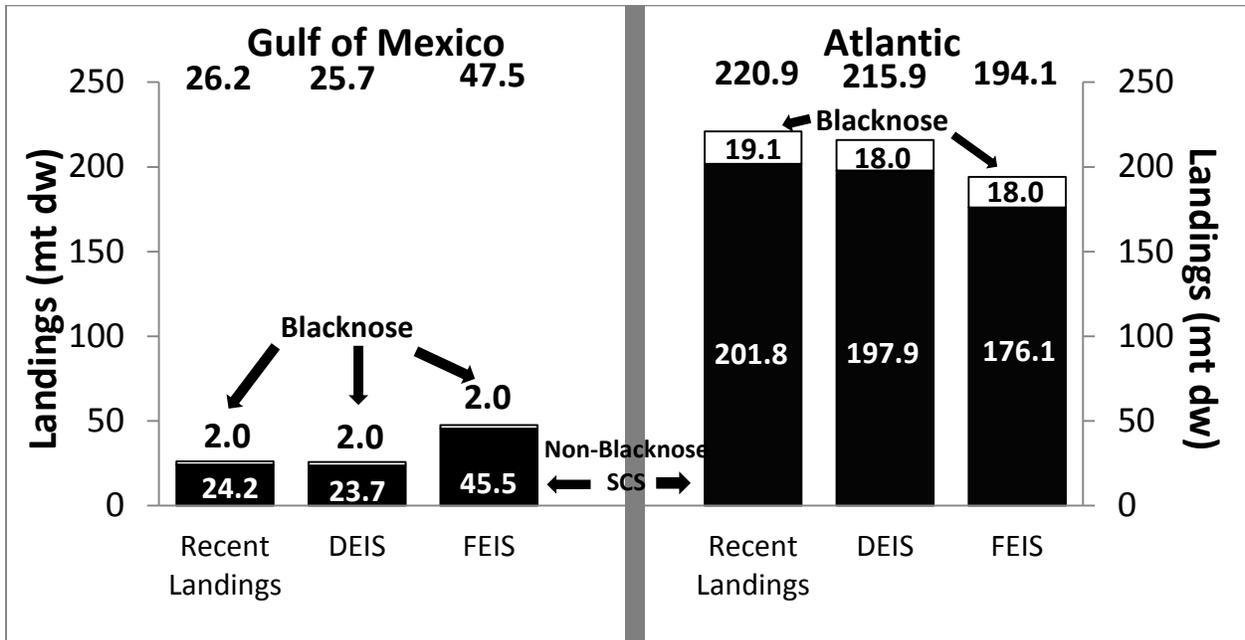


Figure 0.2 Comparison of the impacts to the SCS fisheries based on the current 2013 SCS quotas, and the preferred alternative quotas from the DEIS and FEIS

Overall, Alternative Suite A6 would result in direct, moderate, beneficial ecological impacts in the short- and long-term for scalloped hammerhead, aggregated LCS, Gulf of Mexico blacktip,

blacknose, and non-blacknose SCS species. The revised TAC and quota measures would impact each species individually as follows: In the short- and long-term, scalloped hammerhead sharks would have direct, moderate beneficial ecological impacts since the new species TAC and regional quotas would end overfishing on scalloped hammerhead sharks. Aggregated LCS would have neutral ecological impacts since fishing pressure is not anticipated to change and landings would be capped at current levels. Because the recent stock assessment for Gulf of Mexico blacktip sharks resulted in a healthy stock status determination and commercial landings would be capped at current fishing levels, the ecological impacts would be neutral in the short- and long-term. Blacknose sharks would have short- and long-term minor beneficial ecological impacts since the Atlantic quota is consistent with the rebuilding plan identified in SEDAR 21 and Gulf of Mexico landings would be capped at a level already reduced since the implementation of Amendment 3 to the 2006 Consolidated HMS FMP. There would be direct, minor beneficial ecological impacts for non-blacknose SCS complex in the short- and long-term as it would create regional quotas and restrict fishing mortality below the TAC established for SCS in SEDAR 13. Under Alternative Suite A6, there would be neutral socioeconomic impacts to directed and incidental shark permit holders as the average annual gross revenues would be the same as the status quo for most of the shark species. However, this alternative suite could have minor adverse socioeconomic impacts for fishermen that catch hammerhead sharks because hammerhead sharks are currently counted against the regional non-sandbar LCS quotas, which are much higher than the proposed regional hammerhead shark quotas, and the opportunities to land hammerhead sharks would be reduced. Potential reductions in revenue would negatively impact fishermen, but they would not do so every year since hammerhead sharks species rarely make up a significant portion of shark landings. This alternative is preferred because it strikes a balance between meeting the rebuilding requirements of the Magnuson-Stevens Act by addressing the overfished and overfishing status while minimizing the socioeconomic impacts to shark fishery participants.

### **Quota Linkages and In-season Quota Transfer**

Because new TACs and quotas for a number of species would be established, quota linkages would be implemented to prevent the newly established TACs from being exceeded. Generally, quota linkages are used for shark species that are in separate management groups but that have the potential to be caught together on the same shark fishing trip (e.g. non-blacknose SCS and blacknose sharks). If the quota for one management group has been filled and the management group is closed, that species could still be caught as bycatch by fishermen targeting other shark species, possibly resulting in mortality and negating some of the conservation benefit of management group closures. Therefore, we analyzed a full range of quota linkage alternatives for species in separate management groups that could be caught on the same shark fishing trip.

In the DEIS, Alternative Suites A2 and A4 linked several quotas to ensure that management groups for shark species that are caught together would open and close at the same time, while Alternative Suite A3 did not include any quota linkages. Under Alternative Suite A2, we proposed to link the hammerhead shark and aggregated LCS quotas in the Atlantic region, because opening and closing these two management groups concurrently would strengthen the conservation benefits of either management group's closure. Similarly, in the Gulf of Mexico, hammerhead sharks, blacktip sharks, and the aggregated LCS quotas would be linked. In addition, linkage of the blacknose and non-blacknose SCS regional quotas would be

implemented under this alternative. There would also be a mechanism established that would allow inseason quota transfers between the Atlantic and Gulf of Mexico non-blacknose SCS regions. The ability to transfer hammerhead quota between regions would also be authorized under the preferred alternative in the DEIS.

During the public comment period, we received comments for and against quota linkages proposed in Alternative Suite A2. Some commenters supported linking commercial quotas for certain shark species commonly caught together as a means to minimize bycatch of species under filled quotas, while other commenters did not support quota linkage because there was a concern that these linkages could result in reduced fishing opportunity and significant economic consequences for other species, especially ones that have a healthy stock status (e.g., Gulf of Mexico blacktip sharks). Other commenters supported Alternative Suite A3 measures since that suite did not include quota linkages. Some suggested that fishing could continue on aggregated LCS and Gulf of Mexico blacktip sharks after the hammerhead shark quota had been filled by deducting the additional bycatch mortality estimated for scalloped hammerhead sharks and subtracting that from the overall hammerhead shark quota. In addition, we received comments to allow inseason quota transfer of the hammerhead shark quota between regions since the scalloped hammerhead shark stock assessment was assessed as one region.

In the FEIS, the revised Alternative Suites A2 – A4 and the new preferred Alternative Suite A6, still analyzed establishing quota linkages for the LCS and SCS complexes. The revisions made to Alternative Suites A2 – A4 in the FEIS did not change the quota linkage alternatives in those alternative suites. The new preferred alternative, Alternative Suite A6 would create a new quota linkage scenario for the Gulf of Mexico. This alternative is based on analyses conducted as a result of comments received during the DEIS public comment period and is a combination of the quota linkage alternatives found in Alternative Suites A2 and A3. Alternative Suite A6 would still establish quota linkage for the Atlantic hammerhead and Atlantic aggregated LCS quotas, in the same way that was proposed in the DEIS in Alternative Suite A2. Based on data analysis of LCS landings per trip, we estimate that the Atlantic aggregated LCS quota would be filled before the Atlantic hammerhead shark quota (see Chapters 2 and 4). In the Gulf of Mexico, the hammerhead and aggregated LCS quotas would be linked because directed shark fishermen frequently catch these species together when targeting LCS. The Gulf of Mexico blacktip shark quota would not be linked to the aggregated LCS or hammerhead shark quotas, mainly because aggregated LCS and hammerhead sharks are caught in small amounts on trips targeting Gulf of Mexico blacktip sharks (see Chapters 2 and 4), but we would have additional authority to close the Gulf of Mexico blacktip management group through an inseason action after, or at the same time, the Gulf of Mexico hammerhead and aggregated LCS management groups close depending on several criteria. Under Alternative Suite A6, we would still link the regional blacknose and non-blacknose SCS quotas. We would also allow inseason quota transfers between the Atlantic and Gulf of Mexico non-blacknose SCS regions and between the hammerhead regions. Both stock assessments were based on a single stock across the Atlantic and Gulf of Mexico regions. As proposed, before making any inseason quota transfer, we would consider certain criteria and other relevant factors described in 50 CFR § 635.27(b)(2)(iii)(A–H). Alternative Suite A6 would also provide the flexibility to perform inseason transfers of the hammerhead quota between regions.

The preferred quota linkage alternatives in Alternative Suite A6 would result in short- and long-term direct, moderate, beneficial ecological impacts, because the concurrent closure of quotas for management groups that are caught together prevents incidental catch mortality from exceeding the TAC. In the Gulf of Mexico, linking the aggregated LCS and hammerhead shark quotas would prevent additional discard mortality of hammerhead sharks when that management group is closed and there is still aggregated LCS quota available. Because the Gulf of Mexico blacktip management group would not necessarily close when the Gulf of Mexico hammerhead quota is reached, there is the potential for incidental hammerhead shark mortality when that management group is closed and there is still blacktip shark quota available, although that potential is anticipated to be small (see Chapters 2 and 4). The quota linkages preferred under Alternative Suite A6 could have short- and long-term direct, minor adverse socioeconomic impacts. If a regional hammerhead shark management group closes, the associated regional aggregated LCS management group would close, regardless of what portion of the aggregated LCS quota has been filled. If the entire aggregate LCS quota has not been harvested, the fishery would not realize the full level of revenues possible under the established quotas. The ability to transfer hammerhead shark quota between regions would allow for the greatest opportunity to harvest the aggregated LCS quotas while not exceeding the combined regional quotas for hammerhead sharks, which may help to minimize some adverse socioeconomic impacts. This alternative suite is preferred because it addresses the overfished and overfishing status for the shark species, while minimizing any potential revenue loss with the quota linkage.

## **Recreational Measures**

To further efforts to end overfishing and rebuilding of overfished stocks, we considered several alternatives relating to recreational shark measures. These measures in the DEIS were focused on the size at maturity of dusky and scalloped hammerhead sharks. Also, we examined species-specific shark quotas in the recreational fishery and additional public outreach efforts.

In the DEIS, the preferred Alternative Suite A2 analyzed increasing the current recreational size limit for all authorized shark species (*i.e.*, non-ridgeback large coastal shark, tiger shark, small coastal shark, or pelagic shark) to 96 inches fork length, except for Atlantic sharpnose and bonnethead sharks; requiring mandatory reporting of recreationally landed hammerhead sharks (great, scalloped, and smooth); and increased outreach to the recreational community regarding the identification and prohibition of dusky sharks. The minimum size increase was based on the size at maturity of dusky sharks and was developed specifically to help reduce dusky shark mortality in the recreational fishery. After we reviewed the public comments received on the DEIS, we decided to address dusky shark rebuilding in a separate action, thus this FEIS does not address dusky shark management alternatives. Alternative Suite A3 would increase the recreational minimum size to 78 inches fork length and includes additional outreach to recreational anglers. Alternative Suite A4 would establish species-specific shark recreational quotas and additional outreach to anglers.

During the public comment period, we received multiple comments against increasing the minimum size limit for sharks. Recreational fishermen felt that the 96 inch fork length size limit would be a *de facto* prohibition of most recreationally landed shark species since most of the commonly landed shark species rarely reach the proposed size limit. Some commenters preferred to increase outreach on proper identification of prohibited species rather than

increasing the size limit. Some commenters also supported the 96-inch fork length limit. We received comments supporting the 78 inch fork length for all recreationally landed hammerhead sharks. Supporters of that alternative thought that most of the hammerhead sharks would be released alive and that the 78 inch fork length size limit matches well with size at sexual maturity for both scalloped and smooth hammerhead sharks. Also, some commenters supported the mandatory reporting of hammerhead sharks, but others preferred that all recreational shark landings be reported, not just hammerheads.

In the FEIS, the revised Alternative Suites A3 and A4 remain the same from the DEIS, and Alternative Suite A2 is modified to remove the 96 inch fork length minimum size because it was designed for dusky shark rebuilding, which will be addressed in a separate rulemaking. The recreational measures in new preferred Alternative Suite A6 would be the same as Alternative Suite A3 and also would increase the hammerhead shark recreational size limit and increase outreach efforts to the recreational shark fishing community. Mandatory reporting of hammerhead sharks was not included in the FEIS preferred alternative suite because we have determined that the existing surveys (LPS/MRIP) are sufficient for immediate rebuilding purposes. Recreational shark reporting measures could be addressed in an upcoming dusky shark proposed action (Amendment 5b). Alternative Suite A6 would increase the recreational size limit for all landed hammerhead sharks to 78 inches fork length and would provide additional protection for the scalloped hammerhead shark stock, which is overfished and is experiencing overfishing. Also, in Alternative Suite A6, we would increase outreach to the recreational community regarding the identification of prohibited shark species in recreational fisheries. This outreach could be in the form of updated shark identification placards for authorized and prohibited species and outreach to state agencies and fishing tournaments on the current recreational shark regulations.

Alternative Suite A6 would result in short- and long-term, direct and indirect, minor beneficial ecological impacts since mortality on hammerhead sharks would be reduced. We would increase the minimum recreational size for all hammerhead sharks to 78 inches fork length, which is based on the size when female scalloped hammerhead sharks reach maturity (Hazin et al., 2001). This larger recreational size limit would limit the retention of scalloped hammerhead sharks to mature individuals. Also, we included all hammerhead species together due to identification issues. The three different hammerhead shark species are difficult to differentiate and are commonly misidentified by recreational fishermen. This alternative suite would likely result in short- and long-term, minor, adverse socioeconomic impacts for recreational shark fishermen who target hammerhead sharks because of the reduced opportunities for recreationally landings of these species. Increasing the recreational size limit for hammerhead sharks would ensure that only larger or “trophy” sized sharks would be landed. In addition, this alternative suite would have neutral direct and indirect socioeconomic impacts in the short- and long-term on the other shark species besides hammerhead sharks since it maintains the status quo. When the socioeconomic impacts of Alternative Suite A6 is compared to the other alternative suites, this alternative suite would cause fewer socioeconomic impacts overall to fishermen. For this reason and the ecological reasons stated above, we prefer this alternative suite.

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## List of Commonly Used Abbreviations and Acronyms

ABC	Allowable biological catch
ACCSP	Atlantic Coastal Cooperative Statistics Program
ACL	Annual Catch Limit
ACTs	Allowable catch targets
ALS	Accumulative Landings System
ALWTRP	Atlantic Large Whale Take Reduction Plan
ALWTRT	Atlantic Large Whale Take Reduction Team
AMs	Accountability Measures
ANPR	Advanced Notice of Proposed Rulemaking
AOCTRP	Atlantic Offshore Cetacean Take Reduction Plan
AOCTRT	Atlantic Offshore Cetacean Take Reduction Team
AP	Advisory Panel
APA	Administrative Procedure Act
ASA	American Sportfishing Association
ASMFC	Atlantic States Marine Fisheries Commission
ATCA	Atlantic Tunas Convention Act
B	Biomass
$B_{MSST}$	Biomass of the minimum stock size threshold
$B_{MSY}$	Biomass expected to yield maximum sustainable yield
$B_{OY}$	Biomass expected to yield optimum yield
BAYS	Bigeye, albacore, yellowfin, skipjack tunas
BFT	Bluefin tuna
BiOp	Biological Opinion
BLL	Bottom Longline
CAR	Caribbean Statistical Area
CBP	Customs and Border Protection
CEQ	Council on Environmental Quality
CFDBS	Commercial Fisheries Database System
CFMC	Caribbean Fishery Management Council
CFL	Curved fork length
CFR	Code of Federal Regulations
CHB	Charter/Headboat
CHSRA	Cape Hatteras Special Research Area
CIE	Center for Independent Experts
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CL	Carcass length
COASTSPAN	Cooperative Atlantic States Shark Pupping and Nursery Survey
COFI	Committee on Fisheries
CPI	Consumer Price Index

CPUE	Catch per unit effort
CV	Coefficient of Variation
CZMA	Coastal Zone Management Act
DEIS	Draft Environmental Impact Statement
DPS	Distinct Population Segment
dw	Dressed weight
EA	Environmental Assessment
EEZ	Exclusive Economic Zone
EFH	Essential fish habitat
EFP	Exempted fishing permit
EIS	Environmental Impact Statement
EO	Executive Order
ESA	Endangered Species Act
F	Instantaneous fishing mortality
$F_{MSY}$	Instantaneous fishing mortality rate expected to yield maximum sustainable yield
$F_{OY}$	Fishing mortality rate expected to yield optimum yield
FAO	Food and Agriculture Organization
FEC	Florida East Coast Statistical Area
FEIS	Final Environmental Impact Statement
FLS	Fisheries Logbook System
FMP	Fishery management plan
FMU	Fishery management unit
FR	Federal Register
FRFA	Final regulatory flexibility analysis
GDP	Gross Domestic Product
GIS	Geographic Information System
GOM	Gulf of Mexico
GMFMC	Gulf of Mexico Fishery Management Council
GulfFIN	Gulf of Mexico commercial Fishery Information Network
HAPC	Habitat Area Of Particular Concern
HBS	Headboat Survey, Southeast
HMS	Highly migratory species: Atlantic sharks, tunas, swordfish, and billfish
HTS	Harmonized Tariff Schedule
ICCAT	International Commission for the Conservation of Atlantic Tunas
IFQ	Individual Fishing Quota
IRFA	Initial regulatory flexibility analysis
ITP	International Trade Permit
ITQ	Individual transferable quota
kg	Kilogram

LAP	Limited access permit
LAPP	Limited access privilege program
LCS	Large coastal sharks
LOA	Letter of Acknowledgment
LOF	List of Fisheries
LPS	Large Pelagic Survey
M	Mortality
MAB	Mid-Atlantic Bight Statistical Area
MAFMC	Mid-Atlantic Fishery Management Council
Magnuson-Stevens Act	Magnuson-Stevens Fishery Conservation and Management Act
MFMT	Maximum fishing mortality threshold
MMPA	Marine Mammal Protection Act
MPA	Marine protected area
MRFSS	Marine Recreational Fishing Statistics Survey
MRIP	Marine Recreational Information Program
MSRA	Magnuson-Stevens Fishery Conservation and Management Reauthorization Act
MSST	Minimum stock size threshold
MSY	Maximum sustainable yield
mt	Metric tons
NCA	North Central Atlantic
NEC	Northeast Coastal Statistical Area
NED	Northeast Distant Statistical Area
NEFMC	New England Fishery Management Council
NEFSC	Northeast Fisheries Science Center, NMFS
NEPA	National Environmental Policy Act
nm	Nautical mile
NMFS	National Marine Fisheries Service
NOA	Notice of Availability
NOAA	National Oceanographic and Atmospheric Administration
NOI	Notice of Intent
NPOA	National Plan of Action
NWGB	National Working Group on Bycatch
OFL	Overfishing limit
OY	Optimum yield
PLL	Pelagic longline
PLTRP	Pelagic Longline Take Reduction Plan
PLTRT	Pelagic Longline Take Reduction Team
POP	Pelagic observer program
PPI	Producer price index

PRA	Paperwork Reduction Act
RBS	Recreational Billfish Survey
RFA	Regulatory Flexibility Act
RIR	Regulatory Impact Review
RFMO	Regional Fishery Management Organizations
SAB	South Atlantic Bight
SAFE Report	Stock Assessment and Fishery Evaluation Report
SAFMC	South Atlantic Fishery Management Council
SAR	Sargasso Sea
SBA	Small Business Administration
SBR	Spawning Stock Biomass Ratio
SBRM	Standardized Bycatch Reporting Methodology
SCRS	Standing Committee for Research and Statistics
SCS	Small coastal sharks
SEDAR	Southeast Data, Assessment, and Review
SEFSC	Southeast Fisheries Science Center, NMFS
SERO	Southeast Regional Office, NMFS
SMART	selective magnetic and repellent treated
SRP	Scientific research permit
SSB	Spawning stock biomass
SSF	Spawning Stock Fecundity
SSN	Spawning Stock Number
SWO	swordfish
TAC	Total allowable catch
TL	Total length
TRP	Take Reduction Plan
U.S.C.	United States Code
USFWS	United States Fish and Wildlife Service
VIMS	Virginia Institute of Marine Science
VMS	Vessel monitoring system
VTR	Vessel Trip Report, NMFS NER
ww	Whole weight
ZMRG	Zero Mortality Rate Goal

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## 1.0 INTRODUCTION

Atlantic highly migratory species<sup>1</sup> (HMS) are managed under the dual authority of the Magnuson-Stevens Fishery Conservation and Management Reauthorization Act (Magnuson-Stevens Act) and the Atlantic Tunas Convention Act (ATCA). Under the Magnuson-Stevens Act, the National Marine Fisheries Service (NMFS) must, consistent with the National Standards, manage fisheries to maintain optimum yield on a continuing basis while preventing overfishing. Under ATCA, the Secretary of Commerce shall promulgate such regulations as may be necessary and appropriate to carry out International Commission for the Conservation of Atlantic Tunas (ICCAT) recommendations. The management measures proposed for this Fishery Management Plan (FMP) amendment and associated rulemaking, which address certain species of Atlantic sharks, are taken under the authority of the Magnuson-Stevens Act and consistent with ATCA. In addition to the Magnuson-Stevens Act, any management measures must also be consistent with other applicable laws including, but not limited to, the National Environmental Policy Act (NEPA), the Endangered Species Act (ESA), the Marine Mammal Protection Act (MMPA), and the Coastal Zone Management Act (CZMA). This document is prepared, in part, to comply with our responsibilities under NEPA, as implemented by the regulations published by the Council on Environmental Quality, 50 CFR § 1501-1508, and NMFS Administrative Order 216-6.

On April 28, 2011, we (NMFS) made the determination that scalloped hammerhead sharks were overfished and experiencing overfishing (76 FR 23794). Following this determination, on October 7, 2011 we published a notice announcing our intent to prepare a proposal for Amendment 5 to the 2006 Consolidated HMS FMP with an Environmental Impact Statement (EIS) in accordance with the requirements of the NEPA (76 FR 62331). We made stock status determinations for sandbar, dusky, and blacknose sharks based on the results of the Southeast Data, Assessment, and Review (SEDAR) 21 process. Determinations in the October 2011 notice included that sandbar sharks are still overfished, but no longer experiencing overfishing, and that dusky sharks are still overfished and still experiencing overfishing (i.e., their stock status has not changed). The October 2011 notice also acknowledged that there are two stocks of blacknose sharks, the Atlantic blacknose shark and the Gulf of Mexico blacknose shark. The Atlantic blacknose shark stock is overfished and experiencing overfishing, and the Gulf of Mexico blacknose shark stock status is unknown.

We asked for comments on existing commercial and recreational shark management measures that would assist us in determining options for conservation and management of scalloped hammerhead, sandbar, dusky, and blacknose sharks consistent with relevant federal statutes. We announced six scoping meetings that were held from October through December 2011 and released a scoping presentation in conjunction with the Federal Register notice. In the presentation and at scoping meetings, we described results of stock assessments and potential options for management of scalloped hammerhead, sandbar, dusky, and blacknose sharks to reach rebuilding goals.

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<sup>1</sup>The Magnuson-Stevens Act, at 16 U.S.C. 1802(14), defines the term “highly migratory species” as tuna species, marlin (*Tetrapturus* spp. and *Makaira* spp.), oceanic sharks, sailfishes (*Istiophorus* spp.), and swordfish (*Xiphias gladius*).”

We released a Predraft of Amendment 5 to the 2006 Consolidated HMS FMP, which summarized and incorporated comments received during scoping, to the HMS Advisory Panel on March 14, 2012, and made it available to the public on the internet for broader public comment. The Predraft included, among other things, the outcome of stock assessments for sandbar, dusky, scalloped hammerhead, Atlantic blacknose, and Gulf of Mexico blacknose sharks as well as potential management measures for these species/stocks. We requested that the HMS Advisory Panel, Consulting Parties (Atlantic, Gulf, and Caribbean Fishery Management Councils, Marine Fisheries Commissions, U.S. Coast Guard, and other State and Federal Agency representatives), and the public submit comments on the Predraft by April 13, 2012. The Predraft was published online and public comments were collected.

Following review of the Predraft comments received, we published a Federal Register notice on May 29, 2012 (77 FR 31562) considering the addition of Gulf of Mexico blacktip sharks to Amendment 5. This addition was proposed because Gulf of Mexico blacktip sharks were undergoing a stock assessment as part of the SEDAR 29 process, and that process would be completed before this amendment was finalized. Therefore, we believed that the addition of Gulf of Mexico blacktip sharks to this amendment would facilitate administrative efficiency by optimizing our resources, and would allow us to address new scientific information in the timeliest manner. We also expected that this addition would provide better clarity to and understanding by the public regarding any possible impacts of the rulemaking on shark fisheries by combining potential management measures resulting from recent shark stock assessments into one rulemaking. Public comments on this addition to Amendment 5 were accepted until June 21, 2012. We received two comments on the notice, one supporting the addition of blacktip sharks, the other opposing the addition. The commenter who opposed the addition felt that more time was needed in the Predraft scoping period to provide comment on any particular proposals regarding blacktip shark management. However, during the public comment period on the proposed rule and Draft Environmental Impact Statement (DEIS), the public had adequate opportunity to comment on the management measures specific to Gulf of Mexico blacktip sharks and how those measures could change and interact with the measures considered for other shark species. While it is preferable to have a Predraft, it is not a legal requirement and ample opportunity was presented through the rulemaking process for public input and comment. The commenter who supported the addition felt that this was the most responsive and timely way to address the stock assessment. Since publication of the Federal Register notice announcing our intent to consider the addition of Gulf of Mexico blacktip sharks in this Amendment, we accepted the results of the stock assessment as final. As explained in the proposed rule, the stock assessment indicates that the Gulf of Mexico blacktip shark stock is not overfished and overfishing is not occurring.

Based on comments received during scoping, on the Predraft, and the addition of Gulf of Mexico blacktip shark to this action, we determined the scope of significant issues of concern that would be addressed in the draft amendment. The Notice of Availability of the DEIS for Amendment 5 and the proposed rule published in the Federal Register on December 7, 2012 (77 FR 73029), and November 26, 2012 (77 FR 70552), respectively. The public comment period ended on February 12, 2013. During the comment period, we received numerous comments on the proposed dusky shark measures regarding the data sources used and the analyses of these data. We also received many comments requesting consideration of approaches to dusky shark fishery

management that were significantly different from those we analyzed in the Amendment 5 proposed rule and DEIS. For example, commenters suggested exemptions to a recreational minimum size increase to allow landings of other sharks such as blacktip sharks or “blue” sharks such as shortfin mako or thresher sharks, and other commenters suggested implementing gear restrictions instead of additional pelagic longline closures.

After reviewing all of the comments received, we concluded that further analyses are needed for dusky shark measures. In order to ensure that other shark measures are finalized as expeditiously as possible, we decided to conduct additional dusky shark analyses in a separate proposed action, which will be referred to as Amendment 5b. Comments received on the dusky shark portions of the November 2012 proposed rule will be considered in that action. This document – referred to as Amendment 5a to the 2006 Consolidated HMS FMP – finalizes other shark measures needed to maintain rebuilding of sandbar sharks; end overfishing and rebuild scalloped hammerhead and Atlantic blacknose sharks; and establish a total allowable catch (TAC) and commercial quota and recreational measures for Gulf of Mexico blacknose and blacktip sharks.

Some issues in Amendment 5a are driven by Magnuson-Stevens Act mandates, such as rebuilding and ending overfishing of scalloped hammerhead and Atlantic blacknose sharks. Other issues are being addressed according to updated stock assessment information. In this final amendment, in addition to the “no action” alternative, we consider a full range of reasonable alternatives for several different issues including establishing TACs and commercial quota limits, rebuilding plans for overfished stocks, and recreational measures. Because many of the species-specific TAC, commercial quota, and recreational measures are interlinked, these alternatives are arranged in groups of alternative suites (see Chapter 2). The specific issues for these alternative suites are:

- Establishing Total Allowable Catches: We consider establishing TACs for scalloped hammerhead, Atlantic blacknose, Gulf of Mexico blacknose, and Gulf of Mexico blacktip sharks. The range of alternatives could have a variety of impacts on the human environment ranging from no impact (Suite A1) to significant impacts (Suite A5). The preferred alternative suite (Suite A6) would likely have minor impacts on the human environment.
- Establishing Commercial Quotas: Along with TACs for scalloped hammerhead, Atlantic blacknose, Gulf of Mexico blacknose, and Gulf of Mexico blacktip sharks, we consider establishing specific commercial quotas within the TAC levels. We also consider modifications to the Atlantic and Gulf of Mexico non-sandbar large coastal shark (LCS) management groups and the non-blacknose small coastal shark (SCS) management group that may change the species composition of the management groups and/or the linkage between commercial quotas, which may necessitate commercial quota adjustments. The range of alternatives suites could have a variety of impacts on the human environment ranging from no impact (Suite A1) to significant impacts (Suite A5). The preferred alternative suite (Suite A6) would likely have minor impacts on the human environment.
- Quota Linkages: To prevent overfishing, we link quotas for certain shark species that are commonly caught together. This mechanism would close all linked shark management groups when one of the linked quotas is reached, minimizing any bycatch impacts to the species for which the quota has been reached. We consider a range of quota linkage

alternatives that could have a variety of impacts on the human environment ranging from no impact (Suite A1) to significant impacts (Suite A5). The preferred alternative suite (Suite A6) would likely have moderate impacts on the human environment.

- **Recreational Measures:** Modifications to recreational measures are included in this amendment to assist in rebuilding and/or ending overfishing on shark stocks. The range of alternatives could have a variety of impacts on the human environment ranging from no impact (Suite A1) to significant impacts (Suite A5), and include measures such as increasing the minimum size for hammerhead sharks and establishing additional reporting requirements. The preferred alternative suite (Suite A6) would likely have moderate impacts on the human environment.

The Magnuson-Stevens Act contains National Standard guidelines and requirements specific to the preparation and implementation of an FMP for Atlantic HMS. Summaries of the National Standard guidelines and FMP requirements, and how the preferred alternatives in this document are consistent with them can be found in Chapter 10. The data and analyses necessary to support these FMP preparation and implementation requirements for Amendment 5a can be found in the following chapters. Chapter 2 gives a description of the different alternatives for each issue. Chapter 3 provides a description of the fisheries that interact with sandbar, blacknose, scalloped hammerhead, and blacktip sharks and participants in the fisheries conducted in adjacent areas under the authority of a Council. Chapter 3 also describes safety of human life at sea issues. Chapter 4 of this document provides the ecological, socioeconomic impacts, and cumulative impacts of the conservation and management measures on participants in the fisheries and fishing communities affected by this amendment. Chapter 5 discusses any mitigating measures regarding the preferred alternatives. Chapters 6, 7, and 8 analyze the economic impacts of the alternatives and address the requirements of a Regulatory Impact Review (RIR) and Final Regulatory Flexibility Analysis, and Chapter 9 provides the community profiles and social impact analysis for this amendment. Chapter 10 describes consistency with the National Standards, other requirements of the Magnuson-Stevens Act, and other applicable laws. Chapter 11 provides a list of organizations, individuals, and agencies involved in the development of this document. Appendices are also included to provide our response to public comments (Appendix A).

## **1.1 Brief Management History**

This section provides a brief overview of HMS management. More detail regarding the history of Atlantic shark management can be found in Section 3.1.

In 1989, the Regional Fishery Management Councils requested that the Secretary of Commerce manage Atlantic sharks. On November 28, 1990, the President of the United States signed into law the Fishery Conservation Amendments of 1990 (Pub. L. 101-627). This law amended the Magnuson Fishery Conservation and Management Act (later renamed the Magnuson-Stevens Fishery Conservation and Management Act or Magnuson-Stevens Act) and gave the Secretary the authority (effective January 1, 1992) to manage HMS in the exclusive economic zone of the Atlantic Ocean, Gulf of Mexico, and Caribbean Sea under the authority of the Magnuson-Stevens Act (16 U.S.C. § 1811). This law also transferred from the Fishery Management Councils to the Secretary, effective November 28, 1990, the management authority for HMS in the Atlantic Ocean, Gulf of Mexico, and Caribbean Sea (16 U.S.C. § 1854(f)(3)). At this time, the Secretary

delegated authority to manage Atlantic HMS to NMFS. We finalized a shark FMP in 1993. In 1999, we revised the 1993 FMP and included swordfish and tunas in the 1999 FMP for Atlantic tunas, swordfish, and sharks (NMFS 1999). The 1999 FMP was amended in 2003 (NMFS 2003). We then consolidated the Atlantic tunas, swordfish, and shark FMP and its amendments and the Atlantic Billfish FMP and its amendments in the 2006 Consolidated Atlantic HMS FMP (NMFS 2006). The 2006 Consolidated HMS FMP was amended in 2008 (NMFS 2008a and NMFS 2008b) and 2010 (NMFS 2010). This amendment further amends the 2006 Consolidated HMS FMP.

Under the Magnuson-Stevens Act, we are responsible for managing Atlantic HMS and must comply with all applicable provisions of the Magnuson-Stevens Act when we prepare and amend our FMP and implementing regulations (16 U.S.C. § 1852(a)(3)). We must maintain optimal yield of each fishery while preventing overfishing (16 U.S.C. § 1851(a)(1)). Where a fishery is determined to be in or approaching an overfished condition, we must include in its FMP conservation and management measures to prevent or end overfishing and rebuilding the fishery, stock or species (16 U.S.C. §§ 1853(a)(10); 1854(e)). In preparing and amending an FMP, we must, among other things, consider the National Standards, including using the best scientific information as well as the potential impacts on residents of different States, efficiency, costs, fishing communities, bycatch, and safety at sea (16 U.S.C. § 1851 (a)(1-10)). The Magnuson-Stevens Act also has a specific section that addresses preparing and implementing FMPs for Atlantic HMS (16 U.S.C. § 1854 (g)(1)(A-G)). In summary, this section addressing Atlantic HMS includes, but is not limited to, requirements to:

- Consult with and consider the views of affected Councils, Commissions, and advisory groups;
- Evaluate the likely effects of conservation and management measures on participants and minimize, to the extent practicable, any disadvantage to U.S. fishermen in relation to foreign competitors;
- Provide fishing vessels with a reasonable opportunity to harvest any allocation or quota authorized under an international fishery agreement;
- Diligently pursue, through international entities (such as ICCAT), comparable international fishery management measures; and,
- Ensure that conservation and management measures promote international conservation of the affected fishery, take into consideration traditional fishing patterns of fishing vessels, are fair and equitable in allocating fishing privileges among U.S. fishermen and do not have economic allocation as the sole purpose, and promote, to the extent practicable, implementation of scientific research programs that include the tagging and release of Atlantic HMS.

## **1.2 Rebuilding and Preventing Overfishing of Atlantic Sharks**

Under National Standard 1 of the Magnuson-Stevens Act, as implemented by the National Standard 1 Guidelines (50 C.F.R. § 600.310), an FMP and its implementing regulations are required to “prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery for the U.S. fishing industry.” In order to accomplish this, we must determine the Maximum Sustainable Yield (MSY) and specify status determination criteria (*i.e.*, maximum fishing mortality threshold and minimum stock size threshold) to allow a determination of the

status of the stock. In cases where the fishery is overfished, we must take action to rebuild the stock (by specifying rebuilding targets).

### *Stock Status and Status Determination Criteria*

According to the definition in 50 C.F.R. § 600.310(e)(2)(i)(B) of National Standard 1, overfishing occurs whenever a stock or stock complex is subjected to a level of fishing mortality or annual total catch that jeopardizes the capacity of a stock or stock complex to produce MSY on a continuing basis. The 1999 FMP established the maximum fishing mortality threshold as  $F_{MSY}$ .  $F_{MSY}$  is defined as the fishing mortality level necessary to produce MSY on a continuing basis. If the maximum fishing mortality threshold exceeds  $F_{MSY}$  for more than one year, then the stock is considered to be subject to overfishing, and remedial action must be taken. This is the current situation for scalloped hammerhead and Atlantic blacknose sharks.

The 1999 FMP established the minimum stock size threshold as  $(1-M) B_{MSY}$  when natural mortality ( $M$ ) is less than 0.5. Most species of sharks have natural mortality less than 0.5. When the stock falls below minimum stock size threshold, the stock is overfished and remedial action must be taken to rebuild the stock. This is the current situation for sandbar, scalloped hammerhead, and Atlantic blacknose sharks.

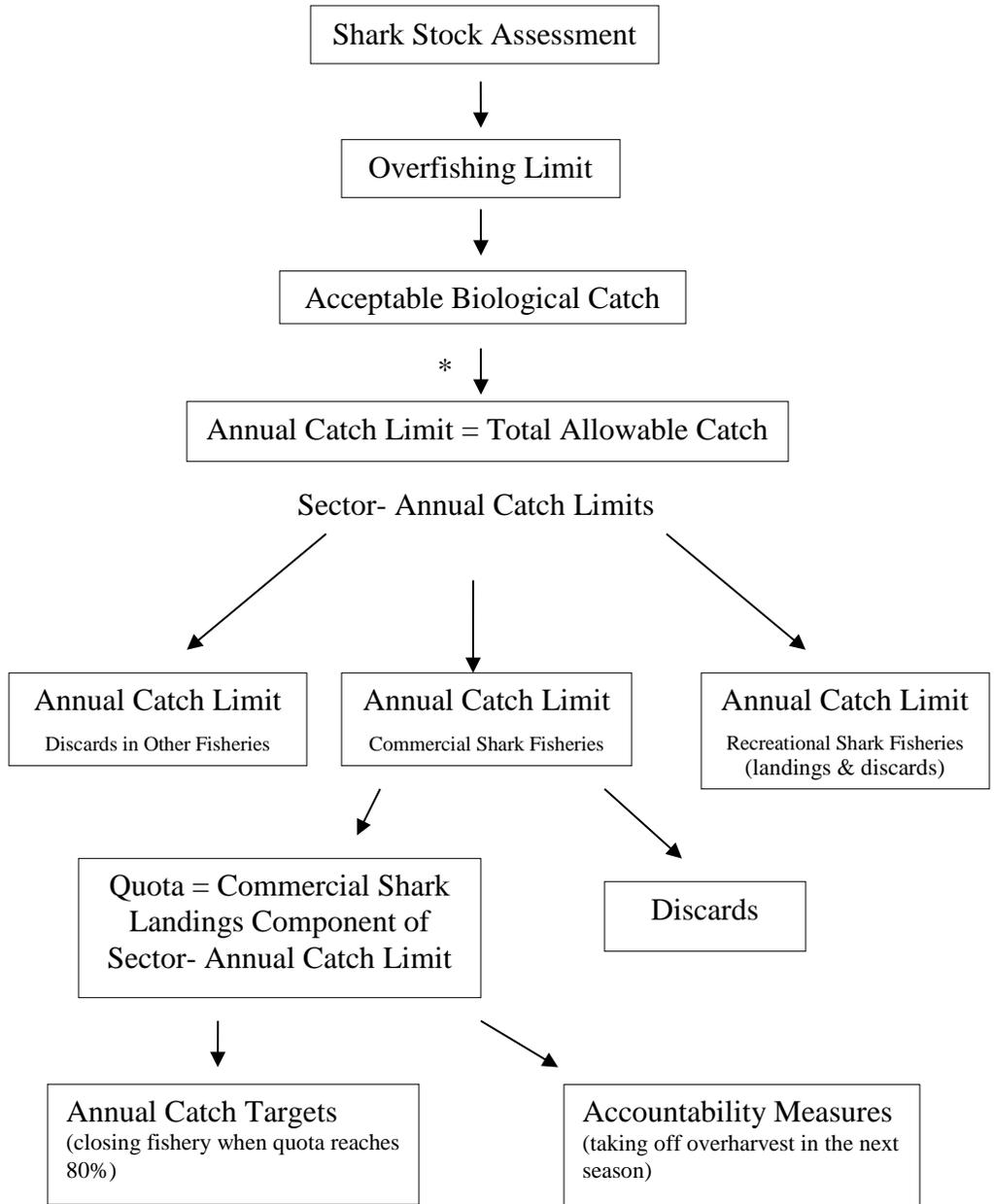
Stocks are considered rebuilt when current biomass levels are equal to  $B_{MSY}$ .  $B_{MSY}$  is the level of stock abundance at which harvesting the resource can be sustained on a continual basis at the level necessary to support MSY. Stocks are considered healthy when fishing mortality is less than or equal to  $0.75 F_{MSY}$  and biomass is greater than or equal to  $B_{OY}$  (the biomass level necessary to produce optimum yield on a continuing basis). In summary, the thresholds used to calculate the status of Atlantic sharks are as follows:

- Maximum Fishing Mortality Threshold =  $F_{limit} = F_{MSY}$ ;
- Overfishing is occurring when  $F_{year} > F_{MSY}$ ;
- Minimum Stock Size Threshold =  $B_{limit} = (1-M)B_{MSY}$  when  $M < 0.5 = 0.5B_{MSY}$  when  $M \geq 0.5$ ;
- Overfished when  $B_{year}/B_{MSY} < \text{Minimum Stock Size Threshold}$ ;
- Biomass target during rebuilding =  $B_{MSY}$ ;
- Fishing mortality during rebuilding  $< F_{MSY}$ ;
- Fishing mortality for healthy stocks =  $0.75F_{MSY}$ ;
- Biomass for healthy stocks =  $B_{OY} = \sim 1.25$  to  $1.30B_{MSY}$ ;
- Minimum biomass flag =  $(1-M)B_{OY}$ ; and
- Level of certainty of *at least* 50 percent but depends on species and circumstances; for sharks, the level of certainty is 70 percent.
- For sharks, in some cases, spawning stock fecundity (SSF) or spawning stock number (SSN) is used as a proxy for biomass since biomass does not influence pup production in sharks.

### *Annual Catch Limits and Accountability Measures*

In the 1999 FMP, and maintained in the 2006 Consolidated HMS FMP, we outlined a stock status determination criteria and a set of rebuilding targets for all HMS. This amendment does not change these criteria or targets that are summarized above. Congress amended the Magnuson-Stevens Act in 2007 to require that each FMP establish a mechanism for specifying Annual Catch Limits at a level that will prevent overfishing and include Accountability Measures to ensure Annual Catch Limits are not exceeded (16 U.S.C. § 1853(a)(15)). As of 2010, we amended the 2006 Consolidated HMS FMP to address these requirements for the appropriate shark stocks in Amendment 3 (NMFS 2010). Amendment 3 amended the 2006 Consolidated HMS FMP to specify Annual Catch Limits for stock complexes and certain specific shark species recently assessed. The regulations necessary to adjust Annual Catch Limits as needed and apply Accountability Measures are already in place. No additional regulations would be necessary to implement these requirements. In short, for all sharks managed pursuant to the 2006 Consolidated HMS FMP and its amendments, the methods are:

- Overfishing Limit > Acceptable Biological Catch  $\geq$  Annual Catch Limit (unless estimates of Acceptable Biological Catch are available);
- Overfishing Limit = the annual amount of catch that corresponds to the estimate of Maximum Fishing Mortality Threshold applied to a stock's abundance relative to F;
- Acceptable Biological Catch = to be determined by future stock assessments, as appropriate; thus in some cases, we assume Acceptable Biological Catch = Annual Catch Limit ;
- Annual Catch Limit = Total Allowable Catch; for overfished stocks, this will be the projection that shows 70 percent probability of rebuilding (in some cases, ABC=ACL=TAC);
- Commercial quota = landings component of the sector Annual Catch Limit; and
- Accountability Measures = restrictions on use of over- and underharvests and closing the fishery when commercial landings are at or projected to be at 80 percent of the quota.



**Figure 1.1** Generalized mechanism for establishing Acceptable Biological Catches/Annual Catch Limits established in Amendment 3.  
 \*Future shark stock assessments will be asked to identify an Acceptable Biological Catch, as appropriate.

This final amendment and associated rulemaking would establish Annual Catch Limits as required by 50 C.F.R. § 303(a)(15) of the statute and are consistent with National Standard 1; would establish new quotas for sandbar sharks, scalloped hammerhead sharks, blacknose sharks, non-blacknose SCS, Gulf of Mexico blacktip sharks and non-sandbar LCS following the mechanisms established in Amendment 3; and would maintain the current quotas for and pelagic sharks, consistent with these methods. Quotas, or the landings component of the sector Annual

Catch Limit, would be adjusted annually for over- and underharvests from the previous fishing year. Annual Catch Limits would be adjusted based on the result of stock assessments.

#### *Determining the Rebuilding Timeframe*

If a stock is overfished, we are required to “prepare an FMP, FMP amendment, or proposed regulations... to specify a time period for ending overfishing and rebuilding the stock or stock complex that will be as short as possible as described under section 304(e)(4) of the Magnuson-Stevens Act.” (50 C.F.R. § 600.310(j)(2)(ii)). A rebuilding Acceptable Biological Catch must be set to reflect the annual catch that is consistent with the schedule of the fishing mortality rates in the rebuilding plan. The time frame to rebuild the stock or stock complex must specify a time period that is as short as possible taking into account a number of factors including:

- The status and biology of the stock or stock complex;
- Interactions between the stock or stock complex and other components of the marine ecosystem;
- The needs of the fishing communities;
- Recommendations by international organizations in which the United States participates; and
- Management measures under an international agreement in which the United States participates.

The rebuilding target may not exceed ten years, unless dictated otherwise by:

- The biology of the stock or complex of fish;
- Other environmental conditions; or,
- Management measures under an international agreement in which the United States participates.

The lower limit of the specified time frame for rebuilding is determined by the status and biology of the stock and is defined as “...the amount of time the stock or stock complex is expected to take to rebuild to its MSY biomass level in the absence of any fishing mortality” (50 C.F.R. § 600.310 (j)(3)(i)(A)).

The National Standard 1 Guidelines specify two strategies for determining the rebuilding time frame depending on the lower limit of the specified time frame for rebuilding. The first strategy (50 C.F.R. 600.310 (j)(3)(i)(C)) states that:

“If  $T_{\min}$  [minimum time for rebuilding a stock] for the stock or stock complex is 10 years or less, then the maximum time allowable for rebuilding ( $T_{\max}$ ) that stock to its  $B_{\text{MSY}}$  is 10 years.”

The second strategy (50 CFR § 600.310 (j)(3)(i)(D)), which is applicable for most species of sharks because the lower limit is generally 10 years or greater, specifies that:

“If  $T_{\min}$  for the stock or stock complex exceeds 10 years, then the maximum time allowable for rebuilding a stock or stock complex to its  $B_{\text{MSY}}$  is  $T_{\min}$  plus the length of time associated with one generation time for that stock or stock complex. ‘Generation time’ is the average length of time between when an individual is born and the birth of its offspring.”

The 1999 FMP established that management measures for Atlantic tunas, swordfish, and sharks should have at least a 50 percent chance of reaching the target reference points used in developing rebuilding projections. This target is consistent with the technical guidelines for National Standard 1. However, compared to other HMS and fish species, many shark species are slow growing, take a long time to mature, have few pups, and generally reproduce every two or three years (*e.g.*, the sandbar shark is believed to have a two to three year reproductive cycle, with litters averaging 8 pups). Due to these life history traits, many shark species have a low reproductive potential. Thus, as described in the 1999 FMP regarding sharks, we use a 70-percent probability to determine the rebuilding plan for sharks to ensure that the intended results are actually realized.

#### *2010/2011 Stock Assessment and Rebuilding Timeframe for Sandbar Sharks*

The latest stock assessment for sandbar sharks was completed through the SEDAR 21 process in 2011 (76 FR 62331, October 7, 2011). The stock assessment provides an update from the 2005/2006 assessment on the status of the stock. Based on the 2005/2006 assessment, sandbar sharks were determined to be overfished and experiencing overfishing, and a rebuilding plan is currently in place for this species with a rebuilding date of 2070. The base model used in the 2010/2011 sandbar assessment indicated that the stock is overfished (spawning stock fecundity  $\text{SSF}_{2009}/\text{SSF}_{\text{MSY}}=0.66$ ), but no longer experiencing overfishing ( $F_{2009}/F_{\text{MSY}}=0.62$ ). The assessment scientists noted that the low and high productivity scenarios in the 2010/2011 stock assessment were unlikely to represent the true state of nature of the stock.

Based on the results of the 2010/2011 stock assessment, we determined that sandbar sharks are still overfished, but are no longer experiencing overfishing. Projections of the base model indicated that there is a 70 percent probability of rebuilding by 2066 with a TAC of 178 metric tons (mt) whole weight (ww) (128 mt dressed weight (dw)). There is a 50 percent probability of rebuilding by 2066 with a TAC of 286 mt ww (205.8 mt dw). The rebuilding year determined from the base model in the 2010/2011 assessment was calculated as the year the stock would rebuild with no fishing pressure (*i.e.*,  $F=0$ ), or 2046, plus one generation time (the generation time for sandbar sharks is 20 years). The target year for rebuilding ranged from 2047 to 2360 depending on the state of nature (*i.e.*, sensitivity run) of the stock. In addition, it was estimated in the stock assessment that the current TAC for the fishery (*i.e.*, 220 mt ww or 158.3 mt dw) could result in a greater than 70 percent probability of rebuilding by the current rebuilding date of 2070.

According to the 2010/2011 stock assessment, current management measures implemented in Amendment 2 to the 2006 Consolidated HMS FMP in 2008 appear to have stopped overfishing on sandbar sharks. Additionally, the sandbar shark stock status is improving, and the current rebuilding timeframe, with the 2008 TAC of 220 mt ww, provides a greater than 70 percent

probability of rebuilding by 2070. Having a 70 percent probability of rebuilding is the level of success for rebuilding of sharks that was established in the 1999 FMP for Atlantic Tunas, Swordfish, and Sharks and carried over in the 2006 Consolidated HMS FMP. The recent stock assessment also indicates that reducing the TAC from the current 220 mt ww to 178 mt ww would provide a 70 percent chance of rebuilding the stock by the year 2066, a reduction of four years from the current rebuilding timeframe. Because the current TAC already provides a greater than 70 percent probability of rebuilding, and because overfishing is not occurring and the stock status is improving, we believe that maintaining the current TAC and rebuilding plan is fully consistent with the Magnuson-Stevens Act requirements and the National Standard Guidelines.

The sandbar shark stock has been under a rebuilding plan since 2008, and according to the most recent stock assessment (SEDAR 2011) overfishing on the stock is no longer occurring. Because of the positive results from the stock assessment, keeping the TAC at its current level under the rebuilding plan is appropriate at this time. The sandbar shark quota will be more accurately monitored with the new HMS electronic dealer reporting system, which was launched on January 1, 2013. This improvement in quota monitoring technology and the weekly, as opposed to biweekly, reporting will provide more information on each dealer transaction, and should ensure that quotas are not exceeded. Overall, this improvement will help with monitoring of commercial landings of all shark species and could reduce bycatch mortality of sandbar sharks, and other species, beyond the reduction recommended in the assessment because quotas are more accurately monitored and management groups will be closed in a more efficient and timely manner. Also, the preferred management measure to provide additional outreach to the recreational fishing community on shark identification and prohibited shark species should reduce mortality of sharks being landed due to misidentification or misinterpretation of recreational regulations and could reduce bycatch mortality of sandbar sharks beyond the reduction recommended in the assessment. The reductions in this action will meet the current rebuilding timeframe requirements. In the future, measures to rebuild and end overfishing of dusky sharks that will be addressed in an upcoming FMP amendment (Amendment 5b) may further reduce fishing mortality on sandbar sharks, as dusky and sandbar sharks are commonly caught together in bottom longline fisheries, which ultimately could help reduce the rebuilding timeframe. A change in the rebuilding plan that would result in a reduction in sandbar shark TAC from 220 mt ww to 178 mt ww could have significant economic impacts on fishermen participating in the shark research fishery. If fishermen feel the economic impacts are sufficiently negative, they are less likely to participate in the shark research fishery, which, in turn, would likely reduce our ability to both collect biological and other data for stock assessments from the research fishery and monitor the status of sandbar and other sharks. After considering this information, we are maintaining the current sandbar shark TAC of 220 mt ww and the current sandbar shark rebuilding plan, including regulations prohibiting possession of sandbar sharks in commercial and recreational shark fisheries.

#### *2010/2011 Stock Assessment and Rebuilding Timeframe for Blacknose Sharks*

The latest stock assessment for blacknose sharks was completed through the SEDAR 21 process in 2011 (76 FR 62331, October 7, 2011). The stock assessment incorporated new landings and biological information that was not available for previous assessments, and assessed blacknose sharks for the first time as two separate stocks: a Gulf of Mexico and an Atlantic stock. After

considering the available data, the SEDAR 21 Life History Working Group concluded that blacknose sharks inhabiting the U.S. waters of the western North Atlantic Ocean (including the Gulf of Mexico) should be considered two separate stocks: one in the U.S. waters of the western North Atlantic Ocean (referred to in the document as South Atlantic Bight), and one in the Gulf of Mexico. In addition, because the assessment model for the Gulf of Mexico stock did not fit the apparent trends in some of the abundance indices and there was a fundamental lack of fit of the model to some of the input data, the Review Panel of the SEDAR 21 Review Panel Workshop did not accept the stock assessment for the Gulf of Mexico blacknose stock. Therefore, we declared the status of the Gulf of Mexico blacknose shark stock as unknown (76 FR 62331; October 7, 2011).

For the Atlantic blacknose shark stock, the base model used for the SEDAR 21 assessment showed that Atlantic blacknose sharks are overfished ( $SSF_{2009}/SSF_{MSY}=0.60$ ) and overfishing is occurring ( $F_{2009}/F_{MSY}=5.02$ ). The assessment recommended an Atlantic blacknose shark specific TAC and a corresponding rebuilding timeframe. Because a separate TAC was recommended for Atlantic blacknose sharks, we are creating a separate rebuilding plan for Atlantic blacknose sharks in this amendment. One objective of this amendment is to ensure that fishing mortality levels for Atlantic blacknose sharks are maintained at or below levels that would result in a 70 percent probability of rebuilding in the timeframe. However, we will be implementing a TAC and quota for Gulf of Mexico blacknose sharks as a precautionary measure to prevent overfishing in that region and limit harvest and discards until a new assessment can be conducted.

Based on the stock assessment, we have determined that the Atlantic blacknose shark stock is overfished and experiencing overfishing. Projections of the base model indicated that the stock has a 70 percent probability to rebuild by 2043 with a TAC of 7,300 blacknose sharks. The rebuilding year determined from the base model in the assessment was calculated as the year the stock would rebuild with no fishing pressure (*i.e.*,  $F=0$ ), or 2034, plus one generation time (the generation time for Atlantic blacknose sharks is 9 years). The target year for rebuilding ranged from 2033 to 2086 depending on the state of nature (*i.e.*, sensitivity run) of the stock. Thus, Atlantic blacknose sharks would not be able to rebuild by the current rebuilding target of 2027 under the current fishery-wide TAC of 19,200 blacknose sharks.

Measures considered for blacknose sharks in this amendment include establishing regional blacknose shark and non-blacknose SCS quotas, and adjusting commercial quotas of blacknose sharks and non-blacknose SCS (*i.e.*, finetooth, Atlantic sharpnose, and bonnethead sharks). Such measures are necessary to ensure that the rebuilding timeframe of 2043 is met for Atlantic blacknose sharks with a 70 percent probability of success.

#### *2009 Stock Assessment and Rebuilding Timeframe for Scalloped Hammerhead Sharks*

In October 2009, Hayes et al. (2009) published in the North American Journal of Fisheries Management a stock assessment of the Atlantic population of scalloped hammerhead sharks in U.S. waters. The stock assessment utilized a surplus production model, an approach commonly used in data poor scenarios, and incorporated commercial and recreational landings, fisheries dependent data, fisheries independent data from NMFS observer programs, and scientific surveys. We reviewed this paper and concluded that: the assessment is complete; the assessment

is an improvement over a 2008 aggregated species assessment for hammerhead sharks; and the assessment is appropriate for U.S. management decisions (76 FR 23794; April 28, 2011). Based on the results of this paper, we determined on April 28, 2011 that scalloped hammerhead sharks were overfished and experiencing overfishing (76 FR 23794).

Scalloped hammerhead sharks are currently a part of the non-sandbar LCS management group, and this is the first assessment specific to scalloped hammerhead sharks. The stock assessment estimated that a TAC of 2,853 scalloped hammerhead sharks (approximately 79.6 mt, calculated using an average dressed weight of 61.5 lb per scalloped hammerhead shark) would allow for a greater than 70 percent probability to rebuild the stock within 10 years. Thus, we establish a separate Annual Catch Limit and Accountability Measures for the scalloped hammerhead shark stock, and establish an annual TAC of 2,853 scalloped hammerhead sharks to allow rebuilding of the stock within 10 years. This TAC includes landings and discards of scalloped hammerhead sharks in all fisheries that interact with scalloped hammerhead sharks.

We considered a range of commercial quotas for scalloped hammerhead sharks to address its overfished with overfishing occurring status. These quota alternatives ranged from maintaining the status quo, which would keep scalloped hammerhead sharks under the non-sandbar LCS quota, and a number of alternatives that would create a separate and/or regional scalloped hammerhead quota, based on the stock assessment recommendation, recreational fishery modifications, to setting a quota of 0 mt for scalloped hammerhead sharks (*i.e.*, prohibiting retention). Other measures would group all hammerhead sharks (great, scalloped, and smooth) under one quota to address the fact that fishermen have difficulty distinguishing among different hammerhead species. Other recreational measures include increasing the recreational minimum size for hammerhead sharks to 78 inches fork length. The selected measures are necessary to end overfishing and rebuild the scalloped hammerhead stock.

#### *2012 Stock Assessment and Rebuilding Timeframe for Gulf of Mexico Blacktip Sharks*

The 2005/2006 blacktip shark stock assessment assessed blacktip sharks for the first time as two separate stocks: Gulf of Mexico and Atlantic. The results of these stock assessments indicate that the Gulf of Mexico population is healthy and that the South Atlantic population is unknown. As a result, in Amendment 2 to the 2006 Consolidated HMS FMP, we implemented management measures to ensure that current catches do not increase in order to keep these populations at sustainable levels consistent with advice from the stock assessment. The SEDAR 29 stock assessment assessed only blacktip sharks in the Gulf of Mexico. Results of the assessment show that Gulf of Mexico blacktip sharks are not overfished ( $SSF_{2009}/SSF_{MSY}=2.50-2.78$ ) and are not experiencing overfishing ( $F_{2009}/F_{MSY}=0.03-0.106$ ) (SEDAR 2012).

The peer review of the assessment was conducted by two scientists under the Center for Independent Experts. Both peer reviewers raised questions about the assessment. One reviewer accepted the model and its results. The other peer reviewer supported the assessment's conclusion that the Gulf of Mexico blacktip shark stock is not overfished, but concluded that the status regarding overfishing is uncertain. The Southeast Fisheries Science Center (SEFSC) addressed the questions from the peer reviewers in a post peer-review "updates and projections" document (SEFSC 2012) written by stock assessment scientists, who were the lead scientists during the SEDAR 29 process. The scientists concluded that the reviewer's conclusion on the

overfishing status was based on the reviewer's interpretation that the model configuration was not appropriate for the stock. Specifically, the peer reviewer did not think that reasonable variation in recruitment was incorporated into the model and was not confident about the "no overfishing" conclusion reached in the assessment because three of the indices had declined in the last five years and because  $F_{MSY}$  was low. The peer reviewer stated that a model with reasonable variation in recruitment could indicate a current fishing mortality more similar to  $F_{MSY}$  and thus show the stock approaching an overfishing condition. The stock assessment scientists showed in the post-review updates and projections document that process error in recruitment was fully considered and that recruitment in the model was reasonable. They also showed that the low value of  $F_{MSY}$  is consistent with what is expected from the biology of sharks, and that of the three indices mentioned by the reviewer that showed a decline, two show an increase in the terminal year of 2010. Therefore, the stock assessment scientists concluded that the stock assessment result of no overfishing is warranted. As such, we made the determination in the proposed rule that the Gulf of Mexico blacktip shark stock is not overfished and no overfishing is occurring.

Because the stock is healthy, projections and the calculations needed to determine the Acceptable Biological Catch were not considered part of the statement of work for the stock assessment and therefore were not conducted during the stock assessment itself (for an overfished stock, these calculations would have been done before completion of the stock assessment). Rather, the SEFSC calculated the projections after the stock assessment as a whole was peer reviewed. The stock assessment noted that current removal rates are sustainable, and the subsequent projections, which were completed outside the SEDAR process, indicate that current removals are unlikely to lead to an overfished fish stock by 2040. The projections also indicate that higher levels of removal (those associated with an  $F_{TARGET}$  scenario) are unlikely to result in an overfished stock; however, the methodology for estimating  $F_{TARGET}$  is currently in development for sharks and has yet to be introduced and reviewed within the SEDAR process for this species. Therefore, we analyze a range of alternatives to calculate the TAC and quota for Gulf of Mexico blacktip sharks.

Measures considered for Gulf of Mexico blacktip sharks in this amendment include establishing a regional Gulf of Mexico blacktip shark quota based on the TAC recommendation, and linking the Gulf of Mexico blacktip shark quota to the hammerhead and aggregated LCS quotas. Such measures are necessary to ensure that the maximum sustainable yield of Gulf of Mexico blacktip sharks is achieved and that the rebuilding timeframes of other regional shark species are maintained.

### **1.3 Social and Economic Considerations**

The Magnuson-Stevens Act section 303(a)(9) requires any FMP to include a fishery impact statement which shall assess, specify, and analyze the likely effects, if any, including the cumulative conservation, economic, and social impacts, of the conservation and management measures on, and possible mitigation measures for:

- Participants in the fisheries and fishing communities affected by the plan or amendment;

- Participants in the fisheries conducted in adjacent areas under the authority of another Council, after consultation with such Council and representatives of those participants; and,
- The safety of human life at sea, including whether and to what extent such measure may affect the safety of participants in the fishery.

A similar analysis using much of the same economic and social data is included to ensure consistency with of the Magnuson-Stevens Act National Standard 8, (section 301(a)(8)) which requires that conservation and management measures, including those developed to end overfishing and rebuild fisheries:

- Take into account the importance of fishery resources to fishing communities in order to provide for their sustained participation; and,
- To the extent practicable, minimize the adverse economic impacts on such communities.

Additionally, section 304(g)(1)(C) requires the Secretary to:

- Evaluate the likely effects, if any, of conservation and management measures on participants in the affected fisheries; and,
- Minimize, to the extent practicable, any disadvantage to U.S. fishermen in relation to foreign competitors.

#### **1.4 Purpose, Need, and Objectives**

In April 2011, we published a notice determining that scalloped hammerhead sharks are overfished and are experiencing overfishing (April 28, 2011, 76 FR 23794). In October 2011, we published determinations for sandbar, dusky, and blacknose sharks in conjunction with a Notice of Intent (October 7, 2011, 76 FR 62331) to prepare an EIS. It was determined that Atlantic blacknose and dusky sharks are overfished and experiencing overfishing; sandbar sharks are still overfished, but not experiencing overfishing; and the overfished and overfishing statuses for Gulf of Mexico blacknose sharks are unknown because we did not accept the assessment. Five scoping hearings and one conference call were announced in this notice. The public comment period for scoping ended on December 31, 2011. Following the public comment period, a Predraft document describing potential alternatives that might be included in the DEIS and proposed rule for the amendment was released to HMS Consulting Parties (which includes the Advisory Panel) on March 8, 2012, and presented to the HMS Advisory Panel on March 14, 2012, and published on the HMS Management Division website to allow public comment. HMS Advisory Panel and Consulting Parties submitted comments on the Predraft prior to April 13, 2011. We published an additional notice of intent announcing the inclusion of Gulf of Mexico blacktip sharks in this current amendment on May 29, 2012 (77 FR 31562) and accepted public comment on this addition to the amendment until June 21, 2012. The Notice of Availability of the DEIS for Amendment 5 and the proposed rule published in the Federal Register on December 7, 2012 (77 FR 73029), and November 26, 2012 (77 FR 70552), respectively. The public comment period ended on February 12, 2013. We held eight public hearings and two

conference calls/webinars during that time, and consulted with the five Atlantic Regional Fishery Management Councils and the Atlantic States Marine Fisheries Commission.

As described above, based on the results of the SEDAR 21 stock assessments for sandbar and blacknose sharks, a stock assessment for scalloped hammerhead sharks (Hayes et al. 2009), and the results of a SEDAR 29 stock assessment for Gulf of Mexico blacktip sharks, we determined that sandbar, scalloped hammerhead, and Atlantic blacknose sharks are overfished; that scalloped hammerhead and Atlantic blacknose sharks are experiencing overfishing; and that Gulf of Mexico blacktip sharks are not overfished and are not experiencing overfishing. In addition, the overfishing and overfished status of the Gulf of Mexico blacknose shark stock is unknown.

**Proposed Action:** Based on the stock assessment findings identified above, we are proposing to amend the 2006 Consolidated HMS FMP in conformance with applicable requirements under the Magnuson-Stevens Act by implementing management measures consistent with recent stock assessments for sandbar, scalloped hammerhead, Gulf of Mexico blacktip, and Atlantic and Gulf of Mexico blacknose sharks; establishing a rebuilding plan for Atlantic blacknose and scalloped hammerhead sharks; implementing commercial quota limits consistent with stock assessment recommendations to prevent overfishing and rebuild overfished stocks; and, modifying recreational measures or prohibit the retention of overfished stocks.

**Purpose:** The purpose of the proposed measures is to manage these fishery resources in a manner that maximizes resources sustainability while minimizing, to the greatest extent possible, the socioeconomic impacts on affected fisheries.

**Need:** To achieve this purpose, and to comply with the Magnuson-Stevens Act and its objectives, we need to implement a suite of actions designed to specify Annual Catch Limits and strengthen Accountability Measures, and stand-alone measures to reduce shark fishing mortality to rebuild overfished stocks and end overfishing. More specifically, we have identified the following objectives with regard to this proposed action:

- End overfishing and achieve optimum yield for scalloped hammerhead, and Atlantic blacknose sharks;
- Implement a rebuilding plan for scalloped hammerhead and Atlantic blacknose sharks to ensure that fishing mortality levels for both species are maintained at or below levels that would result in a 70 percent probability of rebuilding in the timeframe recommended by the assessments;
- Maintain the rebuilding plan for sandbar sharks to ensure 70 percent probability of rebuilding in the timeframe recommended by the assessment; and
- Achieve optimum yield and provide an opportunity for the sustainable harvest of Gulf of Mexico blacknose, Gulf of Mexico blacktip sharks, and other sharks, as appropriate.

## **1.5 Scope and Organization of this Document**

In considering the management measures outlined in this document, we are responsible for complying with a number of Federal statutes, including NEPA. Under NEPA, the purpose of an

EIS is to provide an environmental analysis to support the Secretary's regulatory decision and to encourage and facilitate involvement by the public in the environmental review process.

This document as an EIS assesses potential impacts on the biological and human environments associated with the establishment under Federal regulation of various management measures for fisheries that catch and interact with Atlantic sharks. In this document, we evaluate the potential impacts of these management-based alternatives on the fishery, along with other impacts (e.g., biological, social, and economic, see Chapter 4). The chapters that follow describe the proposed management measures and potential alternatives (Chapter 2), the affected environment as it currently exists (Chapter 3), the probable consequences on the human environment that may result from the implementation of the proposed management measures and their alternatives (Chapter 4), and any mitigating measures (Chapter 5).

In developing this document, we adhered to the procedural requirements of NEPA; the Council on Environmental Quality (CEQ) regulations for implementing NEPA (40 C.F.R. 1500-1508) 28, and National Oceanic and Atmospheric Administration's (NOAA) procedures for implementing NEPA. NOAA Administrative Order (NAO) 216-6 identifies NOAA's procedures to meet the requirements of NEPA to:

- fully integrate NEPA into the agency planning and decision making process; fully consider the impacts of NOAA's proposed actions on the quality of the human environment;
- involve interested and affected agencies, governments, organizations and individuals early in the agency planning and decision making process when significant impacts are or may be expected to the quality of the human environment from implementation of proposed major Federal actions; and
- conduct and document environmental reviews and related decisions appropriately and efficiently.

The following definitions were generally used to characterize the nature of the various impacts evaluated with this EIS. Chapter 4 describes more specifically how these definitions were used for each alternative.

- Short-term or long-term impacts. These characteristics are determined on a case-by-case basis and do not refer to any rigid time period. In general, short-term impacts are those that would occur only with respect to a particular activity or for a finite period. Long-term impacts are those that are more likely to be persistent and chronic.
- Direct or indirect impacts. A direct impact is caused by a proposed action and occurs contemporaneously at or near the location of the action. An indirect impact is caused by a proposed action and might occur later in time or be farther removed in distance but still be a reasonably foreseeable outcome of the action. For example, a direct impact of erosion on a stream might include sediment-laden waters in the vicinity of the action, whereas an indirect impact of the same erosion might lead to lack of spawning and result in lowered reproduction rates of indigenous fish downstream.
- Minor, moderate, or major impacts. These relative terms are used to characterize the magnitude of an impact. Minor impacts are generally those that might be perceptible but,

in their context, are not amenable to measurement because of their relatively minor character. Moderate impacts are those that are more perceptible and, typically, more amenable to quantification or measurement. Major impacts are those that, in their context and due to their intensity (severity), have the potential to meet the thresholds for significance set forth in CEQ regulations (40 C.F.R. § 1508.27) and, thus, warrant heightened attention and examination for potential means for mitigation to fulfill the requirements of NEPA.

- Adverse or beneficial impacts. An adverse impact is one having adverse, unfavorable, or undesirable outcomes on the man-made or natural environment. A beneficial impact is one having positive outcomes on the man-made or natural environment. A single act might result in adverse impacts on one environmental resource and beneficial impacts on another resource.
- Cumulative impact. CEQ regulations implementing NEPA define cumulative impacts as the “impacts on the environment which result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions.” (40 C.F.R. § 1508.7) Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time within a geographic area.

In addition to NEPA, we must comply with other Federal statutes and requirements such as the Magnuson-Stevens Act, Executive Order 12866 and the Regulatory Flexibility Act. This document comprehensively analyzes the alternatives considered for all these requirements. Thus, Chapter 6 provides a summary of all the economic analyses and data that are needed for any economic analysis; Chapter 7 meets the requirements under Executive Order 12866; and Chapter 8 provides the Final Regulatory Flexibility Analysis required under the Regulatory Flexibility Act. Chapters 9 through 11 also provide additional information that is required under various statutes. While some of the chapters were written in a way to comply with the specific requirements under these various statutes and requirements, it is the document as a whole that meets these requirements and not any individual chapter.

## 1.6 Literature Cited

- Hayes, C., Jiao, Y. & Cortes, E. 2009. Stock assessment of scalloped hammerheads in the western North Atlantic Ocean and Gulf of Mexico. *North American Journal of Fisheries Management* 29, 1406–1417.
- NMFS. 1999. Final Fishery Management Plan for Atlantic Tunas, Swordfish and Sharks. NOAA, NMFS, Highly Migratory Species Management Division, Silver Spring, MD.
- NMFS. 2003. Final Amendment 1 to the Fishery Management Plan for Atlantic Tunas, Swordfish, and Sharks. NOAA, NMFS, Highly Migratory Species Management Division, Silver Spring, MD.
- NMFS. 2006. Final Consolidated Atlantic Highly Migratory Species Fishery Management Plan. NOAA, NMFS, Highly Migratory Species Management Division, Silver Spring, MD.
- NMFS. 2008a. Final Amendment 1 to the Consolidated Atlantic Highly Migratory Species Fishery Management Plan Essential Fish Habitat. NOAA, NMFS, Highly Migratory Species Management Division, Silver Spring, MD.
- NMFS. 2008b. Final Amendment 2 to the Consolidated Atlantic Highly Migratory Species Fishery Management Plan. NOAA, NMFS, Highly Migratory Species Management Division, Silver Spring, MD.
- NMFS. 2010. Amendment 3 to the Final Consolidated Atlantic Highly Migratory Species Fishery Management Plan. NOAA, NMFS, Highly Migratory Species Management Division, 1315 East West Highway, Silver Spring, MD 20910.
- SEDAR. 2011. SEDAR 21 Stock Assessment Report: Sandbar, Dusky, and Blacknose Sharks. SEDAR, 4055 Faber Place Drive, Suite 201, North Charleston, SC 29405. 415p.
- SEDAR. 2012. SEDAR 29 Stock Assessment Report: HMS Gulf of Mexico Blacktip Sharks. SEDAR, 4055 Faber Place Drive, Suite 201, North Charleston, SC 29405. 415p.
- SEFSC. 2012. HMS Gulf of Mexico Blacktip Shark Post-Review Updates and Projections for SEDAR 29. 21 p.

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## 2.0 SUMMARY OF THE ALTERNATIVES

As described in Chapter 1, we are considering various shark management measures to meet the objectives of the Magnuson-Stevens Act and the 2006 Consolidated HMS FMP based on the SEDAR 21 stock assessments for sandbar and blacknose sharks, the SEDAR 29 stock assessment for Gulf of Mexico blacktip sharks, and the Hayes et al. 2009 scalloped hammerhead shark stock assessment. The Notice of Availability of the DEIS for Amendment 5 and the proposed rule published in the Federal Register on December 7, 2012 (77 FR 73029), and November 26, 2012 (77 FR 70552), respectively. We held eight public hearings, two conference calls/webinars, consulted with the five Atlantic Regional Fishery Management Councils, the Atlantic States Marine Fisheries Commission, and the HMS Advisory Panel during the public comment period, which closed February 12, 2013. As fully described in Chapter 1, the alternatives addressing the SEDAR 21 stock assessment for dusky sharks considered in the DEIS for Amendment 5 to the 2006 Consolidated HMS FMP have been split out into a separate action, termed Amendment 5b to the 2006 Consolidated HMS FMP. This amendment, termed Amendment 5a to the 2006 Consolidated HMS FMP, does not consider measures to address overfishing on the dusky shark population.

### 2.1 Alternatives

NEPA requires that any Federal agency proposing a major federal action consider all reasonable alternatives, in addition to the proposed action. The evaluation of alternatives in an EIS assists the Secretary in ensuring that any unnecessary impacts are avoided through an assessment of alternative ways to achieve the underlying purpose of the project that may result in less environmental harm.

To warrant detailed evaluation by NMFS, an alternative must be reasonable<sup>1</sup> and meet the Secretary's purpose and need (see Section 1.4). Screening criteria are used to determine whether an alternative is reasonable. The following discussion identifies the screening criteria used in this EIS to evaluate whether an alternative is reasonable; evaluates various alternatives against the screening criteria (including the proposed measures) and identifies those alternatives found to be reasonable; identifies those alternatives found not to be reasonable; and for the latter, the basis for this finding. Alternatives considered but found not to be reasonable are not evaluated in detail in this EIS.

Screening Criteria – To be considered “reasonable” for purposes of this FEIS, an alternative must meet the following criteria:

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<sup>1</sup> “Section 1502.14 (of NEPA) requires the EIS to examine all reasonable alternatives to the proposal. In determining the scope of alternatives to be considered, the emphasis is on what is “reasonable” rather than on whether the proponent or applicant likes or is itself capable of carrying out a particular alternative. Reasonable alternatives include those that are practical or feasible from the technical and economic standpoint and using common sense, rather than simply desirable from the standpoint of the applicant.” (CEQ, “NEPA’s Forty Most Asked Questions” (available at <http://ceq.hss.doe.gov/nepa/regs/40/40P1.HTM>) (emphasis added))

- *An alternative must be consistent with the 10 National Standards set forth in the Magnuson-Stevens Act*
- *An alternative must be administratively feasible. The costs associated with implementing an alternative cannot be prohibitively exorbitant or require unattainable infrastructure.*
- *An alternative cannot violate other laws (e.g., ESA, MMPA).*

This chapter includes a full range of reasonable alternatives designed to meet the purpose and need for action described in Chapter 1 and address public comments received during the scoping and proposed rule comment periods. Because many of the issues regarding TACs, commercial quotas, and recreational measures are interrelated, we have developed and analyzed six alternative suites for addressing these issues in all commercial and recreational shark fisheries. The DEIS presented five alternative suites, but, largely as a result of public comments received on the DEIS, we have added a sixth alternative suite in the FEIS, Alternative Suite A6, which NMFS has also chosen as its preferred alternative. Alternative Suite A6 falls within the range of management approaches fully analyzed in the DEIS: it largely represents a hybrid of measures previously proposed in the DEIS under Alternative Suites A2 and A3, as well as minor adjustments resulting from the application of final 2011 data.

The alternative suites can be found in Table 2.1 and are also described in the text following the table. The alternatives within each suite would be intended to be implemented together. The preferred alternative suite considered all of the input from the public and the HMS Advisory Panel during the scoping, Predraft, and proposed rule stages. The environmental, economic, and social impacts of these alternatives are discussed in later chapters.

As stated above, the alternative suites presented in this FEIS use updated data through 2011, some of which were not available at the DEIS stage. For this reason, some of the landings and quota levels are slightly different than those presented in the DEIS, however, none of this updated data dramatically changed the underlying measures or regional allocations.

**Table 2.1 Alternative Suites for TACs, Commercial Quotas, and Recreational Measures**

Alternative Suite	Scalloped Hammerhead	Non-sandbar LCS	GOM Blacktip	Blacknose	Non-blacknose SCS	Quota Linkage	Recreational
A1 No Action	No individual quota; remains a part of the non-sandbar LCS quota	Quotas <u>Atlantic</u> : 188.3 mt dw <u>GOM</u> : 439.5 mt dw Species included in non-sandbar LCS: blacktip, bull, lemon, nurse, spinner, silky, great hammerhead, smooth hammerhead, scalloped hammerhead, and tiger	No individual quota; remains a part of the non-sandbar LCS quota	No regional quotas; 19.9 mt overall quota	221.6 mt dw overall quota	Non-blacknose SCS quota linked with blacknose shark quota	1 shark (any authorized species) > 54 inches fork length per vessel per trip (except Atlantic sharpnose and bonnethead) Reporting required only if contacted by LPS or MRIP surveys

Alternative Suite	Scalloped Hammerhead	Non-sandbar LCS	GOM Blacktip	Blacknose	Non-blacknose SCS	Quota Linkage	Recreational
A2	<p><b>TAC</b> Scalloped Hammerhead: 79.6 mt dw</p> <p><b>Quotas:</b> <u>Atlantic hammerhead:</u> (TAC – rec – discards -research)* average percentage of hammerhead sharks landed in the Atlantic from 2008-2011 = 27.1 mt dw</p> <p><u>Gulf hammerhead:</u> (TAC – recreational – discards - research)* average percentage of hammerhead sharks landed in the Gulf of Mexico from 2008-2011 = 25.3 mt dw</p> <p>Hammerhead shark group consists of great, scalloped, and smooth hammerhead sharks</p>	<p><b>Quotas:</b> <u>Atlantic Aggregated LCS:</u> average Atlantic Aggregated LCS landings from 2008-2011 = 168.9 mt dw</p> <p><u>GOM Aggregated LCS:</u> average GOM Aggregated LCS landings from 2008-2011 = 157.5 mt dw</p> <p><u>Aggregated LCS research:</u> 50 mt dw</p> <p><u>Aggregated LCS EFPs:</u> 1.4 mt dw</p> <p><u>Species included in Atlantic Aggregated LCS:</u> blacktip, bull, lemon, nurse, spinner, silky, tiger</p> <p><u>Species included in GOM Aggregated LCS:</u> bull, lemon, nurse, spinner, silky, tiger</p>	<p><b>TAC</b> 413.4 mt dw</p> <p><b>Quota</b> <u>GOM blacktip:</u> TAC - recreational - discards - research = 256.6 mt dw</p> <p>Note: blacktip sharks NOT included in GOM</p> <p>Aggregated LCS but are included in Atlantic</p> <p>Aggregated LCS</p>	<p><b>Atlantic TAC:</b> 21.2 mt dw</p> <p><b>GOM TAC:</b> TAC = average rec landings + average discard + average research mortality since A3 + 2011 commercial landings = 34.9 mt dw</p> <p><b>Quotas:</b> <u>Atlantic blacknose:</u> TAC – recreational – discards – research = 18.0 mt dw</p> <p><u>GOM blacknose:</u> TAC – recreational – discards – research = 2.0 mt dw</p>	<p><b>Quotas</b> <u>Atlantic non-blacknose SCS:</u> average percentage of non-blacknose SCS landed in the Atlantic since A3 (221.6 mt dw* 79.4% Atlantic landings from 2011) = 176.1 mt dw</p> <p><u>Gulf non-blacknose SCS:</u> average percentage of non-blacknose SCS landed in the Gulf of Mexico since A3 (221.6 mt dw * 20.6% GOM landings from 2011) = 45.5 mt dw</p>	<p>Link Atlantic scalloped hammerhead and Atlantic Aggregated LCS.</p> <p>Link GOM scalloped hammerhead, GOM Aggregated LCS, and GOM blacktip.</p> <p>Link Atlantic blacknose and Atlantic non-blacknose SCS.</p> <p>Link GOM blacknose and GOM non-blacknose SCS.</p> <p>Allow inseason quota transfers between non-blacknose SCS regions</p>	<p>Require mandatory reporting of all hammerhead sharks landed recreationally to NMFS through the online non-tournament landing system</p> <p>Outreach to recreational community re: shark identification</p>

Alternative Suite	Scalloped Hammerhead	Non-sandbar LCS	GOM Blacktip	Blacknose	Non-blacknose SCS	Quota Linkage	Recreational
A3	<p><b>TAC</b> Same as Suite A2</p> <p><b>Quotas:</b> Create one commercial quota for hammerhead sharks (great, smooth and scalloped) according to scalloped hammerhead TAC</p>	<p><b>Quotas:</b> <u>Atlantic aggregated</u> <u>LCS:</u> Same as Suite A2 <u>GOM aggregated</u> <u>LCS:</u> Same as Suite A2 <u>Species included in Atlantic Aggregated</u> <u>LCS:</u> Same as Suite A2 <u>Species included in GOM Aggregated</u> <u>LCS:</u> Same as Suite A2</p>	<p><b>TAC</b> 537.4 mt dw</p> <p><b>Quota</b> <u>GOM blacktip:</u> TAC - recreational - discards - research = 380.6 mt dw Note: blacktip sharks NOT included in GOM Aggregated LCS but are included in Atlantic Aggregated LCS</p>	<p><b>Atlantic TAC:</b> Same as Suite A2</p> <p><b>GOM TAC:</b> Current combined blacknose TAC – Atlantic TAC = 22.7 mt dw</p> <p><b>Quotas:</b> <u>Atlantic blacknose:</u> Same as Suite A2 <u>GOM blacknose:</u> TAC – recreational – discards - research = 0 mt dw</p>	<p><b>Quotas:</b> 221.6 mt dw No quota link to blacknose quotas</p>	No quota linkages	<p>Establish hammerhead-specific shark (great, scalloped, and smooth) minimum recreational size of 78 inches fork length.</p> <p>Outreach to recreational community re: shark identification</p>

Alternative Suite	Scalloped Hammerhead	Non-sandbar LCS	GOM Blacktip	Blacknose	Non-blacknose SCS	Quota Linkage	Recreational
A4	<p><b>TAC</b> Same as Suite A2</p> <p><b>Quotas:</b> <u>Atlantic scalloped hammerhead:</u> (TAC – recreational – discards -research)* average percentage of scalloped hammerhead sharks landed in the Atlantic from 2008-2011 = 26.6 mt dw</p> <p><u>Gulf scalloped hammerhead:</u> (TAC – recreational – discards - research)* average percentage of scalloped hammerhead sharks landed in the Gulf of Mexico from 2008-2011 = 25.8 mt dw</p>	<p><b>Quotas:</b> <u>Atlantic aggregated LCS:</u> Highest one-year Atlantic Aggregated LCS landings from 2008-2011 = 180.0 mt dw</p> <p><u>GOM aggregated LCS:</u> Highest one-year GOM Aggregated LCS landings from 2008-2011 = 185.8 mt dw</p> <p><u>Species included in Atlantic Aggregated LCS:</u> blacktip, bull, lemon, nurse, spinner, silky, great hammerhead, smooth hammerhead, tiger hammerhead, tiger</p>	<p><b>TAC</b> 2,149.3 mt dw</p> <p><b>Quota</b> <u>GOM blacktip:</u> TAC - recreational - discards - research = 1,992.6 mt dw Note: blacktip sharks NOT included in GOM Aggregated LCS but are included in Atlantic Aggregated LCS</p>	<p><b>Atlantic TAC:</b> Same as Suite A2</p> <p><b>GOM TAC:</b> Current combined blacknose TAC* GOM landings percentage from assessment = 18.7 mt dw</p> <p><b>Quotas:</b> <u>Atlantic blacknose:</u> Same as Suite A2</p> <p><u>GOM blacknose:</u> TAC – recreational – discards - research = 0 mt dw</p>	<p><b>Quotas</b> <u>Atlantic non-blacknose SCS:</u> 110.8 mt dw (221.6 mt dw /2)</p> <p><u>GOM non-blacknose SCS:</u> 110.8 mt dw (221.6 mt dw /2)</p>	Same as Suite A2	<p>Outreach to recreational community re: shark identification</p> <p>Establish species- specific recreational shark quotas</p>
A5	Close all shark fisheries in the Atlantic Ocean, Gulf of Mexico, and Caribbean Sea						

Alternative Suite	Scalloped Hammerhead	Non-sandbar LCS	GOM Blacktip	Blacknose	Non-blacknose SCS	Quota Linkage	Recreational
A6 <i>Preferred Alternative Suite</i>	Same as Suite A2:  <b>TAC</b> Scalloped Hammerhead: 79.6 mt dw <b>Quotas:</b> <u>Atlantic hammerhead:</u> (TAC – recreational – discards -research) * average percentage of hammerhead sharks landed in the Atlantic from 2008-2011 = 27.1 mt dw <u>Gulf hammerhead:</u> (TAC – recreational – discards - research)* average. percentage of hammerhead sharks landed in the Gulf of Mexico from 2008-2011 = 25.3 mt dw Hammerhead shark group consists of great, scalloped, and smooth hammerhead sharks	Same as Suite A2:  <b>Quotas:</b> <u>Atlantic Aggregated LCS:</u> average Atlantic Aggregated LCS landings from 2008-2011 = 168.9 mt dw <u>GOM Aggregated LCS:</u> average GOM Aggregated LCS landings from 2008-2011 = 157.5 mt dw <u>Aggregated LCS research:</u> 50 mt dw <u>Aggregated LCS EFPs:</u> 1.4 mt dw <u>Species included in Atlantic Aggregated LCS:</u> blacktip, bull, lemon, nurse, spinner, silky, tiger <u>Species included in GOM Aggregated LCS:</u> bull, lemon, nurse, spinner, silky, tiger	Same as Suite A2:  <b>TAC</b> 413.4 mt dw <b>Quota</b> <u>GOM blacktip:</u> TAC - recreational - discards - research = 256.6 mt dw Note: blacktip sharks NOT included in GOM Aggregated LCS but are included in Atlantic Aggregated LCS	Same as Suite A2:  <b>Atlantic TAC:</b> 21.2 mt dw <b>GOM TAC:</b> TAC = average recreational landings + avg. discard + avg. research mortality since A3 + 2011 commercial landings = 34.9 mt dw <b>Quotas:</b> <u>Atlantic blacknose:</u> TAC – recreational – discards – research = 18.0 mt dw <u>GOM blacknose:</u> TAC – recreational – discards – research = 2.0 mt dw	Same as Suite A2:  <b>Quotas</b> <u>Atlantic non-blacknose SCS:</u> average percentage of non-blacknose SCS landed in the Atlantic since A3 (221.6 mt dw * 79.4% Atl landings from 2011) = 176.1 mt dw <u>Gulf non-blacknose SCS:</u> average percentage of non-blacknose SCS landed in the Gulf of Mexico since A3 (221.6 mt dw* 20.6% GOM landings from 2011) = 45.5 mt dw	Link blacknose shark and non-blacknose SCS quotas in both regions; link hammerhead shark and aggregated LCS quotas in both regions; GOM blacktip shark quota would not be linked, but inseason authority to close after, or at the same time as, the GOM hammerhead and GOM aggregated LCS quotas close; Allow inseason quota transfers between regional non-blacknose SCS and regional hammerhead shark quotas	Same as Suite A3:  Establish hammerhead-specific shark (great, scalloped, and smooth) minimum recreational size of 78 inches fork length.  Outreach to recreational fishing community re: shark identification

**GOM: Gulf of Mexico; LCS: Large Coastal Sharks; LPS: Large Pelagics Survey; MRIP: Marine Recreational Information Program; SCS: Small Coastal Sharks**

Figure 2.1 and Figure 2.2 compare LCS and SCS quotas among current quotas, the preferred alternative suite under the DEIS, and the preferred alternative suite under the FEIS.

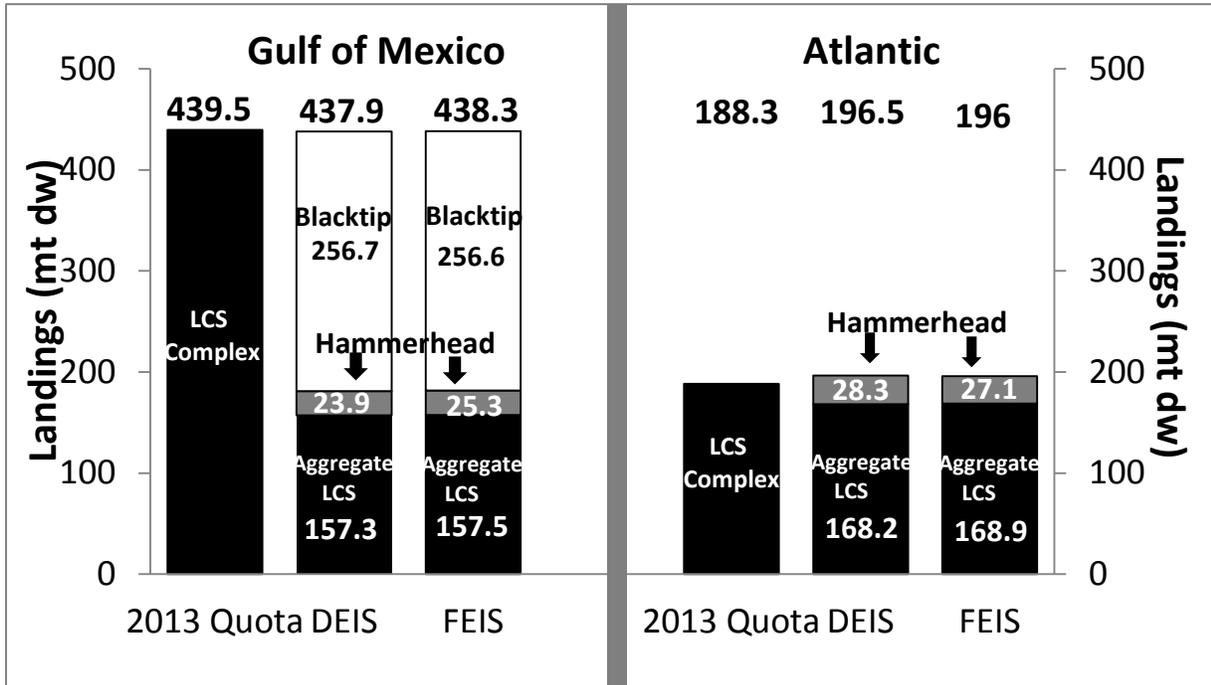


Figure 2.1 Comparison of the impacts to the LCS fisheries based on the current 2013 LCS quotas, and the preferred alternative quotas from the DEIS and FEIS

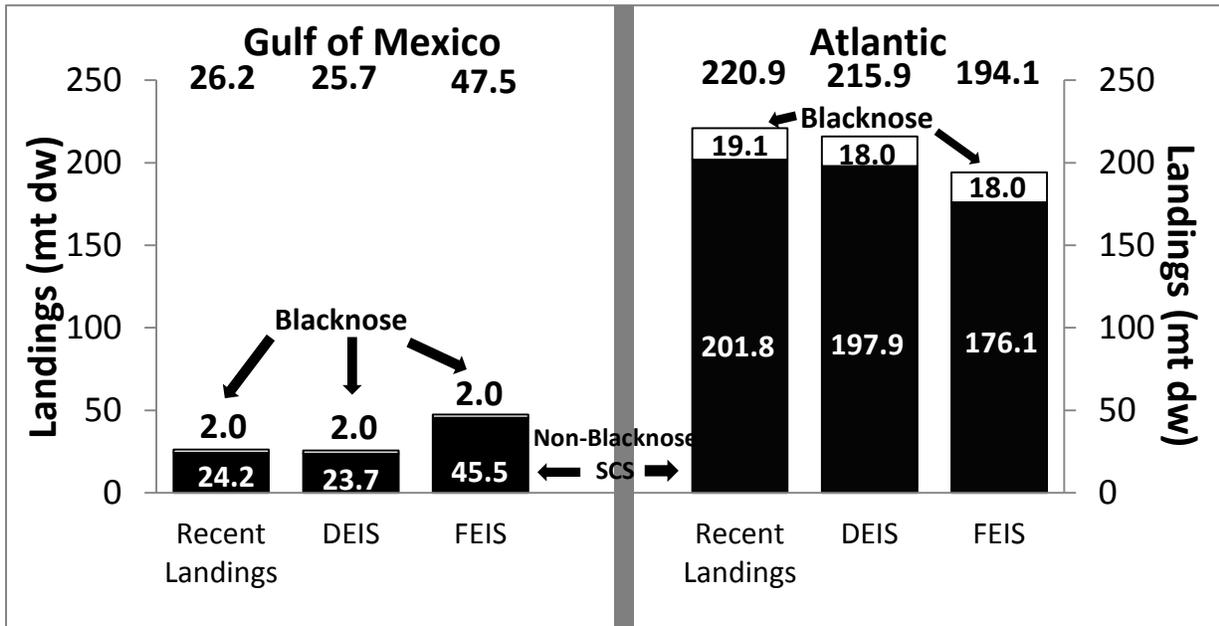


Figure 2.2 Comparison of the impacts to the SCS fisheries based on the current 2013 SCS quotas, and the preferred alternative quotas from the DEIS and FEIS

### 2.1.1 Total Allowable Catch, Commercial Quotas and Recreational Measures Alternatives

The following alternative suites are to rebuild overfished stocks and end overfishing, and manage these fishery resources in a manner that maximizes sustainability, while minimizing, to the greatest extent possible, the social and economic impacts on affected fisheries. The alternatives to rebuild overfished stocks and end overfishing for the Atlantic shark fisheries range from maintaining the status quo under the No Action alternative, to restructuring the species complexes by regions, to changing the LCS and SCS complex quotas, to modifying the recreational size limits and reporting structures, to closing all the shark fisheries. The alternative suites are being considered for establishing, structuring, and distributing commercial quotas and size limitations to rebuild overfished stocks of sandbar, scalloped hammerhead, and Atlantic blacknose sharks. As noted in the introduction to this chapter, the alternative suites presented here use updated data through 2011 so some of the landings and quota levels are slightly different than those presented in the DEIS; however, none of this updated data dramatically changed the underlying measures or regional allocations. Additionally, while the DEIS presented five alternative suites, this FEIS presents a sixth alternative suite, Alternative Suite A6, which incorporates measures from the different alternative suites and is the now the preferred alternative suite.

#### **Alternative Suite A1: No Action**

Alternative Suite A1 maintains current TAC, commercial quotas, and recreational measures in all shark fisheries. Choosing this alternative would not end overfishing or rebuild overfished stocks. The current measures for the shark species covered in this amendment are outlined below.

##### *Scalloped Hammerhead Sharks*

Under Alternative Suite A1, scalloped hammerhead sharks would remain in the non-sandbar LCS management group, and a separate quota would not be established for the species.

##### *Large Coastal Sharks*

Under Alternative Suite A1, the current species composition of the non-sandbar LCS management group would be maintained (silky, tiger, blacktip, bull, spinner, lemon, nurse, smooth hammerhead, scalloped hammerhead, and great hammerhead sharks). The commercial quota for non-sandbar LCS would be unchanged in the Atlantic region at 188.3 mt dw (415,126 lb dw) and the Gulf of Mexico region at 439.5 mt dw (968,922 lb dw).

##### *Blacktip Sharks*

Under Alternative Suite A1, blacktip sharks would remain in the non-sandbar LCS management group and a separate quota would not be established for the species in either the Atlantic or Gulf of Mexico region.

##### *Blacknose Sharks*

Under Alternative Suite A1, there would continue to be one blacknose shark quota for the Atlantic and Gulf Mexico regions of 19.9 mt dw (43,872 lb dw).

### *Non-Blacknose SCS*

Under Alternative Suite A1, the non-blacknose SCS management group would remain as one quota of 221.6 mt dw (488,539 lb dw) for both the Atlantic and Gulf of Mexico regions.

### *Quota Linkages*

Under Alternative Suite A1, the species composition of the non-sandbar LCS management group would be unchanged and no new quota linkages would be made for the management group. Existing quota linkages would remain in effect for blacknose sharks and the non-blacknose SCS management group.

### *Recreational Measures*

Under Alternative Suite A1, recreational measures for sharks would remain the same with a bag limit of one shark (any authorized species) greater than 54 inches fork length per vessel per trip and one Atlantic sharpnose and bonnethead shark per person per trip.

## **Alternative Suite A2**

Alternative Suite A2 would establish species-specific TACs for scalloped hammerhead, Atlantic blacknose, Gulf of Mexico blacknose, and Gulf of Mexico blacktip sharks. It would also create regional commercial quota management groups for all hammerhead sharks combined, non-blacknose SCS, and specified “aggregated LCS,” and species-specific commercial quotas for blacknose and Gulf of Mexico blacktip sharks. Certain quota management groups would be linked to prevent overfishing, and there are multiple recreational measures, including increasing the minimum size. These measures are outlined in greater detail below.

### *Scalloped Hammerhead Sharks*

Under Alternative Suite A2, scalloped, smooth, and great hammerhead sharks (hammerhead sharks) would be removed from the non-sandbar LCS management group quota and Atlantic and Gulf of Mexico hammerhead shark regional quotas would be established.

To calculate the Atlantic and Gulf of Mexico hammerhead shark regional quotas, the maximum sustainable level of scalloped hammerhead shark commercial landings would be estimated by subtracting scalloped hammerhead recreational landings, commercial discards, and research mortality from the TAC calculated in Hayes et al. (2009). This maximum sustainable level of scalloped hammerhead shark commercial landings would then become the hammerhead shark commercial quota in each region, applicable to scalloped, smooth, and great hammerhead sharks. Landings of all three large hammerhead sharks would count toward this quota due to the difficulty in differentiating among the species, especially when dressed. If all three large hammerhead sharks<sup>3</sup> are not grouped under one quota, some scalloped hammerhead sharks could be misidentified as smooth or great hammerhead sharks and would not be appropriately accounted for, possibly leading to mortality in excess of the scalloped hammerhead TAC.

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<sup>3</sup> “Large hammerhead sharks” refer to great hammerhead (*Sphyrna mokarran*), smooth hammerhead (*Sphyrna zygaena*), and scalloped hammerhead (*Sphyrna lewini*) sharks. All references to “hammerhead sharks” in this amendment include only these three species, unless otherwise noted.

To calculate the commercial quota, recreational landings, commercial discards, and research set-aside mortality of scalloped hammerhead sharks would be subtracted from the scalloped hammerhead shark TAC of 79.6 mt dw provided by Hayes et al. (2009) (recreational scalloped hammerhead shark landings = 4.9 mt dw; commercial scalloped hammerhead shark discards = 22.0 mt dw; research set-aside mortality = 0.3 mt dw). This methodology results in a total commercial quota of 52.4 mt dw (115,457 lb dw), which would apply across both the Atlantic and Gulf of Mexico regions and to all three hammerhead shark species. This total commercial hammerhead shark quota would then be divided between these two regions using the average percentage of total hammerhead shark landings in each region. Between 2008 and 2011, hammerhead shark landings in the Atlantic region accounted for 51.7 percent of the total hammerhead shark landings and hammerhead shark landings in the Gulf of Mexico region accounted for 48.3 percent (Table 2.2) of the total hammerhead shark landings. Consequently, under Alternative Suite A2, the Atlantic hammerhead shark commercial quota would be 27.1 mt dw (59,736 lb dw) and the Gulf of Mexico hammerhead shark commercial quota would be 25.3 mt dw (55,722 lb dw). For simplicity, the above methodology for calculating Atlantic and Gulf of Mexico commercial hammerhead shark quotas are outlined in an equation format below:

- 1) (scalloped hammerhead TAC per Hayes et al. 2009) – (recreational scalloped hammerhead shark landings) – (commercial scalloped hammerhead shark discards) – (research set aside) = Total Atlantic and Gulf of Mexico commercial hammerhead shark quota
  - a. 79.6 mt dw (scalloped hammerhead TAC) – 4.9 mt dw (recreational scalloped hammerhead shark landings) – 22.0 mt dw (commercial scalloped hammerhead shark discards) – 0.3 mt dw (research set-aside) = **52.4 mt dw (115,457 lb dw)**
- 2) Atlantic and Gulf of Mexico regional quotas would then be divided using the average percentage of hammerhead sharks landed in each region from 2008-2011 (Table 2.2).
  - a. Atlantic: 52.4 mt dw (115,457 lb dw) \* 51.7 % (proportion of total hammerhead shark landings from the Atlantic) = **27.1 mt dw (59,736 lb dw)**
  - b. Gulf of Mexico: 52.4 mt dw (115,457 lb dw) \* 48.3 % (proportion of total hammerhead shark landings from the Gulf of Mexico) = **25.3 mt dw (55,722 lb dw)**

**Table 2.2 Commercial Hammerhead Shark (scalloped, smooth and great hammerhead sharks) Landings 2008-2011; Source: ACCSP and GULFIN Databases.**

Year	Gulf of Mexico Hammerhead Shark Landings (lb dw)	Atlantic Hammerhead Shark Landings (lb dw)	Total (Gulf of Mexico + Atlantic)	Percentage of Total Hammerhead Shark Landings From Gulf of Mexico	Percentage of Total Hammerhead Shark Landings From Atlantic
2008	39,714	40,431	80,145	49.6 %	50.4 %
2009	87,839	94,129	181,967	48.3 %	51.7 %
2010	23,822	68,071	91,893	25.9 %	74.1 %
2011	63,494	27,715	91,210	69.6 %	30.4 %
<b>Total</b>	<b>214,869</b>	<b>230,346</b>	<b>445,215</b>	<b>48.3 %</b>	<b>51.7 %</b>

*Large Coastal Sharks*

Under Alternative Suite A2, species formerly managed collectively in Atlantic and Gulf of Mexico non-sandbar LCS management groups would be re-grouped. Some species now would be addressed individually while others would continue to be managed within a newly-identified management group. In the Atlantic region, all three hammerhead sharks would be removed from the Atlantic non-sandbar LCS quota and a separate Atlantic hammerhead shark quota would be established. The methodology for establishing the Atlantic hammerhead shark quota is outlined above. After removing hammerhead sharks, the Atlantic non-sandbar LCS quota would be renamed the “Atlantic aggregated LCS” quota and would include blacktip, bull, lemon, nurse, silky, spinner, and tiger sharks. The new Atlantic aggregated LCS commercial quota would be calculated using the following methodology:

- 1) Calculate each species’ percent contribution to total non-sandbar LCS landings using average annual landings from 2008-2011. Table 2.3 below provides the species breakdown by landings of the Atlantic non-sandbar LCS quota.

**Table 2.3 Atlantic Non-Sandbar LCS Percent Landings by Species; Source: ACCSP Database**

Year	% Blacktip	% Bull	% Lemon	% Nurse	% Silky	% Spinner	% Tiger	% Smooth & Great Hammerhead	% Scalloped Hammerhead
2008	75.7	10.3	4.4	0.0	0.1	0.2	3.0	1.8	4.4
2009	55.5	14.4	6.1	0.0	0.3	5.6	2.9	4.4	10.7
2010	57.5	12.6	5.7	0.0	0.3	4.4	8.8	3.1	7.6
2011	55.4	14.9	7.9	0.0	0.2	1.3	11.9	2.4	5.9
<b>2008-2011</b>	<b>62.0</b>	<b>12.8</b>	<b>5.8</b>	<b>0.0</b>	<b>0.2</b>	<b>3.0</b>	<b>5.9</b>	<b>3.0</b>	<b>7.3</b>

- 2) Use each species proportion of total landings (above in Table 2.3) to apportion the total current Atlantic non-sandbar LCS quota (Table 2.4).

**Table 2.4 Atlantic Non-Sandbar LCS Quota Apportioned by Percent Landings by Species (Table 2.3); Source: ACCSP Database**

	Blacktip Shark (mt dw)	Bull Shark (mt dw)	Lemon Shark (mt dw)	Nurse Shark (mt dw)	Silky Shark (mt dw)	Spinner Shark (mt dw)	Tiger Shark (mt dw)	Smooth & Great HH Shark (mt dw)	Scalloped HH Shark (mt dw)
Percent of total landings	62.0 %	12.8 %	5.8 %	0.0 %	0.2 %	3.0 %	5.9 %	3.0 %	7.3 %
Apportioned contribution to overall quota of 188.3 mt dw	116.7	24.1	10.9	< 0.1	0.4	5.7	11.2	5.6	13.7

- 3) Calculate the Atlantic aggregated LCS quota by adding together the apportioned quotas for all current non-sandbar LCS. Do not include scalloped, smooth, and great hammerhead landings:
  - a. 116.7 mt dw (blacktip shark landings) + 24.1 mt dw (bull shark landings) + 10.9 mt dw (lemon shark landings) + < 0.1 mt dw (nurse shark landings) + 0.4 mt dw (silky shark landings) + 5.7 mt dw (spinner shark landings) + 11.2 mt dw (tiger shark landings) = **168.9 mt dw** (Alternative Suite A2's Atlantic aggregated LCS quota; sum of apportioned quota slightly different then the quota due to rounding errors when converting from lb dw to mt dw)

Under Alternative Suite A2, the Atlantic aggregated large coastal shark commercial quota would be 168.9 mt dw.

Under Alternative Suite A2, in the Gulf of Mexico, blacktip sharks as well as all three hammerhead sharks would be removed from the current Gulf of Mexico non-sandbar LCS management group and the group, composed of the remaining species, would be renamed “Gulf of Mexico aggregated LCS.” Thus, the Gulf of Mexico aggregated LCS management group would include bull, lemon, nurse, silky, spinner, and tiger sharks. In addition, a separate quota would be established for both blacktip sharks and hammerhead sharks, as discussed below. The new Gulf of Mexico aggregated LCS commercial quota would be calculated using the following methodology:

- 1) Calculate each species’ percent contribution to total landings. Table 2.5 below provides the species breakdown by landings of the Gulf of Mexico non-sandbar LCS quota.

**Table 2.5 Gulf of Mexico Non-Sandbar LCS Percent Landings by Species;** Source: GULFIN Database

Year	% Blacktip	% Bull	% Lemon	% Nurse	% Silky	% Spinner	% Tiger	% Smooth & Great Hammerhead	% Scalloped Hammerhead
2008	52.3	21.8	4.5	0.0	0.5	13.8	2.7	1.3	3.2
2009	57.0	21.3	8.2	0.0	0.3	2.4	0.8	2.2	7.8
2010	70.5	16.0	1.4	0.0	0.0	8.9	0.7	0.7	1.7
2011	53.2	23.3	4.7	0.0	0.0	9.7	2.7	1.9	4.5
<b>Total</b>	<b>58.4</b>	<b>20.5</b>	<b>4.6</b>	<b>0.0</b>	<b>0.2</b>	<b>8.7</b>	<b>1.8</b>	<b>1.5</b>	<b>4.3</b>

- 2) Use each species proportion of total landings (above, Table 2.5) to apportion the total current Gulf of Mexico non-sandbar LCS quota (Table 2.6).

**Table 2.6 Gulf of Mexico Non-Sandbar LCS Quota Apportioned by Percent Landings by Species (Table 2.5);** Source: GULFIN Database

	Blacktip Shark (mt dw)	Bull Shark (mt dw)	Lemon Shark (mt dw)	Nurse Shark (mt dw)	Silky Shark (mt dw)	Spinner Shark (mt dw)	Tiger Shark (mt dw)	Smooth & Great HH Shark (mt dw)	Scalloped HH Shark (mt dw)

Percent of total landings	58.4 %	20.5 %	4.6 %	0.0 %	0.2 %	8.7 %	1.8 %	1.5 %	4.3 %
Apportioned contribution to overall quota of 439.5 mt dw	256.6	90.3	20.2	< 0.1	0.9	38.5	7.7	6.6	18.7

- 3) Calculate the Gulf of Mexico aggregated LCS quota by adding together the apportioned quotas for all current non-sandbar LCS. Do not include blacktip shark and scalloped, smooth, and great hammerhead shark landings:
- a.  $90.3 \text{ mt dw (bull shark landings)} + 20.2 \text{ mt dw (lemon shark landings)} + < 0.1 \text{ mt dw (nurse shark landings)} + 0.9 \text{ mt dw (silky shark landings)} + 38.5 \text{ mt dw (spinner shark landings)} + 7.7 \text{ mt dw (tiger shark landings)} = \mathbf{157.5 \text{ mt dw}}$  (Alternative Suite A2's Gulf of Mexico aggregated LCS quota)

Under Alternative Suite A2, the Gulf of Mexico aggregated LCS commercial quota would be 157.5 mt dw.

### *Blacktip Sharks*

Under Alternative Suite A2, blacktip sharks would be removed from the non-sandbar LCS management group in the Gulf of Mexico region and a separate Gulf of Mexico blacktip quota would be established along with a new "aggregated LCS" commercial quota.

Based on the results of the SEDAR 29 stock assessment, we have determined that Gulf of Mexico blacktip sharks are not overfished and are not experiencing overfishing. The stock assessment showed that current removal rates are sustainable, and the subsequent projections, which were completed outside the SEDAR process, indicate that current removals are unlikely to lead to an overfished fish stock by 2040. Based on this information, we would establish a TAC based on current sustainable levels of catch. This TAC of 413.4 mt dw would be calculated by summing all of the sources of mortality (recreational landings, commercial discards, and research set-aside mortality) (Table 2.7) and the commercial quota. The commercial quota would be calculated by multiplying the proportion of current Gulf of Mexico blacktip shark landings that make up the Gulf of Mexico non-sandbar LCS quota by the current Gulf of Mexico non-sandbar LCS baseline quota (Table 2.5 and Table 2.6). This would result in a commercial quota of 256.6 mt dw (565,700 lb dw). The Gulf of Mexico blacktip TAC and commercial quota would be calculated using the following methodology:

- 1) (Gulf of Mexico blacktip shark TAC) = (recreational Gulf of Mexico blacktip shark landings) + (Gulf of Mexico blacktip sharks commercial discards) + (research set aside) + Gulf of Mexico commercial blacktip shark quota/average landings from 2008-2011)
  - a.  $\mathbf{413.4 \text{ mt dw}}$  (Gulf of Mexico blacktip shark TAC) = 60.3 mt dw (recreational blacktip shark landings) + 96.2 mt dw (commercial blacktip shark discards) + 0.2 mt dw (research set-aside) +  $\mathbf{256.6 \text{ mt dw}}$  (Gulf of Mexico commercial

**blacktip shark quota)** (sum slightly different than the TAC to rounding errors when converting from lb dw to mt dw)

**Table 2.7 Sources of yearly Gulf of Mexico blacktip shark mortality, 2008-2011.**

Source: SEDAR, 2012. Estimates for the 2011 recreational landings were based on the 2010 landings. Commercial discard estimates from data reported in SEDAR 29 and the Southeast bottom longline and gillnet observer programs. Longline and gillnet discards are derived from multiplying the longline landings and fishing trips by the ratio of dead discards observed in the commercial shark bottom longline fishery. Estimates for the 2011 commercial discards from the menhaden and Mexican fishery were based on the 2010 estimates. Table does not include mortality from commercial landings.

	<b>Recreational Landings</b>	<b>Commercial Discards</b>	<b>Research Set-Aside</b>	<b>Total</b>
<b>Weight (lb dw)</b>	132,937	212,083	441	345,461
<b>Weight (mt dw)</b>	60.3	96.2	0.2	156.9
<b>Percentage</b>	38%	61%	1%	100%

The Gulf of Mexico aggregated LCS commercial quota would be adjusted as discussed above. A separate Atlantic blacktip shark commercial quota would not be established for the Atlantic blacktip shark stock; rather, the Atlantic blacktip shark stock would remain within the Atlantic aggregated LCS management group.

### *Blacknose Sharks*

In 2010, Amendment 3 to the 2006 Consolidated HMS FMP (Amendment 3) removed blacknose sharks from the SCS management group and established a separate quota for blacknose sharks that covered both the Atlantic and Gulf of Mexico regions (NMFS 2010). Alternative Suite A2 would create separate commercial quotas for Atlantic and Gulf of Mexico blacknose sharks based on the recent blacknose shark stock assessments conducted under the SEDAR 21 process which determined that two separate stocks exist (Atlantic and Gulf of Mexico). The Atlantic commercial quota would be derived from the TAC of 7,300 blacknose sharks, or 21.2 mt dw, that was specified in the stock assessment. Within the TAC of 21.2 mt dw, recreational landings, commercial discards, and research set-aside mortality would be subtracted (Table 2.8) from the TAC to calculate the commercial quota of 18.0 mt dw (39,749 lb dw). The above methodology for calculating the Atlantic commercial blacknose shark quota is outlined in an equation format below:

- (Atlantic blacknose shark TAC per SEDAR 21) – (recreational blacknose shark landings) – (commercial blacknose shark discards) – (research set aside) = Total Atlantic commercial blacknose shark quota
  - 21.2 mt dw (blacknose shark TAC) – 0.4 mt dw (recreational blacknose shark landings) – 2.7 mt dw (commercial blacknose shark discards) – < 0.1 mt dw (research set-aside) = **18.0 mt dw (39,749 lb dw)**

**Table 2.8 Sources of yearly Atlantic blacknose shark mortality, 2008-2011.**

Source: SEDAR, 2011. Estimates for the 2011 recreational landings were based on the 2010 landings. Commercial discard estimates from data reported from Southeast bottom longline and gillnet observer programs and bycatch shrimp landings. Longline and gillnet discards are derived from multiplying the longline landings and fishing trips by the ratio of dead discards observed in the commercial shark bottom longline fishery. NMFS used the average bycatch shrimp landings from 2008-2009 to calculate 2010 and 2011 estimates. Table does not include mortality from commercial landings.

<b>Gear</b>	<b>Recreational Landings</b>	<b>Commercial Discards</b>	<b>Research Set-Aside</b>	<b>Total</b>
<b>Weight (lb dw)</b>	882	5,969	39	6,890
<b>Weight (mt dw)</b>	0.4	2.7	< 0.1	3.2
<b>Percentage</b>	13%	86%	< 1%	100%

The Gulf of Mexico stock assessment for blacknose sharks was not accepted by the SEDAR 21 Review Panel, and a TAC recommendation was not provided. Therefore, we determined that the stock status for the Gulf of Mexico blacknose shark stock is unknown (76 FR 62331; October 7, 2011). As a result, we need to determine a basis for establishing a TAC for the Gulf of Mexico stock. The previously accepted stock assessment for blacknose sharks (SEDAR 13 in 2007; SEDAR 2007) assessed blacknose sharks as one stock. Although the previous assessment can help inform our decision regarding the appropriate TAC for the Gulf of Mexico stock now, the difference in structure between the two assessments creates a complication: the best available science for Gulf of Mexico blacknose sharks (SEDAR 13) considered one stock across both regions; the best available science for Atlantic blacknose sharks (SEDAR 21) considered separate regional stocks. As a reasonable approach to this complexity, under this alternative suite, we explored how to calculate a Gulf of Mexico blacknose shark TAC that would include all commercial and recreational landings and any dead discards in all fisheries that interact with Gulf of Mexico blacknose sharks. A TAC of 34.9 mt dw for blacknose sharks was calculated by summing mortality from the 2011 commercial fishery, along with the average recreational and discard mortality since the implementation of blacknose shark measures from Amendment 3 in 2010 (Table 2.9). We used only 2011 commercial landings to calculate the Gulf of Mexico TAC for two main reasons. First, Amendment 3 removed blacknose sharks from the SCS quota and created a blacknose shark-specific quota of 19.9 mt dw (43,872 lb dw) for both regions. Also, the blacknose shark and non-blacknose SCS quotas were linked so if the landings of either the blacknose sharks or non-blacknose SCS (488,540 lb dw; 221.6 mt dw) reaches or is projected to reach 80 percent, both fisheries close for the rest of the season. The reduced quotas and quota linkage changed the fishery as fishermen began avoiding blacknose sharks to ensure that the larger non-blacknose SCS quota remained open. Second, due to the implementation of Amendment 3 (season opened on June 1, 2010) and fishing restrictions due to the Deepwater Horizon/BP oil spill, the commercial fishery in the Gulf of Mexico was reduced in 2010 compared to other years. On May 11, 2010, we issued an emergency rule to close portions of the Gulf of Mexico Exclusive Economic Zone to all fishing, in order to respond to the evolving nature of the Deepwater Horizon/BP oil spill in the Gulf of Mexico (75 FR 27217). Thus, a large portion of the fishing grounds for blacknose and non-blacknose SCS in the Gulf of Mexico,

whose commercial fishing season opened on June 1, 2010, were closed for most of the 2010 commercial fishing season. In addition to using 2011 commercial landings in the calculation of the TAC, we also used 2011 commercial landings in the Gulf of Mexico to calculate the commercial quota. Using this data, the new Gulf of Mexico blacknose shark commercial quota would be 2.0 mt dw (4,513 lb dw).

Using this methodology to calculate TAC would account for the blacknose shark mortality that occurs as bycatch in the shrimp trawl and reef fish fisheries in the Gulf of Mexico region. Since the Gulf of Mexico Fishery Management Council manages the shrimp trawl and reef fish fisheries, we would continue to work with the Gulf of Mexico Fishery Management Council to establish bycatch reduction methods, as appropriate, to reduce mortality in the shrimp trawl and reef fish fisheries.

The Gulf of Mexico commercial blacknose shark TAC would be 34.9 mt dw, and the commercial quota would be 2.0 mt dw (4,513 lb dw). The methodology for calculating the Gulf of Mexico commercial blacknose shark TAC is outlined in an equation format below:

- 1) (Gulf of Mexico blacknose shark TAC) = (recreational blacknose shark landings) + (commercial blacknose shark discards) + (research set aside) + Total Gulf of Mexico commercial blacknose shark quota (2011 commercial landings)
  - a. **34.9 mt dw** (blacknose shark TAC) = 2.6 mt dw (recreational blacknose shark landings) + 30.3 mt dw (commercial blacknose shark discards) + < 0.1 mt dw (research set-aside) + 2.0 mt dw (commercial blacknose shark quota) (sum slightly different than the TAC to rounding errors when converting from lb dw to mt dw)

**Table 2.9 Sources of yearly Gulf of Mexico blacknose shark mortality since implementation of Amendment 3, 2010-2011.** Source: SEDAR, 2011. Estimates for the 2011 recreational landings were based on the 2010 landings. Commercial discard estimates from data reported from Southeast bottom longline and gillnet observer programs and bycatch shrimp landings. Longline and gillnet discards are derived from multiplying the longline landings and fishing trips by the ratio of dead discards observed in the commercial shark bottom longline fishery. NMFS used the average bycatch shrimp landings from 2008-2009 to calculate 2010 and 2011 estimates. Table does not include mortality from commercial landings.

<b>Gear</b>	<b>Recreational Landings</b>	<b>Commercial Discards</b>	<b>Research Set-Aside</b>	<b>Total</b>
<b>Weight (lb dw)</b>	5,732	66,827	49	72,608
<b>Weight (mt dw)</b>	2.6	30.3	< 0.1	32.9
<b>Percentage</b>	13%	86%	< 1%	100%

### *Non-Blacknose Small Coastal Sharks*

Alternative Suite A2 would separate the non-blacknose SCS quota into two separate regions (Atlantic and Gulf of Mexico) based on the percentage of regional landings since implementation of the Amendment 3 blacknose shark quotas. As described above, in 2010, blacknose sharks were removed from the SCS complex quota and a non-blacknose shark-specific quota of 221.6

mt dw (488,540 lb dw) was created for both regions. Blacknose shark and non-blacknose SCS quotas were also linked so that if landings of either non-blacknose SCS or blacknose sharks reach or is projected to reach 80 percent, both management groups would close for the rest of the fishing year. The reduced quotas and quota linkage established in Amendment 3 changed how the SCS fishery operated as fishermen began to specifically avoid blacknose sharks to ensure that the larger non-blacknose SCS fishery would remain open.

According to 2011 dealer data, 79.5 percent of non-blacknose SCS landings occurred in the Atlantic region. As noted above, only 2011 data was used for the Gulf of Mexico non-blacknose SCS since this year included landings after the effective date of Amendment 3, but excluded 2010 when fishing was disrupted by the Deepwater Horizon/BP oil spill. Since the Atlantic non-blacknose SCS quota considers landings relative to the Gulf of Mexico, only 2011 data was used. In 2011, 20.5 percent of the non-blacknose SCS landings occurred in the Gulf of Mexico (Table 2.10). Based on these percentages, the new non-blacknose SCS quota in the Atlantic would be 176.1 mt dw (388,222 lb dw), while the Gulf of Mexico quota would be 45.5 mt dw (100,317 lb dw). Below are the equations describing how the Atlantic and Gulf of Mexico commercial non-blacknose SCS quotas were calculated:

- 1) Atlantic: 221.6 mt dw (488,539 lb dw) \* 79.5 % (proportion of total non-blacknose SCS landings from the Atlantic region) = **176.1 mt dw (388,222 lb dw)**
- 2) Gulf of Mexico: 221.6 mt dw (488,539 lb dw) \* 20.5 % (proportion of non-blacknose SCS landings from the Gulf of Mexico region) = **45.5 mt dw (100,317 lb dw)**

**Table 2.10 Non-blacknose SCS commercial landings and percentage by region from 2011.** Source: ACCSP and GULFIN dealer data (2011).

		2011
Atlantic	Weight (lb dw)	309,676
	Percentage	79.5%
Gulf of Mexico	Weight (lb dw)	80,020
	Percentage	20.5%

### *Quota Linkages*

Under Alternative Suite A2, several quota linkages would be implemented to prevent exceeding the newly established quotas. Generally, two or more shark species with separate quotas are caught together on the same set or trip. If the quota for one of these species has been filled and closed, that species could still be caught in other directed shark fisheries as bycatch, possibly resulting in mortality and negating some of the conservation benefit of quota closures.

Alternative Suite A2 would link several quotas to ensure that the management groups for shark species that are caught together open and close at the same time. In the Atlantic region, the hammerhead shark and aggregated LCS quotas would be linked. These two management groups would open at the same time and both management groups would close when landings of either hammerhead sharks or aggregated LCS reach, or are expected to reach, 80 percent of the quota. Opening and closing these two management groups concurrently would strengthen the conservation benefits of either group's closure. Similarly, in the Gulf of Mexico region, hammerhead sharks, blacktip sharks, and the aggregated LCS management groups would open at

the same time and all three management groups would close when landings of any one of the three management groups reach, or are expected to reach, 80 percent of their quota.

Similarly, the blacknose and non-blacknose SCS regional quotas would be linked under this alternative. The Atlantic blacknose shark quota would be linked to the Atlantic non-blacknose SCS quota, and the Gulf of Mexico blacknose shark quota would be linked to the Gulf of Mexico non-blacknose SCS quota. Because the non-blacknose SCS quota is being split between regions for management purposes and not because there are different stocks between the Atlantic and Gulf of Mexico regions, we would also establish a mechanism that would allow inseason quota transfers between the Atlantic and Gulf of Mexico non-blacknose SCS regions. We would allow for inseason or annual transfers of non-blacknose SCS quota between the regions after considering the following criteria:

- (A) The usefulness of information obtained from catches in the particular management group for biological sampling and monitoring of the status of the respective shark species and/or management group.
- (B) The catches of the particular species and/or management group quota to date and the likelihood of closure of that segment of the fishery if no adjustment is made.
- (C) The projected ability of the vessels fishing under the particular species and/or management group quota to harvest the additional amount of corresponding quota before the end of the fishing year.
- (D) Effects of the adjustment on the status of all shark species.
- (E) Effects of the adjustment on accomplishing the objectives of the fishery management plan.
- (F) Variations in seasonal distribution, abundance, or migration patterns of the appropriate shark species and/or management group.
- (G) Effects of catch rates in one area precluding vessels in another area from having a reasonable opportunity to harvest a portion of the quota.
- (H) Review of dealer reports, daily landing trends, and the availability of the respective shark species and/or management group on the fishing grounds.

### *Recreational Measures*

Under Alternative Suite A2, based on the misidentification issues, we would increase outreach to the recreational community to increase awareness of current regulations and shark identification. In addition, we considered mandatory reporting of all hammerhead sharks landed recreationally through the HMS non-tournament reporting system. Such a reporting requirement would allow us to collect additional data on recreational hammerhead sharks landings.

### **Alternative Suite A3**

Alternative Suite A3 would establish TACs for scalloped hammerhead, Atlantic blacknose, Gulf of Mexico blacknose, and Gulf of Mexico blacktip sharks. It would not create regional quotas for hammerhead sharks and non-blacknose SCS, and quotas would not be linked. There would be multiple recreational measures, including creating a minimum size for hammerhead sharks. These measures are outlined in greater detail below.

### *Scalloped Hammerhead Sharks*

Alternative Suite A3 considers addressing scalloped hammerhead sharks in a similar fashion to Alternative Suite A2. All three large hammerhead shark species would be included under the scalloped hammerhead TAC established in Hayes et al. (2009) due to difficulties in species identification. The overall hammerhead shark commercial quota across the Atlantic and Gulf of Mexico regions would be calculated using the same methodology outlined in Alternative Suite A2; however, the quota would not be sub-divided between the Atlantic and Gulf of Mexico regions. Instead one hammerhead shark quota applicable to both regions would be established. The hammerhead shark commercial quota would open and close across both regions at the same time. The total hammerhead shark commercial quota, applicable across both the Atlantic and Gulf of Mexico regions, would be 52.4 mt dw (115,457 lb dw). The methodology used to calculate this quota can be found in the scalloped hammerhead section of Alternative Suite A2. The key difference is that the quota would not be divided between the two regions.

### *Large Coastal Sharks*

A new management group would be created for non-sandbar LCS under Alternative Suite A3. The species included in the management group (aggregated LCS) would be identical to those under Alternative Suite A2. Specifically, the species in the Atlantic aggregated LCS would include blacktip, bull, lemon, nurse, silky, spinner, and tiger sharks. The species in the Gulf of Mexico aggregated LCS would include bull, lemon, nurse, silky, spinner, and tiger sharks. Under Alternative suite A3, the Atlantic aggregated LCS commercial quota would be 168.9 mt dw and the Gulf of Mexico aggregated LCS quota would be 157.5 mt dw. See the “Large Coastal Sharks” section of Alternative Suite A2 for more details.

### *Blacktip Sharks*

Under Alternative Suite A3, blacktip sharks would be removed from the non-sandbar LCS management group in the Gulf of Mexico and a separate blacktip quota would be established along with a new “aggregated LCS” commercial quota. Alternative Suite A3 would also establish a Gulf of Mexico blacktip shark TAC that would be calculated by increasing the TAC calculated in Alternative Suite A2 by 30 percent. Gulf of Mexico blacktip sharks were assessed in the SEDAR 29 stock assessment. Based on this assessment, we made the determination that the stock is not overfished and is not experiencing overfishing. As detailed in Chapter 1, SEFSC stock assessment scientists developed projections using the stock assessment data and model results. These projections estimated the maximum Gulf of Mexico blacktip shark mortality that could occur over the next 30 years without impacting the sustainability of the stock. The projections of the base model used in the SEDAR 29 stock assessment suggest that sustainable removals could vary between current removal levels up to approximately 200,000 blacktip sharks per year. However, there is a high degree of uncertainty associated with the projections. For overfished Atlantic shark stocks, we use a 70 percent probability of success under the 2006 Consolidated HMS FMP as a guide to ensure that the results of a management action are realized. This leaves a 30 percent probability of not achieving rebuilding, which we have deemed an acceptable risk. Since blacktip sharks are not overfished and we do not have an

estimate on the maximum sustainable level of morality, we used the acceptable 30 percent risk of unsustainable fishing as a guide to a possible increase in the quota above current landings. Following this framework, under Alternative Suite A3, we would increase the TAC for Gulf of Mexico blacktip sharks by 30 percent compared to current removals. The Gulf of Mexico blacktip shark TAC and commercial quota would be calculated using the following methodology:

- 1) Gulf of Mexico TAC = (Gulf of Mexico blacktip shark TAC in Alternative Suite A2 \* 130 percent)
  - a. Gulf of Mexico TAC = 413.4 mt dw \* 1.3 = 537.4 mt dw
  
- 2) (Gulf of Mexico TAC) – (recreational Gulf of Mexico blacktip shark landings) – (Gulf of Mexico blacktip shark commercial discards) – (research set aside) = Gulf of Mexico commercial blacktip shark quota
  - a. **537.4 mt dw** (Gulf of Mexico blacktip shark TAC) – 60.3 mt dw (recreational Gulf of Mexico blacktip shark landings) - 96.2 mt dw (Gulf of Mexico blacktip shark commercial discards) - 0.2 mt dw (research set-aside) = **380.6 mt dw (Gulf of Mexico commercial blacktip shark quota)**

Under Alternative Suite A3, the Gulf of Mexico blacktip shark commercial quota would be 380.6 mt dw (839,090 lb dw). As with Alternative Suite A2, a separate Atlantic blacktip shark commercial quota would not be established for the Atlantic blacktip shark stock.

### *Blacknose Sharks*

Under Alternative Suite A3, we would establish separate Atlantic and Gulf of Mexico blacknose shark regional quotas. The Atlantic blacknose shark regional TAC (7,300 sharks) would result in an Atlantic commercial blacknose shark quota of 18.0 mt dw (39,749 lb dw), which is the same as under Alternative Suite A2.

For the Gulf of Mexico blacknose stock, the stock status is unknown and there is no TAC recommendation from the assessment. Therefore, we needed to determine a basis for establishing a TAC for the Gulf of Mexico stock. The previously accepted stock assessment for blacknose sharks (SEDAR 13 in 2007; SEDAR 2007) assessed blacknose sharks as one stock. Although the previous assessment can help inform our decision regarding the appropriate TAC for the Gulf of Mexico stock now, the difference in structure between the two assessments creates a complication: the best available science for Gulf of Mexico blacknose sharks (SEDAR 13) considered one stock across both regions; the best available science for Atlantic blacknose sharks (SEDAR 21) considered separate regional stocks. As a reasonable approach to this complexity, under this alternative suite, we would subtract the SEDAR 21 Atlantic blacknose shark TAC of 7,300 sharks from the SEDAR 13 Atlantic and Gulf of Mexico TAC of 19,200 sharks, leaving the Gulf of Mexico TAC. This would create a TAC of 11,900 blacknose sharks for the Gulf of Mexico (19,200 – 7,300 = 11,900 sharks), or 22.7 mt dw. However, because other sources of mortality in the Gulf of Mexico (i.e., recreational landings, commercial discards, and research set-aside) exceed this TAC, there would be no quota available for commercial or

recreational retention of blacknose sharks in the Gulf of Mexico region under this alternative suite (Table 2.11). We would also work with the Gulf of Mexico Fishery Management Council to reduce mortality of blacknose sharks in non-HMS fisheries to ensure the overall TAC would not be exceeded for Gulf of Mexico blacknose sharks. The methodology for calculating the Gulf of Mexico commercial blacknose shark quota is outlined in an equation format below:

- 1) (Gulf of Mexico blacknose shark TAC = TAC per SEDAR 13 TAC - Atlantic SEDAR 21 TAC) - (recreational blacknose shark landings) – (commercial blacknose shark discards) – (research set aside) = Total Gulf of Mexico commercial blacknose shark quota
  - a. 22.7 mt dw (blacknose shark TAC) – 3.6 mt dw (recreational blacknose shark landings) – 31.6 mt dw (commercial blacknose shark discards) – < 0.1 mt dw (research set-aside) = **-12.5 mt dw**

**Table 2.11 Sources of yearly Gulf of Mexico blacknose shark mortality, 2008-2011.**

Source: SEDAR, 2011. Estimates for the 2011 recreational landings were based on the 2010 landings. Commercial discard estimates from data reported from Southeast bottom longline and gillnet observer programs and bycatch shrimp landings. Longline and gillnet discards are derived from multiplying the longline landings and fishing trips by the ratio of dead discards observed in the commercial shark bottom longline fishery. NMFS used the average bycatch shrimp landings from 2008-2009 to calculate 2010 and 2011 estimates. Table does not include mortality from commercial landings.

<b>Gear</b>	<b>Recreational Landings</b>	<b>Commercial Discards</b>	<b>Research Set-Aside</b>	<b>Total</b>
<b>Weight (lb dw)</b>	7,937	69,734	39	77,710
<b>Weight (mt dw)</b>	3.6	31.6	< 0.1	35.2
<b>Percentage</b>	10%	90%	< 1%	100%

### *Non-Blacknose Small Coastal Sharks*

Under Alternative Suite A3, the non-blacknose SCS management group would remain as one region with a quota of 221.6 mt dw (488,539 lb dw). This would be the same as the non-blacknose SCS alternative included in Alternative Suite 1.

### *Quota Linkages*

Under Alternative Suite A3, no quota linkages would be implemented. All shark quotas would open and close independent of each other. This measure is a change from status quo in that the blacknose shark and non-blacknose SCS quotas would no longer be linked.

### *Recreational Measures*

Under Alternative Suite A3, the minimum recreational size for all hammerhead sharks (great, smooth, and scalloped) would be increased to 78 inches fork length based on data from Hazin et al. (2001). As with Alternative Suite A2, outreach materials would be developed to improve

shark identification including hammerhead shark identification as it is often hard to differentiate between great, scalloped, and smooth hammerhead sharks.

### **Alternative Suite A4**

Alternative Suite A4 would establish species-specific TACs for scalloped hammerhead, Atlantic blacknose, Gulf of Mexico blacknose, and Gulf of Mexico blacktip sharks. It would also create regional quotas for scalloped hammerhead sharks, blacknose sharks, non-blacknose SCS, and aggregated LCS, and Gulf of Mexico blacktip sharks. Recreational shark quotas would be established. These measures are outlined in greater detail below

#### *Scalloped Hammerhead Sharks*

Alternative Suite A4 considers addressing scalloped hammerhead sharks in a similar fashion to Alternative Suite A2, except that only scalloped hammerhead sharks would be included under the scalloped hammerhead shark TAC established in Hayes et al. (2009), rather than all large hammerhead shark species. Scalloped hammerhead shark mortality from recreational landings, commercial discards, and the research set-aside mortality would be deducted from the overall scalloped hammerhead shark TAC of 79.6 mt dw, resulting in a scalloped hammerhead shark commercial quota. This scalloped hammerhead shark commercial quota would then be divided between the Atlantic and Gulf of Mexico regions based on average percent of scalloped hammerhead sharks landed in each region relative to the total from 2008-2011. Between 2008 and 2011, scalloped hammerhead shark landings in the Atlantic region accounted for 50.8 percent of the total scalloped hammerhead shark landings and scalloped hammerhead shark landings in the Gulf of Mexico region accounted for 49.2 percent (Table 2.12) of the total. Consequently, under Alternative Suite A4, the Atlantic scalloped hammerhead shark commercial quota would be 26.6 mt dw (58,602 lb dw) and the Gulf of Mexico scalloped hammerhead shark commercial quota would be 25.8 mt dw (56,855 lb dw). For simplicity, the above methodology for calculating Atlantic and Gulf of Mexico commercial scalloped hammerhead shark quotas is outlined in an equation format below:

- 1) (scalloped hammerhead shark TAC per Hayes et al. 2009) – (recreational scalloped hammerhead shark landings) – (commercial scalloped hammerhead shark discards) - (research set aside mortality) = Total Atlantic and Gulf of Mexico commercial hammerhead shark quota
  - a.  $79.6 \text{ mt dw (scalloped hammerhead shark TAC)} - 4.9 \text{ mt dw (recreational scalloped hammerhead shark landings)} - 22.0 \text{ mt dw (commercial scalloped hammerhead shark discards)} - 0.3 \text{ mt dw (research set-aside mortality)} = \mathbf{52.4 \text{ mt dw (115,457 lb dw)}}$
  
- 2) Atlantic and Gulf of Mexico regional quotas would then be multiplied by the average percentage of scalloped hammerhead sharks landed in each region
  - a. Atlantic:  $52.4 \text{ mt dw (115,457 lb dw)} * 50.8 \% \text{ (proportion of total hammerhead shark landings from the Atlantic)} = \mathbf{26.6 \text{ mt dw (58,602 lb dw)}}$

- b. Gulf of Mexico: 52.4 mt dw (115,457 lb dw) \* 49.2 % (proportion of total hammerhead shark landings from the Gulf of Mexico) = **25.8 mt dw (56,855 lb dw)**

**Table 2.12 Commercial Scalloped Hammerhead Shark Landings;** Source: ACCSP and GULFIN Databases.

Year	Gulf of Mexico Scalloped Hammerhead Shark Landings (lb dw)	Atlantic Scalloped Hammerhead Shark Landings (lb dw)	Total (Gulf of Mexico + Atlantic)	Percentage of Total Scalloped Hammerhead Shark Landings From Gulf of Mexico	Percentage of Total Scalloped Hammerhead Shark Landings From Atlantic
2008	28,197	28,706	56,903	49.6%	50.4%
2009	68,548	66,831	135,379	50.6%	49.4%
2010	16,913	48,331	65,244	25.9%	74.1%
2011	45,081	19,750	64,831	69.5%	30.5%
<b>Total</b>	<b>158,739</b>	<b>163,618</b>	<b>322,357</b>	<b>49.2%</b>	<b>50.8%</b>

### *Large Coastal Sharks*

Alternative Suite A4 would establish new aggregated LCS quotas in the Atlantic and Gulf of Mexico regions using a similar methodology to that outlined in Alternative Suite A2. However, while Alternative Suite A2 would calculate each species' contribution to total non-sandbar LCS landings using average annual landings between 2008 and 2011, Alternative Suite A4 would calculate each species' contribution to total non-sandbar LCS landings using the year with the highest annual landings for the complex between 2008 and 2011 for each species. This alternative suite would use the year with the highest annual landings in each region to compensate for low catch in abnormal years (e.g., 2010: Gulf of Mexico Deepwater Horizon/BP oil spill). This methodology was chosen to show a common representation of the fishery. The year with the highest non-sandbar LCS landings in the Atlantic region was 2008 and the highest in the Gulf of Mexico region was 2011.

In the Atlantic region under Alternative Suite A4, only scalloped hammerhead sharks, rather than all three species of large hammerhead sharks, would be removed from the Atlantic non-sandbar LCS quota and a separate Atlantic scalloped hammerhead shark quota would be established to rebuild the species based on the stock assessment. Under this alternative suite, only scalloped hammerhead sharks would be removed from the LCS quota to provide the opportunity to analyze the impact of a scalloped hammerhead shark-only quota rather than a quota for all hammerhead sharks as analyzed in Alternative Suites A2 and A3. The methodology for establishing the Atlantic scalloped hammerhead shark quota is outlined above. After removing scalloped hammerhead sharks, the Atlantic aggregated LCS quota would include blacktip, bull, lemon, nurse, silky, spinner, tiger, smooth hammerhead, and great hammerhead sharks. The new Atlantic aggregated commercial quota would be calculated using the following methodology:

- 1) Calculate each species' percent contribution to total landings based on 2008-2011 landings data using the highest annual non-sandbar LCS landings in the Atlantic, 2008 (Table 2.13)

**Table 2.13 Atlantic Non-Sandbar LCS Percent Landings by Species in 2009;** Source: ACCSP Database

Year	% Blacktip	% Bull	% Lemon	% Nurse	% Silky	% Spinner	% Tiger	% Smooth & Great Hammerhead	% Scalloped Hammerhead
2008	75.7%	10.3%	4.4%	0.0%	0.1%	0.2%	3.0%	1.8%	4.4%

- 2) Use each species proportion of total landings to apportion the total current Atlantic non-sandbar LCS quota (Table 2.14)

**Table 2.14 Atlantic Non-Sandbar LCS Quota Apportioned by Percent Landings by Species (Table 2.13);** Source: ACCSP Database

Quota (mt dw)	Blacktip Shark (mt dw)	Bull Shark (mt dw)	Lemon Shark (mt dw)	Nurse Shark (mt dw)	Silky Shark (mt dw)	Spinner Shark (mt dw)	Tiger Shark (mt dw)	Smooth & Great HH Shark (mt dw)	Scalloped HH Shark (mt dw)
188.3	142.6	19.5	8.3	0	0.2	0.4	5.6	3.4	8.3

- 3) The Atlantic aggregated LCS quota would be the sum of the apportioned quotas for all current non-sandbar LCS except scalloped hammerhead shark landings:
  - a. 142.6 mt dw (blacktip shark landings) + 19.5 mt dw (bull shark landings) + 8.3 mt dw (lemon shark landings) + 0 mt dw (nurse shark landings) + 0.2 mt dw (silky shark landings) + 0.4 mt dw (spinner shark landings) + 5.6 mt dw (tiger shark landings) + 3.4 mt dw (smooth and great hammerhead shark landings) = **180.0 mt dw** (Alternative Suite A4's Atlantic aggregated LCS quota)

Thus, under Alternative Suite A4, the Atlantic aggregated LCS commercial quota would be 180.0 mt dw.

In the Gulf of Mexico, blacktip sharks as well as scalloped hammerhead sharks would be managed separately from the Gulf of Mexico aggregated LCS quota under Alternative Suite A4 since we have stock assessments for both species. A separate quota would be established for both blacktip sharks and scalloped hammerhead sharks, as discussed above. After removing blacktip and scalloped hammerhead sharks, the Gulf of Mexico aggregated LCS quota would include bull, lemon, nurse, silky, spinner, tiger, smooth hammerhead, and great hammerhead sharks. The new Gulf of Mexico aggregated LCS commercial quota would be calculated using the following methodology:

- 1) Calculate each species' percent contribution to total landings based on 2008-2011 landings data using the highest annual non-sandbar LCS landings in the Gulf of Mexico, 2011 (Table 2.15)

**Table 2.15 Gulf of Mexico Non-Sandbar LCS Percent Landings by Species in 2011;** Source: GULFIN Database

Year	% Blacktip	% Bull	% Lemon	% Nurse	% Silky	% Spinner	% Tiger	% Smooth & Great HH	% Scalloped HH
2011	53.2%	23.3%	4.7%	0.0%	0.0%	9.7%	2.7%	1.9%	4.5%

- 2) Use each species proportion of total landings to apportion the total current Gulf of Mexico aggregated LCS quota (Table 2.16)

**Table 2.16 Gulf of Mexico Non-Sandbar LCS Quota Apportioned by Percent Landings by Species (Table 2.15);** Source: GULFIN Database

Quota (mt dw)	Blacktip Shark (mt dw)	Bull Shark (mt dw)	Lemon Shark (mt dw)	Nurse Shark (mt dw)	Silky Shark (mt dw)	Spinner Shark (mt dw)	Tiger Shark (mt dw)	Smooth & Great Hammerhead Shark (mt dw)	Scalloped Hammerhead Shark (mt dw)
439.5	233.7	102.4	20.5	< 0.1	0.2	42.5	12.0	8.2	20.2

- 3) The Gulf of Mexico aggregated LCS quota would be the sum of the apportioned quotas for all current non-sandbar LCS except blacktip shark and scalloped hammerhead shark landings:
- a.  $102.4 \text{ mt dw (bull shark landings)} + 20.5 \text{ mt dw (lemon shark landings)} + < 0.1 \text{ mt dw (nurse shark landings)} + 0.2 \text{ mt dw (silky shark landings)} + 42.5 \text{ mt dw (spinner shark landings)} + 12.0 \text{ mt dw (tiger shark landings)} + 8.2 \text{ mt dw (smooth and great hammerhead shark landings)} = \mathbf{185.8 \text{ mt dw}}$  (Alternative Suite 4’s Gulf of Mexico aggregated LCS quota)

Thus, under Alternative Suite A4, the Gulf of Mexico aggregated LCS commercial quota would be 185.8 mt dw.

*Blacktip Sharks*

Under Alternative Suite A4, blacktip sharks would be removed from the non-sandbar LCS quota in the Gulf of Mexico and a separate blacktip quota would be established along with a new “aggregated LCS” commercial quota. Gulf of Mexico blacktip sharks were assessed in the SEDAR 29 stock assessment. Based on the assessment, we determined that the stock is not overfished and is not experiencing overfishing. As detailed in Chapter 1, SEFSC stock assessment scientists developed projections using the stock assessment data and model results. These projections estimated the maximum Gulf of Mexico blacktip shark mortality that could occur over the next 30 years without impacting the sustainability of the stock. This total mortality is equivalent to a TAC estimate. In the case of the base model projections, an annual TAC of 206,919 blacktip sharks is unlikely to result in an overfished stock as of 2040. This equates to a TAC of 2,149.3 mt dw (4,738,445 lb dw) using the average blacktip shark weight from bottom longline observer program records of 22.9 lb dw. Alternative Suite A4 would

implement this TAC for Gulf of Mexico blacktip sharks and the commercial Gulf of Mexico blacktip quota would be calculated using the following methodology:

- 1) (Gulf of Mexico blacktip shark TAC recommendation per the SEDAR 29 process) – (recreational Gulf of Mexico blacktip shark landings) – (Gulf of Mexico blacktip sharks commercial discards) – (research set aside) = Gulf of Mexico commercial blacktip shark quota
  - a. 2,149.3 mt dw (TAC) – 60.3 mt dw (recreational landings) – 96.2 mt dw (commercial discards) – 0.2 (research set aside) = **1,992.6 mt dw** (4,392,886 lb dw)

Under Alternative Suite A4, the Gulf of Mexico blacktip shark commercial quota would be 1,992.6 mt dw (4,392,886 lb dw). The Gulf of Mexico aggregated LCS commercial quota would be adjusted as discussed above. As with Alternative Suite A2, a separate Atlantic blacktip shark commercial quota would not be established for the Atlantic blacktip shark stock.

### *Blacknose Sharks*

Alternative Suite A4 would establish separate Atlantic and Gulf of Mexico blacknose shark regional quotas. The Atlantic quota would be based on the results of SEDAR 21 stock assessment TAC recommendation of 7,300 sharks. See the blacknose shark section of Alternative Suite A2 for more details.

As described above, the Gulf of Mexico stock assessment for blacknose sharks was not accepted by the SEDAR 21 Review Panel, and a TAC recommendation was not provided. Therefore, we determined that the stock status for the Gulf of Mexico blacknose shark stock is unknown (76 FR 62331; October 7, 2011). As a result, we need to determine a basis for establishing a TAC for the Gulf of Mexico stock. As a reasonable approach, under this alternative suite for the Gulf of Mexico region, we applied the average percentage of regional blacknose shark catches that was used in the SEDAR 13 stock assessment (51 percent for the Gulf of Mexico) to the current overall 19,200 blacknose shark TAC to establish a TAC for the Gulf of Mexico stock. This percentage approach results in a TAC of 9,792 sharks ( $19,200 * 0.51 = 9,792$ ), or 18.7 mt dw, for the Gulf of Mexico. When calculating the quota by deducting blacknose shark mortality from other sources in the Gulf of Mexico (i.e., recreational landings, commercial discards, and research set-aside; Table 2.11) the TAC is exceeded. Therefore, there would be no quota available for commercial or recreational retention of blacknose sharks in the Gulf of Mexico region under this Alternative Suite. We would also work with the Gulf of Mexico Fishery Management Council to reduce mortality of blacknose sharks in non-HMS fisheries to ensure the overall TAC would not be exceeded for Gulf of Mexico blacknose sharks. The methodology for calculating the Gulf of Mexico commercial blacknose shark quota is outlined in an equation format below:

- 1) (Gulf of Mexico blacknose shark TAC = (51% of SEDAR 13 TAC) – (recreational blacknose shark landings) – (commercial blacknose shark discards) – (research set aside)

- b. TAC = 18.7 mt dw (51% of SEDAR 13 TAC)– 3.6 mt dw (recreational blacknose shark landings) – 31.6 mt dw (commercial blacknose shark discards) – < 0.1 mt dw (research set-aside) = **-16.5 mt dw**

### *Non-Blacknose Small Coastal Sharks*

Alternative Suite A4 would separate the non-blacknose SCS quota into regional quotas. We would divide the 488,539 lb dw (221.6 mt dw) in half for each region to allow equal fishing opportunity for the SCS fishermen. This would result in Atlantic and Gulf of Mexico regional quotas of 244,269.5 lb dw (110.8 mt dw) in each region.

### *Quota Linkages*

Quota linkages under Alternative Suite A4 would be nearly identical to those under Alternative Suite A2 except that instead of linking the hammerhead quotas in the Atlantic and Gulf of Mexico regions, the regional scalloped hammerhead quota would be linked to their associated regional aggregated LCS quotas. Alternative Suite A4 considers a scalloped hammerhead shark-only quota as opposed to a hammerhead shark quota (which would include scalloped, smooth, and great hammerhead sharks) under Alternative Suite A2. In the Atlantic, the scalloped hammerhead shark and Atlantic aggregated LCS quotas would be linked. These two management groups would open at the same time and both management groups would close when landings of either scalloped hammerhead sharks or the Atlantic aggregated LCS reach, or are expected to reach, 80 percent of the quota. Opening and closing these two management groups concurrently would strengthen the conservation benefits of either group's quota closure. Similarly, in the Gulf of Mexico, scalloped hammerhead sharks, blacktip sharks, and the Gulf of Mexico aggregated LCS management groups would open at the same time and all three management groups would close when landings of any one of the three management groups reach, or are expected to reach, 80 percent.

As in Alternative A2, regional blacknose and non-blacknose SCS would be linked, and a mechanism to transfer non-blacknose SCS quota between regions would be established.

### *Recreational Measures*

To reduce recreational landings of overfished species such as sandbar, scalloped hammerhead, and blacknose sharks, species-specific recreational shark quotas would be implemented. A three year average of recreational landings would be used as a cap to restrict recreational landings at current levels. If the shark species-specific landings exceed the quota, further action would be taken to prohibit certain species or close all recreational shark fishing. In addition, outreach material would be developed for and distributed to the recreational community to help identify all shark species including prohibited species. The other recreational fishery regulations would still apply. Currently, recreational anglers may retain one authorized shark species (*i.e.*, LCS, SCS, or pelagic shark) per vessel per trip that has a fork length of at least 54 inches. Also, recreational anglers are also allowed one Atlantic sharpnose and one bonnethead shark per person per vessel per trip.

## **Alternative Suite A5**

This alternative would prohibit commercial and recreational retention of sharks. Under Alternative Suite A5, all Atlantic Ocean, Gulf of Mexico, and Caribbean Sea recreational and commercial shark fisheries would be closed. No sharks could be retained by commercial or recreational fishermen in the Atlantic Ocean, Gulf of Mexico, or U.S. Caribbean.

## ***Alternative Suite A6 – Preferred Alternative Suite***

Based on public comment, Alternative Suite A6 was developed as a new preferred alternative. It is essentially a hybrid of management measures previously evaluated in the DEIS and falls within the range of alternatives that were discussed and analyzed in the DEIS. For the most part, this alternative suite is based on Alternative Suite A2, the preferred alternative suite in the DEIS. The only differences are in the approach to quota linkages and recreational measures. The specific public comments and additional analyses are discussed in the Quota Linkages and Recreational Measures sections. These differences are discussed in the following sections.

### *Scalloped Hammerhead Sharks*

Alternative Suite A6 scalloped hammerhead shark measures are identical to those under Alternative Suite A2, which was the preferred alternative at the DEIS stage.

Scalloped, smooth, and great hammerhead sharks (hammerhead sharks) would be removed from the Atlantic and Gulf of Mexico non-sandbar LCS quotas and separate Atlantic and Gulf of Mexico hammerhead shark quotas would be established. To calculate the Atlantic and Gulf of Mexico hammerhead shark quotas, the maximum sustainable level of scalloped hammerhead shark commercial landings would be estimated by using the TAC calculated in Hayes et al. (2009) and subtracting scalloped hammerhead recreational landings, commercial discards, and research mortality. This maximum sustainable level of scalloped hammerhead shark commercial landings would then become the hammerhead shark commercial quota in each region, applicable to scalloped, smooth, and great hammerhead sharks. Landings of all three large hammerhead sharks would count toward this quota due to the difficulty in differentiating among the species, especially when dressed. The TAC would be 79.6 mt dw and the overall commercial quota for both regions would be 52.4 mt dw (115,457 lb dw). This overall commercial quota would then be apportioned between the two regions based on the proportions of total hammerhead shark landings between the Atlantic and Gulf of Mexico regions. From 2008-2011, the Atlantic region caught 51.7 percent of the total hammerhead shark landings and the Gulf of Mexico region caught 48.3 percent. This results in an Atlantic hammerhead shark commercial quota of 27.1 mt dw (59,736 lb dw) and a Gulf of Mexico hammerhead shark commercial quota of 25.3 mt dw (55,722 lb dw). See the description of hammerhead shark measures under Alternative Suite A2 for more detailed information.

### *Large Coastal Sharks*

Alternative Suite A6 would create the Atlantic aggregated LCS and Gulf of Mexico aggregated LCS management groups, which are identical to the management groups analyzed under Alternative Suite A2 and preferred at the DEIS stage. Specifically, the species in the Atlantic

Aggregated LCS would include blacktip, bull, lemon, nurse, silky, spinner, and tiger sharks. The species in the Gulf of Mexico Aggregated LCS would include bull, lemon, nurse, silky, spinner, and tiger sharks. Under Alternative suite 2, the Atlantic aggregated LCS commercial quota would be 168.9 mt dw (372,552 lb dw) and the Gulf of Mexico aggregated LCS quota would be 157.5 mt dw (347,317 lb dw). See the Large Coastal Sharks section of Alternative Suite A2 for more details.

#### *Blacktip Sharks*

Under Alternative Suite A6, blacktip sharks would be removed from the non-sandbar LCS quota in the Gulf of Mexico region and a separate blacktip quota would be established using the identical methodology described under Alternative Suite A2. The TAC of 413.4 mt dw would be calculated by summing all of the sources of mortality (recreational landings, commercial discards, and research set-aside mortality) and the commercial quota. The commercial quota would be calculated by multiplying the proportion of current Gulf of Mexico blacktip shark landings that make up the Gulf of Mexico non-sandbar LCS quota by the current Gulf of Mexico non-sandbar LCS 2013 baseline quota. This would result in a commercial quota of 256.6 mt dw (565,700 lb dw). See the Blacktip Sharks section of Alternative Suite A2 for more detailed information.

#### *Blacknose Sharks*

The blacknose sharks measures under Alternative Suite A6 are identical to those under Alternative Suite A2. The Atlantic commercial quota would be derived from the TAC of 7,300 blacknose sharks, or 21.2 mt dw, that was specified in the stock assessment. Within the TAC of 21.2 mt dw, blacknose shark recreational landings, commercial discards, and research set-aside mortality would be subtracted from the TAC to calculate the commercial quota of 18.0 mt dw (39,749 lb dw). See the Blacknose Sharks section of Alternative Suite A2 for more detailed information.

For Gulf of Mexico blacknose sharks, a TAC of 34.9 mt dw was calculated by summing mortality from the 2011 commercial fishery, and average recreational and discard mortality since the implementation of blacknose shark measures from Amendment 3 in 2010. The 2011 commercial mortality was used to calculate the TAC instead of average commercial mortality since Amendment 3 was implemented, because of a shortened 2010 fishing season due to the implementation of Amendment 3 (season opened on June 1, 2010) and fishing restrictions due to the Deepwater Horizon/BP oil spill. Using 2011 commercial landings of blacknose sharks in the Gulf of Mexico, the new Gulf of Mexico blacknose shark commercial quota would be 2.0 mt dw (4,513 lb dw). See the Blacknose Sharks section of Alternative Suite A2 for more detailed information.

#### *Non-Blacknose Small Coastal Sharks*

The non-blacknose SCS measures under Alternative Suite A6 are identical to those under Alternative Suite A2. The existing commercial quota, applicable to both the Atlantic and Gulf of Mexico regions, would be apportioned between the two regions based on the percentage of

regional landings. The current commercial quota across both regions is 221.6 mt dw (488,540 lb dw). According to 2011 dealer data, 79.5 percent of non-blacknose landings occurred in the Atlantic region and 20.5 percent of the non-blacknose landings occurred in the Gulf of Mexico. Based on these percentages, the new non-blacknose SCS quota in the Atlantic would be 176.1 mt dw (388,222 lb dw), while the Gulf of Mexico quota would be 45.5 mt dw (100,317 lb dw). As noted above, only 2011 data was used for the Gulf of Mexico non-blacknose SCS since this year included landings after the effective date of Amendment 3, but excluded 2010 when fishing was disrupted by the Deepwater Horizon/BP oil spill. Since the Atlantic non-blacknose SCS quota considers landings relative to the Gulf of Mexico, only 2011 data was used in the Atlantic as well. See the Non-Blacknose Small Coastal Sharks section of Alternative Suite A2 for more detailed information.

### *Quota Linkages*

As described in the introduction to this alternative suite, quota linkage measures are one of the two measures that changed between the DEIS and FEIS, based on public comment and additional analyses.

For quota linkages, we incorporated the quota linkages in Alternative Suite A2 for Atlantic and Gulf of Mexico blacknose shark and non-blacknose SCS quotas, and for the Atlantic hammerhead shark and aggregated LCS quotas. These quota linkages are identical to those presented in Alternative Suite A2. Management groups with linked quotas would all close when landings from one of the component management groups reach, or is expected to reach, 80 percent of the quota. Additionally, there would be a mechanism established that would allow inseason quota transfers between the Atlantic and Gulf of Mexico non-blacknose SCS regions. Similarly, under this alternative suite, there would be a mechanism established that would allow inseason quota transfers between the Atlantic and Gulf of Mexico hammerhead regions.

For Gulf of Mexico blacktip shark, hammerhead shark, and aggregated LCS quota linkages, we combined aspects of the quota linkage measures from Alternative Suites A2 and A3. As in Alternative Suite A2, the Gulf of Mexico hammerhead shark quota and the Gulf of Mexico aggregated LCS quota would be linked. When landings of either management group reach, or is expected to reach, 80 percent of the quota, both management groups would close. The Gulf of Mexico blacktip shark quota, on the other hand, would not be linked to any other quotas. The Gulf of Mexico blacktip shark management group would open and close independently of the hammerhead shark and aggregated LCS management groups. The blacktip shark, hammerhead shark, and aggregated LCS Gulf of Mexico quotas are either based on recent landings history in this region (blacktip shark and aggregated LCS) or were calculated to be at a level slightly above recent landings (hammerhead sharks). Consequently, if fishing continues as it did in 2008-2011, these three quotas should be filled at approximately the same rate and each management group would likely close near the same time. When these three management groups close at approximately the same time, mortality of a species in a closed management group is unlikely to be excessive in the open management group. For example, if the hammerhead shark management group is closed, it is unlikely that a high level of mortality would occur while fishing for blacktip sharks continues since the blacktip shark management group would likely close slightly before or slightly after the hammerhead shark management group closed. We

received several comments from constituents and state representatives that blacktip sharks and hammerhead sharks are not often caught together in the Gulf of Mexico. We performed additional analyses and found that, based on landings data from 2008-2011, 76 percent of the Gulf of Mexico blacktip shark landings occur in Louisiana, while only 1 percent of Gulf of Mexico hammerhead shark landings occur in that state. The situation is reversed for Florida. Based on landings data from 2008-2011, 99 percent of the hammerhead shark landings and only 6 percent of the blacktip shark landings occur in Florida. Such a large geographic separation in landings minimizes the potential of high hammerhead or blacktip shark mortality to occur when one management group is closed. For these reasons, and primarily because we would expect the Gulf of Mexico blacktip, hammerhead, and aggregated LCS management groups to close at the same time based on past fishing practice, we no longer prefer to link the Gulf of Mexico blacktip shark quota to any other quota.

A similar analysis of aggregated LCS and hammerhead sharks did not find a similar geographic split and the two management groups are often caught together. For example, Florida, where 99 percent of Gulf of Mexico hammerhead landings are based, also lands about 60 percent of Gulf of Mexico aggregated LCS, based on landings data from 2008-2011. Since there is such a large overlap between the two management groups, we still prefer to link the aggregated LCS and hammerhead shark quotas, despite the high probability that both quotas will likely be reached at about the same rate.

To prevent excessive incidental mortality when hammerhead shark and aggregated LCS management groups are closed and the blacktip management group is open, we would implement an accountability measure under this alternative suite. We would have the inseason authority to close the blacktip shark management group before landings reach, or are expected to reach, 80 percent of the quota after, or at the same time, the hammerhead and aggregated LCS management groups close. Based on consideration of the criteria listed below and other relevant factors, we would close the Gulf of Mexico blacktip management group after, or at the same time, the hammerhead and aggregated LCS management groups close to ensure that bycatch of hammerhead sharks and aggregated LCS does not result in mortality that would exceed the TAC of either management group. The criteria are as follows:

- Estimated Gulf of Mexico blacktip shark season length based on available quota and average weekly catch rates during the current fishing year and from previous years;
- Variations in seasonal distribution, abundance, or migratory patterns of blacktip sharks, hammerhead sharks, and aggregated LCS based on scientific and fishery information;
- Effects of the adjustment on accomplishing the objectives of the 2006 Consolidated HMS FMP and its amendments;
- The amount of remaining shark quota in the relevant area or region, to date, based on dealer or other reports;
- The catch rates of the relevant shark species/management groups, to date, based on dealer or other reports.

### *Recreational Measures*

The recreational measures under Alternative Suite A6 would be identical to those presented under Alternative Suite A3. The minimum recreational size for all hammerhead sharks (great, smooth, and scalloped) would be increased to 78 inches fork length based on data from Hazin et al. (2001). Additionally, outreach materials would be developed to improve shark identification, particularly large hammerhead shark identification. We now prefer this recreational measure to that presented in Alternative Suite A2 (raise the minimum size for most recreationally caught shark to 96 inches fork length) based on public comment and because the 96-inch fork length minimum size is not necessary to meet the purpose and need of this action now that dusky shark measures are being considered in a separate action. During the public comment period, several constituents expressed concern that the preferred recreational measures in the DEIS, particularly the new 96 inch fork length minimum size for most sharks, would preclude recreational anglers' ability to retain most recreationally-caught sharks. Some specific concerns focused on blacktip sharks which are a popular recreational species that rarely reach 96 inches fork length. This size limit was based on the size-at-maturity of dusky sharks, but would have provided some protection for scalloped hammerhead sharks as well. As noted in Chapter 1, dusky shark measures have been removed from this portion of the amendment and will be addressed a later date. Consequently, the dusky shark-based minimum size is no longer preferred. We now prefer a 78 inch fork length minimum size, applicable to all three large hammerhead sharks only. This size will help protect juvenile scalloped hammerhead sharks, and since hammerhead sharks are easily identifiable as a group, it is unlikely that misidentification would result in non-compliance.

## **2.2 Dusky Shark Measures**

Based on comments received on the Predraft during scoping, and the addition of Gulf of Mexico blacktip shark to this action, we determined the scope of significant issues of concern that would be addressed in the draft amendment. The Notice of Availability of the DEIS for Amendment 5 and the proposed rule published in the Federal Register on December 7, 2013 (77 FR 73029), and November 26, 2012 (77 FR 70552), respectively. The public comment period ended on February 12, 2013. During the comment period, we received numerous comments on the proposed dusky shark measures regarding the data sources used and the analyses of these data. We also received many comments requesting consideration of approaches to dusky shark fishery management that were significantly different from those we analyzed in the Amendment 5 proposed rule and DEIS. For example, commenters suggested exemptions to a recreational minimum size increase to allow landings of other sharks such as blacktip sharks or "blue" sharks such as shortfin mako or thresher sharks, and other commenters suggested implementing gear restrictions instead of additional pelagic longline closures.

After reviewing all of the comments received, we concluded that further analyses are needed for dusky shark measures. In order to ensure that other shark measures are finalized as expeditiously as possible, we decided to conduct additional dusky shark analyses in a separate proposed action, which will be referred to as Amendment 5b. Comments received on the dusky shark portions of the November 2012 proposed rule will be considered in that action. This final document — referred to as Amendment A5a to the 2006 Consolidated HMS FMP — finalizes other shark measures needed to maintain rebuilding of sandbar sharks; end overfishing and rebuild scalloped hammerhead and Atlantic blacknose sharks; and establish a TAC and commercial quota and recreational measures for Gulf of Mexico blacknose and blacktip sharks.

## **2.3 Alternatives Considered But Not Further Analyzed**

### **Alternative 1. Commercial retention limit modifications for scalloped hammerhead, non-sandbar LCS, and blacknose sharks.**

Retention limit modifications considered but not further analyzed include options that would complement rebuilding measures for Atlantic blacknose and scalloped hammerhead sharks. However, at this time, we do not prefer to implement retention limits due to the risk of increased dead discards for blacknose and scalloped hammerhead sharks. An increase in dead discards of blacknose and/or scalloped hammerhead sharks would not achieve the purpose of managing these fishery resources in a manner that maximizes resources sustainability, while minimizing, to the greatest extent possible, the socioeconomic impacts on affected fisheries.

Blacknose retention limit modifications considered but not further analyzed include the application of the current incidental SCS retention limit (16) to directed and incidental shark permit holders for blacknose sharks. Adverse socioeconomic impacts could occur for SCS-directed shark permit holders that may incidentally encounter blacknose shark under either of these options. The preferred alternative for Amendment 3 established a quota for blacknose (19.9 mt dw) after fishermen demonstrated that selective fishing for non-blacknose SCS was possible. However, blacknose sharks are known to form large schools, and even skilled fishermen with a high success rate of avoiding blacknose sharks may still encounter schools. The quota established was based on a ratio of the estimated amount of blacknose sharks that would be landed in order for fishermen to fill the non-blacknose SCS quota. The creation of a commercial retention limit could reduce the incentive to target blacknose sharks; however, the current quota linkages between the blacknose shark fishery and the non-blacknose SCS fishery already provide an effective incentive to avoid blacknose sharks. Applying the incidental retention limits to commercial operations could result in sets with high regulatory discards because the trip limit would not be available to cover the rare events where large numbers of blacknose sharks were incidentally encountered. These dead discards may lead to continued overfishing and adverse ecological impacts.

Scalloped hammerhead shark retention measures considered but not further analyzed include the creation of a hammerhead shark trip limit equal to the average or maximum numbers of hammerhead sharks landed on trips that landed hammerhead sharks from 2008-2011, or retaining the current non-sandbar LCS trip limit and either including or excluding scalloped hammerhead sharks from counting against the non-sandbar LCS trip limit. There are a number of issues with establishing a retention limit. Scalloped hammerhead sharks are known to aggregate in schools. Setting a retention limit equal to the average landings per trip could lead to dead discards if fishermen encounter an unusually large school of scalloped hammerhead sharks. We received public comment that establishing a retention limit may also encourage high-grading, or targeting of larger sharks. Setting the retention limit equal to the maximum number of hammerhead sharks landed on a trip would reduce the risk of regulatory discards, but it could also create a high trip limit that would result in an early closure of both the scalloped hammerhead and LCS fisheries. We prefer to address scalloped hammerhead shark dead discards by linking scalloped hammerhead or hammerhead quotas with other LCS quotas, which would likely provide greater

and more effective incentive for reducing landings within the commercial shark fisheries than a retention limit, thus more effectively addressing the purpose of managing the scalloped hammerhead fishery resource in a manner that maximizes resource sustainability, while minimizing, to the greatest extent possible, the socioeconomic impacts on affected fisheries.

## **Alternative 2. Recreational retention limit modifications for blacknose sharks.**

Currently, recreational fishermen can land one blacknose shark greater than 54 inches (137 cm) fork length per trip. We considered but did not further analyze changing the trip limit (1 authorized species per vessel per trip) to a per day limit to prevent fishermen from making multiple trips targeting blacknose sharks within a day. The species generally does not grow to be that large, so the 54 inch fork length acts as a *de facto* recreational prohibition on blacknose sharks. However, recently there have been anecdotal reports of recreational landings of blacknose sharks greater than the 54 inch fork length minimum size limit. Along with the few allowable recreational landings of blacknose sharks in the federal fishery, some states have smaller (or no) recreational minimum sizes for blacknose sharks, and these state water landings may contribute more to blacknose shark recreational landings than the federal landings. In these areas, state water fishermen could catch and retain blacknose sharks smaller than the federal 54 inch fork length size limit as long as they do not possess a federal shark permit. If they do possess a federal permit they would need to abide by the federal minimum size of 54 inches fork length in the state waters as well as the federal waters as a condition of the permit. Increasing the federal minimum size for blacknose sharks is not necessary at this time, because the current federal recreational size limit of 54 inch fork length is substantially greater than the 39.8 inch fork length (101.2 cm) size at 50 percent maturity used in the SEDAR 21 stock assessments for Atlantic and Gulf of Mexico blacknose sharks. Therefore, changing the recreational possession limits and/or increasing the federal recreational minimum size for blacknose sharks would not achieve the purpose of managing this fishery resource in a manner that maximizes resources sustainability, while minimizing, to the greatest extent possible, the socioeconomic impacts on affected fisheries, and thus was considered but not further analyzed.

## Literature Cited

- Hayes, C., Jiao, Y. & Cortes, E. 2009. Stock assessment of scalloped hammerheads in the western North Atlantic Ocean and Gulf of Mexico. *North American Journal of Fisheries Management* 29, 1406–1417.
- Hazin, F., A. Fischer and M. Broadhurst. 2001. Aspects of reproductive biology of the scalloped hammerhead shark, *Sphyrna lewini*, off northeastern Brazil. *Environ. Biol. Fishes* 61: 151-159.
- NMFS. 2010. Amendment 3 to the Final Consolidated Atlantic Highly Migratory Species Fishery Management Plan. NOAA, NMFS, Highly Migratory Species Management Division, 1315 East West Highway, Silver Spring, MD 20910.
- SEDAR. 2007. SEDAR 13 Stock Assessment Report: Small Coastal Shark Complex, Atlantic Sharpnose, Blacknose, Bonnethead, and Finetooth Shark. Highly Migratory Species Management Division, 1315 East West Highway, Silver Spring, MD 20910.
- SEDAR. 2011. SEDAR 21 Stock Assessment Report: Sandbar, Dusky, and Blacknose Sharks. SEDAR, 4055 Faber Place Drive, Suite 201, North Charleston, SC 29405. 415p.

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### **3.0 DESCRIPTION OF AFFECTED ENVIRONMENT**

This chapter serves several purposes. It describes the affected environment (the fishery, the gears used, the communities involved, *etc.*), and describes the current condition of the fishery, which serves as a baseline against which to compare potential impacts of the different alternatives. This chapter also provides a summary of information concerning the biological status of shark stocks; the marine ecosystems in the fishery management unit; the social and economic condition of the fishing interests, fishing communities, and fish processing industries; and, the best available scientific information concerning the past, present, and possible future condition of shark stocks, ecosystems, and fisheries.

#### **3.1 Introduction to Highly Migratory Species Management and Highly Migratory Species Fisheries**

Atlantic HMS fisheries are managed by the Secretary of Commerce, who delegated that responsibility to NMFS. The HMS Management Division within the NMFS Office of Sustainable Fisheries is the lead office in developing regulations for HMS fisheries, although some actions affecting HMS (e.g., Large Whale Take Reduction Plan) are taken by other NMFS offices if the main legislation (e.g., MMPA) driving the action is not the Magnuson-Stevens Act or ATCA. Because of their migratory nature, HMS fisheries require management at the international, national, and state levels. NMFS manages HMS fisheries in federal waters (domestic) and the high seas (international) while individual states establish regulations for some HMS in their own waters. There are exceptions to this generalization. For example, federally-permitted commercial shark fishermen, as a condition of their permit, are required to follow federal regulations in all waters, including state waters, unless the state has more restrictive regulations, in which case the state laws prevail. Additionally, in 2005, the Atlantic States Marine Fisheries Commission (ASMFC) agreed to develop an interstate coastal shark FMP. This interstate FMP coordinates management measures among all states along the Atlantic coast (Florida to Maine). NMFS participated in the development of this interstate shark FMP, which became effective in 2010.

While NMFS does not generally manage HMS fisheries in state waters, states are invited to send representatives to Advisory Panel meetings and to participate in stock assessments, public hearings, or other fora. NMFS continues to work on improving its communication and coordination with state agencies and welcomes comments from states about various shark measures. NMFS will share this final FMP amendment with the Atlantic, Gulf of Mexico, and Caribbean states and territories and will work with states, to the extent practicable, to ensure complementary regulations. Please see Section 3.1.3 for more information regarding regulations by state.

On the international level, NMFS participates in the stock assessments conducted by the ICCAT Standing Committee on Research and Statistics (SCRS) and in annual ICCAT meetings. NMFS implements conservation and management measures adopted by ICCAT and other relevant international agreements, consistent with specific domestic implementing legislation and the Magnuson-Stevens Act. In regard to sharks, ICCAT has assessed the Atlantic blue and shortfin mako shark stocks, participated with the International Council for the Exploration of the Sea on a

joint porbeagle shark assessment, and conducted several ecosystem risk assessments for various shark species, among other things. Stock assessments and management recommendations or resolutions are listed on ICCAT's website at <http://www.iccat.int/en>. As described below, in recent years ICCAT has adopted several shark-specific recommendations. ATCA authorizes NMFS to promulgate regulations as may be "necessary and appropriate" to carry out ICCAT recommendations domestically.

NMFS also actively participates in other international bodies that could affect U.S. shark fishermen and the shark industry including Convention on International Trade in Endangered Species (CITES) and the Food and Agriculture Organization (FAO). Recently several shark species were listed under Appendix II at CITES.

### **3.1.1 History of Domestic Shark Management**

Sharks are managed along with other HMS species; thus, management of the shark fishery is presented in FMPs along with Atlantic billfish, Atlantic tunas, and Atlantic swordfish. This section gives a relatively brief history of shark management of Atlantic sharks. This history is organized by previous FMPs. For more detail regarding the history of management and of other HMS species besides sharks, please see the original documents. Proposed rules, final rules, and other official notices can be found in the Federal Register at <http://www.gpoaccess.gov/fr/index.html>. Supporting documents can be found on the HMS Management Division's webpage at <http://www.nmfs.noaa.gov/sfa/hms>. Documents can also be requested by calling the HMS Management Division at (301) 427-8503.

The management history of U.S. Atlantic shark fisheries is outlined in greater detail in Chapter 1 of the Amendment 5 Predraft document, which can be found online at:

[http://www.nmfs.noaa.gov/sfa/hms/FMP/am5\\_predraft/a5\\_predraft\\_final\\_031212\\_web.pdf](http://www.nmfs.noaa.gov/sfa/hms/FMP/am5_predraft/a5_predraft_final_031212_web.pdf)

The Predraft includes sections that summarize Atlantic shark fisheries and management prior to 1999, Amendment 1 to the FMP for Atlantic tunas, swordfish, and sharks, the 2006 Consolidated HMS FMP, and Amendments 2 and 3 to the 2006 Consolidated HMS FMP. This overview covers the growth of the commercial shark fishery from when it was under no regulations to the most recent rules currently in place to manage the Atlantic shark fisheries.

Commercial shark fishing quotas and seasons are established in a final rule on an annual basis. Quotas are generally adjusted based on over- and/or under-harvests experienced during previous Atlantic commercial shark fishing seasons, and adaptive management measures are used to provide, to the extent practicable, fishing opportunities for commercial shark fishermen in all regions and areas to determine the opening dates.

### **3.1.2 International Shark Management**

#### **3.1.2.1 ICCAT Shark Measures**

ICCAT was established at a Conference of Plenipotentiaries, which prepared and adopted the International Convention for the Conservation of Atlantic Tunas, signed in Rio de Janeiro, Brazil, in 1966. ICCAT recommendations are binding instruments for Contracting Parties while ICCAT resolutions are non-binding and express the will of the Commission. All ICCAT

recommendations and resolutions are available on the ICCAT website at <http://www.ICCAT.es>. Under ATCA, the Secretary has authority to promulgate regulations as “necessary and appropriate” to implement ICCAT measures. ICCAT generally manages tuna and tuna-like fisheries and bycatch in those fisheries but also conducts research and has adopted measures related to shark species caught within the Convention area that are associated with other ICCAT species.

The first binding measure passed by ICCAT dealing specifically with sharks, *Recommendation 04-10 Concerning the Conservation of Sharks Caught in Association with Fisheries Managed by ICCAT*, included: reporting of shark catch data by Contracting Parties, a ban on shark finning, research on gears and shark nursery areas, a request for Contracting Parties to live-release sharks that are caught incidentally, a review of management alternatives from the 2004 assessment on blue and shortfin mako sharks, and a commitment to conduct another stock assessment of selected pelagic shark species no later than 2007. The 2004 ICCAT stock assessments for shortfin mako and blue sharks included a review of their biology, a description of the fisheries, analyses of the state of the stocks and outlook, analyses of the effects of current regulations, and recommendations for statistics and research. The SCRS assessment indicated that the current biomass of North and South Atlantic blue sharks was above MSY ( $B > B_{MSY}$ ); however, these results were conditional and based on assumptions made by the Committee and on limited landings data. The North Atlantic shortfin mako shark population had experienced some level of stock depletion, as suggested by the historical catch-per-unit-effort (CPUE) trend and model outputs. The stock was below maximum sustainable yield ( $B < B_{MSY}$ ), suggesting that the species was overfished (SCRS 2004). In 2005, ICCAT amended Recommendation 04-10 (Recommendation 05-05) to include additional measures pertaining to pelagic sharks, including a requirement for Contracting Parties that had not yet implemented the 2004 recommendation to reduce shortfin mako shark mortality and to annually report on their efforts to the Commission.

At the 2007 ICCAT annual meeting, ICCAT adopted a recommendation concerning pelagic sharks, *07-06, Supplemental Recommendation by ICCAT Concerning Sharks*. The recommendation directed the SCRS to conduct stock assessments and recommend management alternatives for porbeagle sharks, take appropriate measures to reduce fishing mortality in porbeagle and North Atlantic shortfin mako shark stocks, and implement research on pelagic shark species caught in the Convention area in order to identify potential nursery areas. It also required that Contracting Parties, Cooperating non-Contracting Parties, Entities and Fishing Entities submit Task I and II data 4 for sharks in advance of the next SCRS assessment.

In 2008, an updated stock assessment for blue and shortfin mako sharks was conducted by ICCAT’s SCRS. The SCRS determined that while the quantity and quality of the data available for use in the stock assessment had improved since the 2004 assessment, they were still uninformative and did not provide a consistent signal to inform the models used in the 2008 assessment. The SCRS noted that if these data issues could not be resolved in the future, their ability to determine stock status for these and other species would continue to be uncertain. The SCRS assessed blue and shortfin mako sharks as three different stocks: North Atlantic, South

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4 Task I data is nominal catch and fleet characteristics. Task II data is catch and effort and size samples. See <http://www.iccat.int/Documents/SCRS/Manual/CH1/CH1-ENG.pdf#page=3> for more information.

Atlantic, and Mediterranean. However, the Mediterranean data was considered insufficient to conduct the quantitative assessments for these species.

In 2010, ICCAT adopted ICCAT Recommendations 10-07 and 10-08 which prohibit the retention, transshipping, landing, storing, or selling of hammerhead sharks in the family *Sphyrnidae* (except for *Sphyrna tiburo*) and oceanic whitetip sharks (*Carcharhinus longimanus*) caught in association with ICCAT fisheries.

At the 2011 meeting, ICCAT adopted Recommendation 11-08, which prohibits retention, transshipping, or landing of any part or whole carcass of silky shark (*Carcharhinus falciformis*) caught in association with ICCAT fisheries.

In 2012, ICCAT adopted Recommendation 12-05 *Recommendation by ICCAT on Compliance with Existing Measures on Shark Conservation and Management*, which requires that CPCs submit details on the implementation of and compliance with ICCAT shark conservation and management measures before the 2013 annual meeting.

### 3.1.2.2 Domestic Implementation of Recent ICCAT Shark Measures

NMFS published a final rule (76 FR 53652, August 29, 2011) that implemented ICCAT Recommendations 10-07 and 10-08 which prohibit the retention, transshipping, landing, storing, or selling of hammerhead sharks in the family *Sphyrnidae* (except for bonnethead sharks, *Sphyrna tiburo*) and oceanic whitetip sharks (*Carcharhinus longimanus*) caught in association with fisheries managed by ICCAT. This final rule, which became effective on September 28, 2011, prohibits the retention of hammerhead and oceanic whitetip sharks by Atlantic HMS commercially permitted vessels that have pelagic longline (PLL) gear on board, and recreational fishermen fishing with a General Category permit when participating in a HMS tournament or fishing under an HMS Angling or Charter/Headboat permit where tunas, swordfish, and/or billfish are also retained. Commercial shark bottom longline (BLL), gillnet, or handgear fisheries, and shark recreational fisheries when tunas, swordfish, and billfish are not retained, were not impacted by this rule because they are not considered ICCAT fisheries (i.e., fisheries that target tunas, swordfish, and/or billfish) and thus can continue to retain oceanic whitetip and hammerhead sharks.

In 2012 we published a final rule to implement ICCAT Recommendation 11-08, which prohibits retaining, transshipping, or landing silky sharks (*Carcharhinus falciformis*) caught in association with ICCAT fisheries (77 FR 60632; October 4, 2012). In order to facilitate domestic enforcement and compliance, we also prohibited storing, selling and purchasing the species, consistent with the similar regulations finalized last year regarding oceanic whitetip and most hammerhead sharks. This rule prohibits retention of silky sharks by vessels with PLL gear onboard and also prohibits retention of silky sharks by vessels that are issued both an HMS Charter/Headboat permit and a commercial shark permit when tuna, swordfish or billfish are on board the vessel.

ICCAT has conducted a stock assessment for shortfin mako sharks and an environmental risk assessment that covers a number of shark species. Based on the stock assessment and

environmental risk assessment, NMFS considers shortfin mako to be not overfished with overfishing not occurring.

### 3.1.2.3 **Domestic Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)**

CITES is an international treaty designed to control and regulate international trade of certain animal and plant species that are now or potentially may be threatened with extinction, and are affected by trade. These species are included in Appendices to CITES, which are available on the CITES Secretariat's website at <http://www.cites.org/eng/app/appendices.php>. Currently, 177 countries, including the United States, are Parties to CITES. The Convention calls for meetings of the Conference of the Parties, held every two to three years, at which the Parties review treaty implementation, make provisions enabling the CITES Secretariat in Switzerland to carry out its functions, consider amendments to the lists of species in Appendices I and II, consider reports presented by the Secretariat, and make recommendations for the improved effectiveness of CITES. Any country that is a Party to CITES may propose for these meetings amendments to Appendices I and II, and resolutions, decisions, and agenda items for consideration by all the Parties.

At the fifteenth regular meeting of the Conference of the Parties to CITES (CoP15) the United States submitted a proposal to include oceanic whitetip and hammerhead sharks (great, scalloped, and smooth hammerhead sharks) in Appendix II; however, the proposal was rejected. At the sixteenth regular meeting of the Conference of the Parties to CITES (CoP16) took place in March 2013, the United States again co-proposed listing oceanic whitetip sharks with Colombia and Brazil for Appendix II listing. This measure was adopted by consensus. Also at CoP16, Brazil, Costa Rica, Croatia, Denmark (on behalf of the European Union), Ecuador, Honduras, and Mexico sponsored a proposal supported by the United States to list great, scalloped, and smooth hammerhead sharks on Appendix II; this proposal was also adopted. Thus, oceanic whitetip sharks, and great, scalloped, and smooth hammerhead sharks are now listed on Appendix II, which imposes certain trade-related requirements.

Appendix II includes species that are not currently threatened, but may become so without trade control. Regulated trade is allowed provided that the exporting country issues a permit based on findings that the specimens were legally acquired, and the trade will not be detrimental to the survival of the species or its role in the ecosystem. Once these listings go into effect, any U.S. fishermen or dealer who wishes to export oceanic whitetip sharks, great, scalloped, or smooth hammerhead sharks, or porbeagle sharks will have to obtain a CITES permit in order to export or re-export these products.

On June 27, 2012, several European Union Member States requested that the CITES Secretariat include porbeagle sharks in Appendix III of CITES, and Costa Rica requested the inclusion of scalloped hammerhead sharks in Appendix III. CITES Parties can unilaterally list a species in Appendix III, and when a species is listed in this Appendix, certain CITES documentation is required for all imports and exports of the species by all CITES Parties. These listings came into effect on September 25, 2012; thus any U.S. fishermen or dealer who wishes to export and/or re-export porbeagle or scalloped hammerhead shark from the United States must be registered and licensed with the U.S. Fish and Wildlife Service (USFWS) and obtain a CITES certificate of

origin from the USFWS. The EU, Brazil, Egypt, the Comoros, and Croatia proposed listing porbeagle sharks in Appendix II with the support of the United States, and this measure was also adopted. The Appendix II listing of porbeagle will supersede the Appendix III listing, once the listing goes into effect.

### **3.1.3 Existing State Regulations**

Table 3.1 outlines the existing State regulations in Atlantic, Gulf of Mexico, and Caribbean states/territories, as of November 11, 2011, with regard to shark species. While the HMS Management Division updates this table periodically throughout the year, persons interested in the current regulations for any state should contact that state directly.

**Table 3.1 State Rules and Regulations Pertaining to Atlantic Sharks, as of November 1, 2011.** Please note that state regulations are subject to change. Please contact the appropriate state personnel to ensure that the regulations listed below remain current. FL = Fork Length; CL = Carcass Length; TL = Total Length; DW = Dressed Weight; and SCS = Small Coastal Sharks; LCS = Large Coastal Sharks.

State	Cite Reference	Regulatory Details	Contact Information
ME	Code ME R. 13-188 ' 50.01, 50.04, and 50.10	Commercial harvest of sharks (except spiny dogfish) in state waters prohibited; finning prohibited; sharks harvested elsewhere but landed in Maine, or sharks landed recreationally, must be landed with head, fins, and tail naturally attached to the carcass; porbeagle cannot be landed commercially after federal quota closes dealers who purchase sharks must obtain a federal dealer permit. Recreational anglers must possess a federal HMS angling permits.	ME Department of Marine Resources Phone: (207) 624-6553 Fax: (207) 624-6024
NH	FIS 603.20	Prohibited sharks listed; Federal Dealer permit required for all dealers purchasing listed sharks; Porbeagle sharks can only be taken by recreational fishing; Head, fins and tail must remain attached to all shark species through landing	NH Fish and Game Douglas Grout Phone: (603) 868-1095 Fax: (603) 868-3305
MA	322 CMR 6.37	ASMFC Coastal Shark Plan (no shark species may be landed with tails or fins removed 322 CMR 6.37(3)(d))	MA Division of Marine Fisheries Jared Silva Phone: (617) 626-1534 Fax: (617) 626-1509  All MA commercial and recreational fishing regulations can be found online: <a href="http://www.mass.gov/dfwele/dmf/commercialfishing/cmr/index.htm">http://www.mass.gov/dfwele/dmf/commercialfishing/cmr/index.htm</a>
RI	RIMFC Regulations part VII 7.24	ASMFC Coastal Shark Plan	RI Department of Environment Management, Division of Fish and Wildlife Eric Schneider Phone: (401) 423-1933 RIMFC Regulations part VII 7.24 are available online at: <a href="http://www.dem.ri.gov/pubs/regs/regs/fishwild/rimf7.pdf">http://www.dem.ri.gov/pubs/regs/regs/fishwild/rimf7.pdf</a>
CT	Regulations of Connecticut State Agencies § 26-159a-1; Connecticut General Statutes §26-142a(d) Declarations: 10-03, 10-05, 10-07	Prohibited species same as federal regulations; No commercial fishing for LCS; No commercial SCS fishing until further notice	CT Department of Environmental Protection David Simpson Phone: (860) 434-6043 Fax: (860) 434-6150

State	Cite Reference	Regulatory Details	Contact Information
NY	NY Environmental Conservation ' 13-0338; State of New York Codes, Rules and Regulations (Section 40.7)	ASMFC Coastal Shark Plan	NY Department of Environmental Conservation Stephen W. Heins Phone: (631) 444-0430 Fax: (631) 444-0449
NJ	NJ Administrative Code, Title 7. Department of Environmental Protection, NJAC 7:25-18.1 and 7:25-18.12(d)	ASMFC Coastal Shark Plan	NJ Fish and Wildlife Russ Babb Phone: (609)748-2020 Fax: (609) 748-2032
DE	DE Code Regulations 3541	ASMFC Coastal Shark Plan	DE Division of Fish and Wildlife John Clark Phone: (302) 739-9914
MD	Code of Maryland Regulations 08.02.12.03 and 08.02.22.01-.04	ASMFC Coastal Shark Plan	MD Department of Natural Resources Gina Hunt Phone: (410) 260-8326
VA	4 VA Administrative Code 20-490-10	ASMFC Coastal Shark Plan	VA Marine Resources Commission Robert O'Reilly Phone: (757) 247-2247 Fax: (757) 247-2020
NC	NC Administrative Code tit. 15A, NCAC, 03M .0512 Compliance with Fishery Management Plans	Director may impose restrictions for size, seasons, areas, quantity, etc. via proclamation; ASMFC Coastal Shark Plan; additionally: LL in the shark fishery shall not exceed 500 yds or have more than 50 hooks	NC Division of Marine Fisheries Randy Gregory Phone: (252) 726-7021 Fax: (252) 726-0254
SC	SC Code Ann. ' 50-5-2725, 2730	Defer to federal regulations; Gillnets may not be used in the shark fishery in state waters; State permit required for shark fishing in state waters	SC Department of Natural Resources Wallace Jenkins Phone: (843) 953-9835 Fax: (843) 953-9386
GA	GA Code Ann. ' 27-4-130.1; GA Comp. R. & Regs. ' 391-2-4-.04	Commercial/Recreational: 1/person/boat for sharks from the Small Shark Composite (bonnethead, sharpnose, and spiny dogfish, min size 30" FL; All other sharks - 1 shark/person or boat, whichever is less, min size 54" FL; Prohibited Species: same as federal, plus silky sharks; All species must be landed head and fins intact; Sharks may not be landed in Georgia if harvested using gillnets; ASMFC Coastal Shark Plan	GA Department of Natural Resources Carolyn Belcher Phone: (912) 264-7218 Fax: (912) 262-3143

State	Cite Reference	Regulatory Details	Contact Information
FL	FL Administrative Code 68B-44	Commercial/recreational: min size – 54” except no min. size on blacknose, blacktip, bonnethead, smoothhound, finetooth, Atlantic sharpnose; Commercial/recreational possession limit – 1 shark/person/day, max; 2 sharks/vessel on any vessel with 2 or more persons on board; Allowable gear – hook and line only; State waters close to commercial harvest when adjacent federal waters close; Federal permit required for commercial harvest, so federal regulations apply in state waters unless state regulations are more restrictive; Finning, removing heads and tails, and filleting prohibited (gutting allowed); Prohibited species same as federal regulations plus prohibition on harvest of lemon, sandbar, tiger, great hammerhead, smooth hammerhead, and scalloped hammerhead sharks in state waters, direct and continuous transit through state waters to place of landing of lemon, sandbar, tiger, great hammerhead, smooth hammerhead, and scalloped hammerhead sharks legally caught in federal waters is allowed.	FL Fish and Wildlife Conservation Commission Martha Bademan Phone: (850) 487-0554 Fax: (850) 487-4847
AL	AL Administrative Code r.220-3-.30, r.220-3-.37, r.220-3-.42, and r.220-2-.77	Recreational & commercial: bag limit – 1 sharpnose/person/day and 1 bonnethead/person/day; no min size; all other sharks – 1/person/day; min size – 54” FL or 30” dressed; Restrictions of chumming and shore-based angling if creating unsafe bathing conditions; Prohibited species: Atlantic angel, basking, bigeye sand tiger, bigeye sixgill, bigeye thresher, bignose, Caribbean reef, Caribbean sharpnose, dusky, Galapagos, largetooth sawfish, longfin mako, narrowtooth, night, sand tiger, smalltooth sawfish, smalltail, sevengill, sixgill, spotted eagle ray, whale, white; Commercial-state waters close when federal season closes; no shark fishing on weekends, Memorial Day, Independence Day, or Labor Day; Regardless of open or closed season, gillnet fishermen targeting other fish may retain sharks with a dressed weight not exceeding 10% of total catch	AL Department of Conservation and Natural Resources Phone: (251) 861 2882

State	Cite Reference	Regulatory Details	Contact Information
LA	LA Administrative Code Title 76, Pt. VII, Ch. 3, § 357	Recreational: min size – 54” FL, except Atlantic sharpnose and bonnethead which have no size limit; bag limit - 1 sharpnose or bonnethead/person/day, all other sharks – 1 fish/person/day in aggregate including SCS, LCS, and pelagic sharks; Commercial: 33/vessel/day limit (36/vessel/day by mid-2013); no min size; Com & rec harvest prohibited: 4/1-6/30; Prohibited species: same as federal regulations; Fins must remain naturally attached to carcass though off-loading. Commercial shark fishing requires annual state shark permit. Owners/operators of vessels other than those taking sharks in compliance with state or federal commercial permits are restricted to no more than one shark from either the LCS, SCS, or pelagic group per vessel per trip within or without Louisiana waters.	LA Department of Wildlife and Fisheries Jason Adriance (504) 284-2032 or (225) 765-2889 Fax( 504) 284-5263 or (225) 765-2489
MS	MS Code Title-22 part 7	Recreational: min size - LCS/Pelagics 37” TL; SCS 25” TL; bag limit - LCS/Pelagics 1/person (possession limit) up to 3/vessel (possession limit); SCS 4/person (possession limit); Commercial and prohibited species – same as federal regulations; Prohibition on finning	MS Department of Marine Resources Kerwin Cuevas Phone: (228) 374-5000
TX	TX Administrative Code Title 31, Part 2, Parks and Wildlife Code Title 5, Parks and Wildlife Proclamations 57.971, 57.973 and 57.981	Sharks are game fish and may only be taken with pole and line (including rod and reel); Commercial/recreational: bag limit - 1 shark/person/day; Commercial/recreational possession limit is twice the daily bag limit ( <i>i.e.</i> , 2 sharks/person/day); min size 24” TL for Atlantic sharpnose, blacktip, and bonnethead sharks and 64” TL for all other lawful sharks. Prohibited species: same as federal regulations	TX Parks & Wildlife Department Mark Lingo Phone: (956) 350-4490 Fax: (956) 350-3470
Puerto Rico	Regulation #6768 Article 8 – General Fishing Limits Article 13 – Limitations Article 17 – Permits for Recreational Fishing	Swordfish or billfish, tuna and shark are covered under the federal Atlantic HMS regulations (50 CFR, Part 635); Fishers who capture these species are required to comply with said regulation; billfish captured incidentally with long line must be released by cutting the line close to the fishhook, avoiding the removal of the fish from the water; in the case of tuna and swordfish, fishers shall obtain a permit according to the requirements of the federal government; Year-round closed season on nurse sharks.	Puerto Rico Department of Natural and Environmental Resources Craig Lilyestrom Phone: (787) 999-2200 x2689 Fax: (787) 999-2271  <a href="http://www.caribbeanfmc.com/REGULATIONS%20PR-USVI/reg%20pesca%20pr/Rgl768-%20feb%202004.pdf">http://www.caribbeanfmc.com/REGULATIONS%20PR-USVI/reg%20pesca%20pr/Rgl768-%20feb%202004.pdf</a>
U.S. Virgin Island	V.I.C., Title 12, Chapter 9A.	Federal regulations and federal permit requirements apply in territorial waters. <a href="http://caribbeanfmc.com/pdfs/booklet%20usvi%20Commercial%202009.pdf">http://caribbeanfmc.com/pdfs/booklet%20usvi%20Commercial%202009.pdf</a>	6291 Estate Nazareth St. Thomas, VI 00802 (340) 775-6762  45 Mars Hill Complex Frederiksted, St. Croix, VI 00840 (340) 773-1082



### 3.2 Status of the Stocks

The thresholds used to determine the status of Atlantic HMS, including sharks, are fully described in Chapter 3 of the 1999 FMP and Amendment 1 to the Billfish FMP, Chapter 3 of the 2006 Consolidated HMS FMP, and are presented in Figure 3.1. These thresholds are based on the thresholds described in a paper describing the technical guidance for implementing National Standard 1 of the Magnuson-Stevens Act (Restrepo et al., 1998). NMFS uses these thresholds to determine whether or not a stock is overfished/experiencing overfishing each time it is assessed.

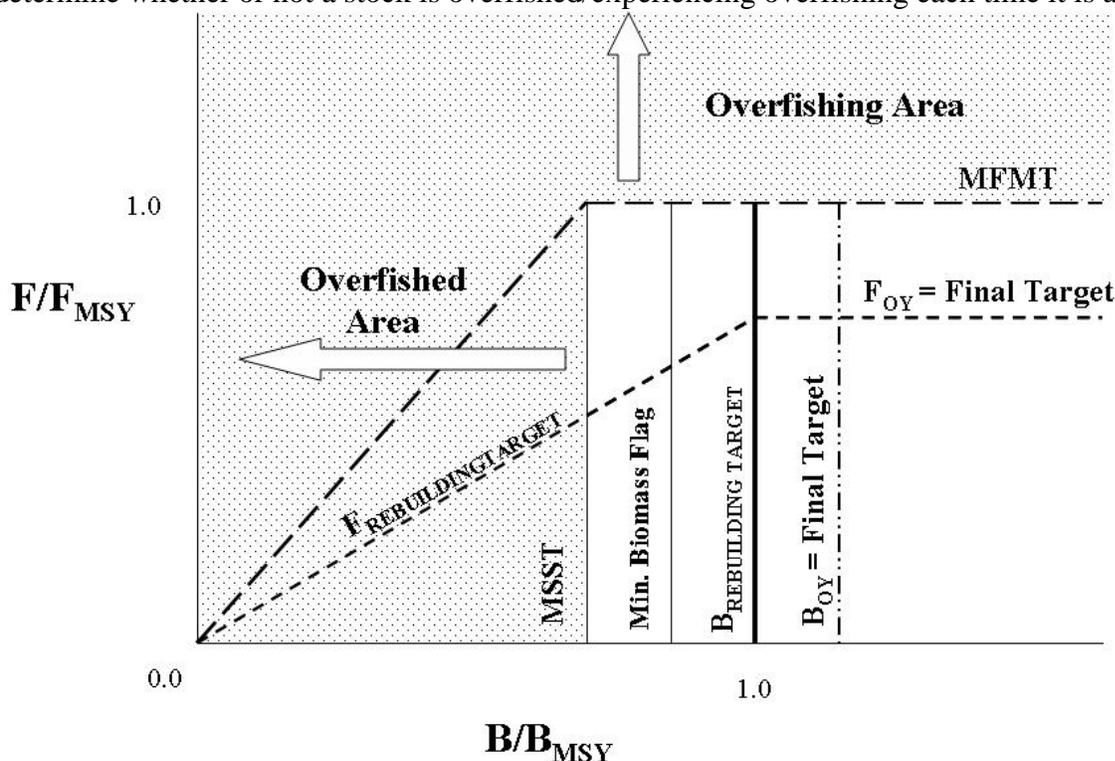


Figure 3.1 Illustration of the status determination and rebuilding terms.

In summary, a species is considered overfished when the current biomass ( $B$ ) is less than the minimum stock size threshold ( $MSST$ ) ( $B < B_{MSST}$ ). The  $MSST$  is determined based on the natural mortality of the stock and the biomass at  $MSY$  ( $B_{MSY}$ ).  $MSY$  is the maximum long-term average yield that can be produced by a stock on a continuing basis. The biomass can be lower than  $B_{MSY}$ , and the stock will not be declared overfished as long as the biomass is above  $B_{MSST}$ .

Overfishing may be occurring on a species if the current fishing mortality ( $F$ ) is greater than the fishing mortality at  $MSY$  ( $F_{MSY}$ ) ( $F > F_{MSY}$ ). In the case of  $F$ , the maximum fishing mortality threshold is  $F_{MSY}$ . Thus, if  $F$  exceeds  $F_{MSY}$ , the stock is experiencing overfishing.

If a species is declared overfished or has overfishing occurring, action to rebuild the stock and end overfishing is required by law. A species is considered rebuilt when  $B$  is greater than  $B_{MSY}$  and  $F$  is less than  $F_{MSY}$ . A species is considered healthy when  $B$  is greater than or equal to the biomass at optimum yield ( $B_{OY}$ ) and  $F$  is less than or equal to the fishing mortality at optimum yield ( $F_{OY}$ ).

In summary, the thresholds used to calculate the status of Atlantic HMS, as described in the 1999 FMP and 2006 Consolidated HMS FMP, are:

- Maximum Fishing Mortality Threshold (MFMT) =  $F_{\text{limit}} = F_{\text{MSY}}$ ;
- Overfishing is occurring when  $F_{\text{year}} > F_{\text{MSY}}$ ;
- Minimum Stock Size Threshold (MSST) =  $B_{\text{limit}} = (1-M)B_{\text{MSY}}$  when  $M < 0.5 = 0.5B_{\text{MSY}}$  when  $M \geq 0.5$ ;
- Overfished when  $B_{\text{year}}/B_{\text{MSY}} < \text{MSST}$ ;
- Biomass target during rebuilding =  $B_{\text{MSY}}$ ;
- Fishing mortality during rebuilding  $< F_{\text{MSY}}$ ;
- Fishing mortality for healthy stocks =  $0.75F_{\text{MSY}}$ ;
- Biomass for healthy stocks =  $B_{\text{OY}} = \sim 1.25$  to  $1.30B_{\text{MSY}}$ ;
- Minimum biomass flag =  $(1-M)B_{\text{OY}}$ ; and
- Level of certainty of *at least* 50 percent but depends on species and circumstances; for sharks, a level of certainty of 70 percent is used as a guide.
- For sharks, in some cases, spawning stock fecundity (SSF) or spawning stock number (SSN) was used as a proxy for biomass since biomass does not influence pup production in sharks

### 3.2.1 Atlantic Sharks

Sharks belong to the class Chondrichthyes (cartilaginous fishes), which also includes rays, skates, and deep water chimaeras (ratfishes). From an evolutionary perspective, sharks are an old group of fishes characterized by skeletons lacking true bones. The earliest known sharks were identified from fossils from the Devonian period, over 400 million years ago. These primitive sharks were small creatures, about 60 to 100 cm long, that were preyed upon by larger armored fishes that dominated the seas.

Relative to other marine fish, sharks have a very low reproductive potential. Several important commercial species, including large coastal carcharhinids, such as sandbar (Casey et al., 1985; Sminkey and Musick, 1995; Heist et al., 1995), lemon (Brown and Gruber, 1988), and bull sharks (*Carcharhinus leucas*) (Branstetter and Stiles, 1987), do not reach maturity until 12 to 18 years of age. Various factors determine this low reproductive rate: slow growth, late sexual maturity, one- to two-year reproductive cycles, a small number of young per brood, and specific requirements for nursery areas. These biological factors leave many species of sharks vulnerable to overfishing.

There is extreme diversity among the approximately 350 species of sharks, ranging from tiny pygmy sharks of only 20 cm (7.8 in) in length to the giant whale sharks, over 12 meters (39 feet) in length. There are fast-moving, streamlined species such as mako (*Isurus* spp.) and thresher sharks (*Alopias* spp.), and sharks with flattened, ray-like bodies, such as angel sharks (*Squatina dumerili*). The most commonly known sharks are large apex predators including the white

(*Carcharodon carcharias*), mako, tiger (*Galeocerdo cuvier*), bull, and great hammerhead (*Sphyrna mokarran*). Some shark species reproduce by laying eggs, while others nourish their embryos through a placenta. The life span of all shark species in the wild is not known, but it is believed that many species are long-lived and may live 30 to 40 years or longer. The diversity in size, feeding habits, behavior, and reproduction, has contributed greatly to the evolutionary success of sharks.

The most significant reproductive adaptations of sharks are internal fertilization and the production of fully developed young or “pups.” These pups are large at birth, effectively reducing the number of potential predators and enhancing their chances of survival. During mating, the male shark inseminates the female with copulatory organs, known as claspers that develop on the pelvic fins. In most species, the embryos spend their entire developmental period protected within their mother’s body, although some species lay eggs. The number of young produced by most shark species in each litter is small, usually ranging from two to 25, although large females of some species can produce litters of 100 or more pups. The production of fully-developed pups requires great amounts of nutrients to nourish the developing embryo. Traditionally, these adaptations have been grouped into three modes of reproduction: oviparity (eggs hatch outside body), aplacental viviparity (eggs hatch inside body), and viviparity (live birth).

Adults usually congregate in specific areas to mate. For some coastal shark species, females travel to specific nursery areas to pup. These nurseries are discrete geographic areas, usually in waters shallower than those inhabited by the adults. Frequently, the nursery areas are in highly productive coastal or estuarine waters where abundant small fishes and crustaceans provide food for the growing pups. These areas also may have fewer large predators, thus enhancing the chances of survival of the young sharks. In temperate zones, the young leave the nursery with the onset of winter; in tropical areas, young sharks may stay in the nursery area for a few years.

Shark habitat can be described in four broad categories: (1) coastal, (2) pelagic, (3) coastal-pelagic, and (4) deep-dwelling. Coastal species inhabit estuaries, the nearshore and waters of the continental shelves, *e.g.*, blacktip, finetooth, bull, lemon, and Atlantic sharpnose sharks. Pelagic species, on the other hand, range widely in the upper zones of the oceans, often traveling over entire ocean basins. Examples include shortfin mako, blue, and oceanic whitetip sharks. Coastal-pelagic species are intermediate in that they occur both inshore and beyond the continental shelves, but have not demonstrated mid-ocean or transoceanic movements. Sandbar sharks are examples of a coastal-pelagic species. Deep-dwelling species, *e.g.*, most cat sharks (*Apristurus* spp.) and gulper sharks (*Centrophorus* spp.) inhabit the dark, cold waters of the continental slopes and deeper waters of the ocean basins.

Seventy-three species of sharks are known to inhabit the waters along the U.S. Atlantic coast, including the Gulf of Mexico and the waters around Puerto Rico and the U.S. Virgin Islands. Thirty-nine species are managed by HMS. Deep-water sharks were removed from the HMS management unit in 2003.

Based on ecology and fishery dynamics, NMFS divided HMS sharks into four species groups for purposes of HMS management: (1) LCS, (2) SCS, (3) pelagic sharks, and (4) prohibited species

(Table 3.2). Some LCS and SCS species have been separately assessed and given a species-specific quota. Additional species-specific quotas are established in this amendment. Other factors affecting the make-up of the management unit include purpose, need, and management objectives. For example, as a result of Amendment 2 to the 2006 Consolidated HMS FMP, sandbar sharks can only be taken commercially within a shark research fishery. In addition, sandbar and silky sharks cannot be retained by recreational anglers. International recommendations can also affect the complex. As a result of domestic regulations implementing ICCAT Recommendations 10-07 and 10-08, the retention of oceanic whitetip sharks and scalloped, smooth, and great hammerhead sharks is prohibited in the commercial PLL and HMS Angling, Charter/Headboat, and General category (when fishing in a registered HMS tournament) fisheries for tuna and tuna-like species. Additionally, retention of silky sharks on Atlantic HMS commercially-permitted vessels that have PLL gear on board is prohibited.

**Table 3.2 Common names of shark species included within the four species management units under Amendment 2 to the Consolidated HMS FMP (NMFS 2008a).**

Management Unit	Shark Species Included
LCS (11)	Sandbar, silky, tiger, blacktip, bull, spinner, lemon, nurse, smooth hammerhead*, scalloped hammerhead*, and great hammerhead* sharks
SCS (4)	Atlantic sharpnose, blacknose, finetooth, and bonnethead sharks
Pelagic Sharks (5)	Shortfin mako, thresher, oceanic whitetip*, porbeagle, and blue sharks
Prohibited Species (19)	Whale, basking, sand tiger, bigeye sand tiger, white, dusky, night, bignose, Galapagos, Caribbean reef, narrowtooth, longfin mako, bigeye thresher, sevengill, sixgill, bigeye sixgill, Caribbean sharpnose, smalltail, and Atlantic angel sharks

\*Prohibited from commercial retention on pelagic longline gear and recreationally if swordfish, tunas, and/or billfish are also retained

### 3.2.1.1 Stock Status

SEDAR is responsible for conducting stock assessments for the LCS and SCS management groups although NMFS will adopt stock assessments from other sources when appropriate for management (e.g., Hayes, et al. 2009 scalloped hammerhead shark assessment). Stock assessments were conducted for the dusky, sandbar, and blacknose sharks in 2010 and 2011 in SEDAR 21 (SEDAR 2011), and Gulf of Mexico blacktip sharks were assessed in SEDAR 29 (SEDAR 2012a). More details are given below.

In October 2009, Hayes et al. (2009) published in the North American Journal of Fisheries Management a stock assessment of the Atlantic population of scalloped hammerhead sharks in U.S. waters. The stock assessment utilized a surplus production model; an approach commonly used in data poor scenarios, and incorporated commercial and recreational landings, fisheries dependent data, fisheries independent data from NMFS observer programs, and scientific surveys. NMFS reviewed this paper and concluded that: the assessment is complete; the assessment is an improvement over a 2008 aggregated species assessment for hammerhead

sharks; and the assessment is appropriate for U.S. management decisions (76 FR 23794; April 28, 2011). Based on the results of this paper, NMFS adopted the Hayes et al. assessment and on that basis determined on April 28, 2011, that scalloped hammerhead sharks were overfished and experiencing overfishing (76 FR 23794).

Recent assessments of sandbar, dusky, and blacknose sharks were completed through the SEDAR process (76 FR 61092; October 3, 2011). The SEDAR process is a cooperative process initiated in 2002 to improve the quality and reliability of fishery stock assessments in the South Atlantic, Gulf of Mexico, and U.S. Caribbean. These assessments were conducted under SEDAR 21, using two face-to-face workshops and a series of webinars. The Data Workshop was a week-long face-to-face meeting, during which fisheries, monitoring, and life history data were reviewed and compiled. The SEDAR 21 Data Workshop was held June 21-25, 2010, in Charleston, SC (May 4, 2010, 75 FR 23676). The Assessment Process was conducted via a series of webinars, during which assessment models were developed and population parameters were estimated using the information provided from the Data Workshop. Eighteen webinars were held between September 2010 and January 2011 (August 26, 2010, 75 FR 52510; October 12, 2010, 75 FR 62506; November 17, 2010, 75 FR 70216; December 16, 2010, 75 FR 78679). Finally, the Review Workshop was a week-long face-to-face meeting during which independent experts reviewed the input data, assessment methods, and assessment products. The Review Workshop for these assessments was held in Annapolis, MD, on April 18-22, 2011 (March 15, 2011, 76 FR 13985). All meetings were open to the public, and all materials from these meetings are available on the SEDAR website or upon request.

In each assessment, a base model was used to assess the individual populations. In addition, numerous sensitivity analyses were conducted during the assessment cycle for each assessment, which provided verification that the results of the assessment were robust to the assumptions about the underlying stock productivity and assumed levels of removal. Of these sensitivity runs, the Review Panel of the SEDAR 21 Review Panel Workshop selected which runs represented plausible “states of nature” of the stocks and requested projections of these and the base model. The ranges based on these selected sensitivity runs and the base models are given in the stock assessment descriptions for sandbar, dusky, and blacknose shark below. However, details on the different sensitivity analyses and projections are provided in the SEDAR 21 Stock Assessment Report for each assessment.

As described below, based on these recent assessments, NMFS determined that: sandbar sharks are still overfished, but no longer experiencing overfishing; dusky sharks are still overfished and still experiencing overfishing (i.e., their stock status has not changed from previous assessments); scalloped hammerhead sharks are overfished and experiencing overfishing; the Atlantic stock of blacknose sharks is overfished and experiencing overfishing, the status of the Gulf of Mexico stock blacknose sharks is unknown; and the status of Gulf of Mexico blacktip sharks is not overfished and not experiencing overfishing (77 FR 70552; Nov 26, 2012). Besides the stocks listed above, the status of none of the other species have changed since Amendment 3 was implemented in 2010 (NMFS 2010). Summaries of other stock assessments can be found in Amendment 2 to the HMS FMP (NMFS 2008a), Amendment 3 to the 2006 Consolidated HMS FMP (NMFS, 2010), and the 2012 Stock Assessment and Fishery Evaluation (SAFE) Report (NMFS 2012).

### *Sandbar Sharks*

The SEDAR 21 sandbar shark stock assessment evaluated the status of the stock based on new landings and biological data, and projected future abundance under a variety of catch levels in the U.S. Atlantic Ocean, Gulf of Mexico, and Caribbean Sea. Before the most recent assessment, sandbar sharks were determined to be overfished and experiencing overfishing in a 2005/2006 stock assessment. NMFS established a rebuilding plan for this species in July 2008 (NMFS 2008a). Under that rebuilding plan, NMFS determined that sandbar sharks would rebuild by the year 2070 with a total allowable catch of 220 mt ww (158.3 mt dw). Also, as part of that rebuilding plan, NMFS maintained the bottom longline mid-Atlantic shark closed area, prohibited the landing of sandbar sharks in the recreational fishery, and established a shark research fishery in the commercial fishery. Only fishermen participating in the limited shark research fishery can land sandbar sharks.

The SEDAR 21 assessment includes updated catch estimates, new biological data, and a number of fishery-independent and fishery-dependent catch rate series. The base model used in the SEDAR 21 sandbar shark assessment, an age-structured production model, indicated that the stock is overfished (spawning stock fecundity ( $SSF_{2009}/SSF_{MSY}=0.66$ ), but no longer experiencing overfishing ( $F_{2009}/F_{MSY}=0.62$ ). In addition, 20 sensitivity runs were performed throughout the assessment cycle. The Review Panel selected seven sensitivity runs in addition to the base model to assess the underlying states of nature of the stock. Current biomass (i.e.,  $SSF$ ) values from these selected sensitivity runs all indicated that the stock is overfished ( $SSF_{2009}/SSF_{MSY}=0.51-0.72$ ). In addition, current  $F$  values from most of the selected sensitivity runs indicated that the stock is currently not experiencing overfishing ( $F_{2009}/F_{MSY}=0.29-0.93$ ); whereas the low productivity sensitivity run indicated overfishing is occurring ( $F_{2009}/F_{MSY}=2.62$ ). The assessment scientists, however, noted that the low and high productivity scenarios were unlikely to represent the true state of nature of the stock. In summary, the base model and all sensitivity runs indicated that the stock was overfished. The base model and all but one of the sensitivity runs (the low productivity sensitivity run that the assessment scientists noted) indicated that the stock was not experiencing overfishing. Based on this, NMFS has determined that sandbar sharks are still overfished, but are no longer experiencing overfishing. Projections of the base model indicated that there is a 70 percent probability of rebuilding by 2066 with a TAC of 178 mt ww (128 mt dw). There is a 50 percent probability of rebuilding by 2066 with a TAC of 286 mt ww (205.8 mt dw). The rebuilding year determined from the base model in the 2010/2011 assessment was calculated as the year the stock would rebuild with no fishing pressure (i.e.,  $F=0$ ), or 2046, plus one generation time (the generation time for sandbar sharks is 20 years). The target year for rebuilding ranged from 2047 to 2360 depending on the state of nature (i.e., sensitivity run) of the stock. In addition, it was determined by the stock assessment that the current TAC for the fishery (i.e., 220 mt ww or 158.3 mt dw) could result in a greater than 70 percent probability of rebuilding by the current rebuilding date of 2070.

### *Dusky Sharks*

Dusky sharks (*Carcharhinus obscurus*) were proposed to be included in this rulemaking; however, after reviewing the comments received, HMS decided to address the dusky shark

measures in a proposed separate action. The SEDAR stock assessment for dusky sharks will be discussed in that rulemaking.

### *Scalloped Hammerhead Sharks*

Based on the Hayes et al. (2009) stock assessment, which used data through 2005, the scalloped hammerhead population was estimated to be at 45 percent of the biomass that would produce MSY, and fishing mortality was estimated to be 129 percent of fishing mortality associated with MSY. This assessment is the first assessment for this species. Previously, NMFS had assessed scalloped hammerhead sharks as part of the LCS management group.

The assessment estimated that the current population is only 17 percent of the virgin stock size. In addition, it was estimated that a TAC of 2,853 scalloped hammerhead sharks per year (or 69 percent of 2005 catch) would allow a 70 percent probability of rebuilding within 10 years. Based on the results of this stock assessment, NMFS determined that scalloped hammerhead sharks are overfished and experiencing overfishing.

### *Gulf of Mexico Blacktip Sharks*

The 2005/2006 stock assessment assessed blacktip sharks for the first time as two separate populations: a Gulf of Mexico and an Atlantic population. The results indicated that the Gulf of Mexico stock is not overfished and overfishing is not taking place (November 7, 2006, 71 FR 65086), but the assessment Panel did not accept the absolute estimates of the stock status. The three abundance indices believed to be most representative of the stock were consistent with each other, suggesting that stock abundance has been increasing over a period of declining catch during the past 10 years. Based on life history characteristics, blacktip sharks are a relatively productive shark species, and a combination of these characteristics and recent increases in the most representative abundance indices, suggested that the blacktip stock is relatively healthy. There was no scientific basis, however, to consider increasing the catch or quota.

This assessment also indicated that the current status of the blacktip shark population in the South Atlantic region is unknown. The assessment scientists were unable to provide estimates of stock status or reliable population projections, but indicated that current catch levels should not change. In 2006, NMFS therefore declared the status of the South Atlantic blacktip shark population to be unknown (November 7, 2006, 71 FR 65086).

Gulf of Mexico blacktip sharks were recently assessed in 2012 under the SEDAR process. This latest assessment assessed only blacktip sharks in the Gulf of Mexico due to timing and personnel limitations. The base model used for the SEDAR 29 assessment showed that Gulf of Mexico blacktip sharks are not overfished ( $SSF_{2010}/SSF_{MSY}=2.00-2.78$ ) and no overfishing is occurring ( $F_{2010}/F_{MSY}=0.05-0.27$ ).

The peer review of the SEDAR 29 assessment was conducted by two scientists under the Center for Independent Experts. Both peer reviewers raised questions about the assessment. One reviewer accepted the model and its results. The other peer reviewer supported the assessment's conclusion that the Gulf of Mexico blacktip shark stock is not overfished, but concluded that the status regarding overfishing is uncertain. The SEFSC addressed the questions from the peer

reviewers in a post peer-review “updates and projections” document (SEDAR 2012b) written by stock assessment scientists, who were the lead scientists during the SEDAR 29 process. The scientists concluded that the reviewer’s conclusion on the overfishing status was based on the reviewer’s interpretation that the model configuration was not appropriate for the stock. Specifically, the peer reviewer did not think that reasonable variation in recruitment was incorporated into the model and was not confident about the conclusion of “no overfishing” reached in the assessment because three of the indices had declined in the last five years and because MSY fishing mortality ( $F_{MSY}$ ) was low. The peer reviewer stated that a model with reasonable variation in recruitment could indicate a current fishing mortality more similar to  $F_{MSY}$  and thus show the stock approaching an overfishing condition. The stock assessment scientists showed in the post-review updates and projections document that process error in recruitment was fully considered and that recruitment in the model was reasonable. They also showed that the low value of  $F_{MSY}$  is consistent with what is expected from the biology of sharks, and that of the three indices mentioned by the reviewer that showed a decline, two show an increase in the terminal year of 2010. Therefore, the stock assessment scientists concluded that the stock assessment result of no overfishing is warranted. As such, we made the determination that the Gulf of Mexico blacktip shark stock is not overfished and no overfishing is occurring (77 FR 70552; Nov 26, 2012).

Because the stock is not overfished and no overfishing is occurring, projections and the calculations needed to determine the acceptable biological catch were not part of the statement of work for the stock assessment by the stock assessment scientists and therefore were not conducted during the stock assessment itself (for an overfished stock, these calculations would have been done before completion of the stock assessment). Rather, the SEFSC calculated the projections after the stock assessment as a whole was peer reviewed. The stock assessment noted that current removal rates are sustainable, and the subsequent projections, which were completed outside the SEDAR process, indicate that current removals are unlikely to lead to an overfished fish stock by 2040. The projections also indicate that higher levels of removal are unlikely to result in an overfished stock; however, the projection methodology for shark stocks that are not overfished is currently in development and has yet to be introduced and reviewed within the SEDAR process for this species.

#### *Atlantic and Gulf of Mexico Blacknose Sharks*

A 2007 stock assessment for blacknose sharks indicated that SSF in 2005 and during 2001–2005 was smaller than  $SSF_{MSY}$  ( $SSF_{2005}/SSF_{MSY} = 0.48$ ). In addition, the estimate of fishing mortality rate in 2005 and the average for 2001–2005 was greater than  $F_{MSY}$ , and the ratio was substantially greater than 1 in both cases ( $F_{2005}/F_{MSY} = 3.77$ ). Based on these results, NMFS determined that blacknose sharks were overfished and experiencing overfishing (73 FR 25666; May 7, 2008). Rebuilding measures implemented in Amendment 3 to the Consolidated HMS FMP included working with the South Atlantic and Gulf of Mexico Fishery Management Councils to reduce bycatch in shrimp trawl fisheries and changes to the SCS quotas, and the creation of a blacknose quota (NMFS 2010).

Blacknose sharks were recently assessed again in 2011/2012. This latest assessment incorporated new landings and biological information that was not available for previous

assessments. Unlike the 2007 assessment, the SEDAR 21 assessment assessed blacknose sharks for the first time as two separate stocks: a Gulf of Mexico and an Atlantic stock. After considering the available data, the Life History Working Group for this latest assessment concluded that blacknose sharks inhabiting the U.S. waters of the western North Atlantic Ocean (including the Gulf of Mexico) should be considered two separate stocks based on tagging and life history data.

In addition, the assessment model for the Gulf of Mexico stock did not fit the apparent trends in some of the abundance indices and there was a fundamental lack of fit of the model to some of the input data. Therefore, the Review Panel for the latest blacknose assessment did not accept the stock assessment for the Gulf of Mexico blacknose stock. Therefore, NMFS declared the status of the Gulf of Mexico blacknose shark stock as unknown (76 FR 62331; October 7, 2011).

For the Atlantic blacknose shark stock, the recent assessment used an age-structured production model base model that showed that Atlantic blacknose sharks are overfished ( $SSF_{2009}/SSF_{MSY}=0.60$ ) and experiencing overfishing ( $F_{2009}/F_{MSY}=5.02$ ). In addition, 14 sensitivity analyses were performed over the assessment cycle. The Review Panel selected five sensitivity runs in addition to the base model to assess the underlying states of nature of the stock. Current biomass (i.e.,  $SSF$ ) values from these selected sensitivity runs all indicated that the stock is overfished ( $SSF_{2009}/SSF_{MSY}=0.43-0.64$ ). In addition, current  $F$  values from the selected sensitivity runs indicated that the stock is currently experiencing overfishing ( $F_{2009}/F_{MSY}=3.26-22.53$ ). Based on this, NMFS has determined that the Atlantic blacknose shark stock is overfished and experiencing overfishing. Projections of the base model indicated that the stock could rebuild by 2043 with a total allowable catch of 7,300 blacknose sharks. The rebuilding year determined from the base model in the 2010/2011 assessment was calculated as the year the stock would rebuild with no fishing pressure (i.e.,  $F=0$ ), or 2034, plus one generation time (the generation time for Atlantic blacknose sharks is 9 years). The target year for rebuilding ranged from 2033 to 2086 depending on the state of nature (i.e., sensitivity run) of the stock. Thus, Atlantic blacknose sharks would not be able to rebuild by the current rebuilding target of 2027 under the current fishery-wide total allowable catch of 19,200 blacknose sharks.

Table 3.3 summarizes stock assessment information and the current status of Atlantic sharks as of July 2012, and provides an update of the minimum stock size threshold numbers for sandbar and Atlantic blacknose sharks, which were miscalculated in the Amendment 5 Notice of Intent (76 FR 62331; October 7, 2011).

**Table 3.3 Stock Assessment Summary Table for the Large and Small Coastal Atlantic Sharks Addressed In this Amendment**  
Sources: Cortés et al., 2006; SEDAR 2006b; SEDAR 2007; SEDAR 2011; SEDAR 2012a

Species	Current Relative Biomass Level	B <sub>MSY</sub> in (number of sharks)	Minimum Stock Size Threshold	Current Relative Fishing Mortality Rate	Maximum Fishing Mortality Threshold	Outlook	Years to Rebuild	Rebuilding Start Date (Rebuilding End Date)
<b>Sandbar</b>	$SSF_{09}/SSF_{MSY} = 0.51-0.72$	$SSF_{MSY} = 349,330-1,377,800$	$3.01-4.24E+05$	$F_{09}/F_{MSY} = 0.29-2.62$	0.004-0.06	Overfished; overfishing not occurring	66	1/1/2005 (2070)
<b>Scalloped Hammerhead</b>	$N_{05}/N_{MSY} = 1.29$	$N_{MSY} = 62,000$	$(1-M)B_{MSY}$	$F_{05}/F_{MSY} = 0.45$	0.11	Overfished; overfishing is occurring	Under development	Expected Summer 2013
<b>Gulf of Mexico Blacktip</b>	$SSF_{2010}/SSF_{MSY}=2.00-2.66$	$SSF_{MSY} = 1,570,000 - 6,440,000$	$1.30-5.50E+06$	$F_{2010}/F_{MSY} = 0.05-0.27$	0.021-0.163	Not overfished; overfishing not occurring		
<b>Atlantic Sharpnose Sharks</b>	$SSF_{2005}/SSF_{MSY} = 1.47$	$SSF_{MSY} = 4,590,000$	$4.09E+06$	$F_{05}/F_{MSY} = 0.74$	0.19	Not overfished; No overfishing is occurring		
<b>Bonnethead Sharks</b>	$SSF_{2005}/SSF_{MSY}= 1.13$	$SSF_{MSY} = 1,990,000$	$1.4E+06$	$F_{05}/F_{MSY} = 0.61$	0.31	Not overfished; No overfishing is occurring		
<b>Finetooth Sharks</b>	$N_{2005}/N_{MSY} = 1.80$ 3.3	$N_{MSY} = 3,200,000$	$2.4E+06$	$F_{05}/F_{MSY} = 0.17$	0.03	Not overfished; No overfishing is occurring		
<b>Atlantic Blacknose Sharks</b>	$SSF_{09}/SSF_{MSY} = 0.43-0.64$	$SSF_{MSY} = 77,577-288,360$	$6.23E+04 - 2.32E+5$	$F_{09}/F_{MSY}=3.26-22.53$	0.01-0.15	Overfished; overfishing is occurring	Under development	Expected summer 2013
<b>Gulf of Mexico Blacknose Sharks</b>	<i>Unknown</i>	<i>Unknown</i>	$(1-M)B_{MSY}$	<i>Unknown</i>	<i>Unknown</i>	<i>Unknown</i>		

### 3.4 Habitat

Section 303(a)(7) of the Magnuson-Stevens Act, 16 U.S.C. §1801 *et seq.*, requires FMPs to describe and identify essential fish habitat (EFH), minimize to the extent practicable adverse effects on such habitat caused by fishing, and identify other actions to encourage the conservation and enhancement of such habitat. The Magnuson-Stevens Act defines EFH as “those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity.” (16 U.S.C. § 1802(10)). The EFH regulations (at 50 C.F.R. § 600 Subpart J) provide additional interpretation of the definition of EFH:

“Waters’ include aquatic areas and their associated physical, chemical, and biological properties that are used by fish, and may include aquatic areas historically used by fish where appropriate; ‘substrate’ includes sediment, hard bottom, structures underlying the waters, and associated biological communities; ‘necessary’ means the habitat required to support a sustainable fishery and the managed species’ contribution to a healthy ecosystem; and ‘spawning, breeding, feeding, or growth to maturity’ covers a species’ full life cycle.”

The EFH regulations require that EFH be described and identified within the U.S. exclusive economic zone (EEZ) for all life stages of each species in a fishery management unit. FMPs must describe EFH in text, tables, and figures that provide information on the biological requirements for each life history stage of the species. According to the EFH regulations, an initial inventory of available environmental and fisheries data sources should be undertaken to compile information necessary to describe and identify EFH and to identify major species-specific habitat data gaps. Habitats that satisfy the criteria in the Magnuson-Stevens Act have been identified and described as EFH in the 1999 FMPs and in Amendment 1 to the 1999 Tunas, Swordfish, and Shark FMP, and were updated in Amendment 1 to the 2006 Consolidated HMS FMP (NMFS 2008b).

NMFS originally described and identified EFH and related EFH regulatory elements for all HMS in the management unit in the 1999 FMPs, which were updated in Amendment 1 to the 1999 Tunas, Swordfish, and Shark FMP and implemented in 2003 (NMFS 1999; NMFS 2003). The EFH regulations require NMFS to conduct a comprehensive review of all EFH related information at least once every five years and revise or amend the EFH boundaries if warranted. To that effect, NMFS undertook the comprehensive five-year review of information pertaining to EFH for all HMS in the management unit in the 2006 Consolidated HMS FMP (NMFS 2006). Based on the findings of this review, NMFS issued a Notice of Intent to amend EFH for HMS through Amendment 1 to the 2006 Consolidated HMS FMP on November 7, 2006 (71 FR 65087). In the Notice of Intent NMFS described its intent to prepare an EIS to examine alternatives for updating existing HMS EFH, consider additional Habitat Areas of Particular Concern (HAPCs), analyze fishing gear impacts, and if necessary, identify ways to avoid or minimize, to the extent practicable, adverse fishing impacts on EFH consistent with the Magnuson-Stevens Act and other relevant federal laws. At that time, NMFS requested new information not previously considered in the 2006 Consolidated HMS FMP, comments on

potential HAPCs, and information regarding potential fishing and non-fishing impacts that may adversely affect EFH.

On June 12, 2009, NMFS published a Notice of Availability of the Final Environmental Impact Statement for Amendment 1 to the 2006 Consolidated HMS FMP EFH (74 FR 28018) (NMFS 2008b). This amendment updated and revised EFH boundaries for HMS, designated a new HAPC for bluefin tuna in the Gulf of Mexico, and analyzed fishing and non-fishing impacts on EFH. To facilitate public outreach, an internet-based mapping program (HMS EFH Evaluation Tool) was created to show the updated and revised EFH boundaries for HMS.

#### **3.4.1.1 Habitat Areas of Particular Concern**

To further the conservation and enhancement of EFH, the EFH guidelines encourage FMPs to identify HAPCs. HAPCs are areas within EFH that meet one or more of the following criteria: they are ecologically important, particularly vulnerable to degradation, undergoing stress from development, or are a rare habitat type. HAPCs can be used to focus conservation efforts on specific habitat types that are particularly important to managed species. Currently, HAPC has been designated for two HMS species: sandbar sharks and bluefin tuna. The areas off of North Carolina, Delaware Bay, Chesapeake Bay, MD, and Great Bay, NJ, have been identified as HAPCs for sandbar sharks (NMFS 1999). HAPC for bluefin tuna was designated in Amendment 1 to the 2006 Consolidated HMS FMP and is located across the western, northern, and central Gulf of Mexico. Maps of these areas are available on the HMS Management Division website at <http://www.nmfs.noaa.gov/sfa/hms/EFH/index.htm>.

#### **3.4.2 Habitat Types and Distributions**

Sharks may be found in large expanses of the world's oceans, straddling jurisdictional boundaries. Although many of the species frequent other oceans of the world, the Magnuson-Stevens Act only authorizes the description and identification of EFH in federal, state or territorial waters, including areas of the U.S. Caribbean, the Gulf of Mexico, and the Atlantic coast of the United States to the seaward limit of the EEZ. For a detailed description of shark coastal and estuarine habitat, continental shelf and slope area habitat, and pelagic habitat for the Atlantic, Gulf of Mexico, and U.S. Caribbean, please refer to Section 3.3.2 of the 2006 Consolidated HMS FMP.

### **3.5 Fishery Data Update**

In this section, shark fishery data are analyzed by gear type. While shark fishermen generally target particular species, the non-selective nature of many fishing gears warrants analysis and management on a gear-by-gear basis. In addition, issues such as bycatch and safety are generally better addressed by gear type.

The revised list of authorized fisheries and fishing gear became effective December 1, 1999 (64 FR 67511). The rule applies to all U.S. marine fisheries, including Atlantic HMS. As stated in the rule, "no person or vessel may employ fishing gear or participate in a fishery in the exclusive economic zone (EEZ) not included in this List of Fisheries (LOF) without giving 90 days' advance notice to the appropriate Fishery Management Council (Council) or, with respect to

Atlantic HMS, the Secretary of Commerce (Secretary).” Authorized gear types routinely used in Atlantic shark fisheries include:

- PLL fishery – longline (commercial)
- Shark gillnet fishery – gillnet (commercial)
- Shark BLL fishery – longline (commercial)
- Shark handgear fishery - rod and reel, handline, bandit gear (commercial)
- Shark recreational fishery – rod and reel, handline (recreational)

### 3.5.1 **Bottom Longline**

BLL gear is the primary commercial gear employed for targeting LCS in all regions. SCS are also caught on BLL. Gear characteristics vary by region and target species, but in general, BLL consists of a longline between 3 and 8 km (1.8 – 5 miles) long with 200-400 hooks attached and is set for between 2 and 20 hours. Depending on the species being targeted, both circle and J hooks can be used. Fishermen targeting sharks with BLL gear are opportunistic and often maintain permits for council-managed fisheries such as reef fish, snapper/grouper, tilefish, and other teleosts. Minor modifications to how and where the gear is deployed allow fishermen to harvest sharks and teleosts on the same trip. Seasons, quota availability, market prices, and other factors influence decisions concerning whether or not to target sharks, teleosts, or both on a given trip. The gear typically consists of a heavy monofilament mainline with lighter weight monofilament gangions. Some fishermen may occasionally use a flexible 1/16 inch wire rope as gangion material or as a short leader above the hook (Hale et al., 2010).

#### 3.5.1.1 **Domestic History and Current Management**

Regulations for the shark fishery in this section apply to all gear types. The 1993 FMP for Sharks of the Atlantic Ocean established the basis for subsequent shark management, including establishment of three management units (LCS, SCS, and pelagic sharks), commercial quotas, and authorized gears, among other measures. Amendment 1 to the FMP for Atlantic Tunas, Swordfish, and Sharks was completed in 2003 because of updated stock assessments, litigation, and other public comments (December 24, 2003, 68 FR 74746). Management measures enacted in that amendment included: modifying the commercial quotas, eliminating the commercial minimum size restrictions, establishing regions and trimester seasons for LCS and SCS management units, imposing gear restrictions to reduce bycatch, and a time/area closure off the coast of North Carolina effective as of January 1, 2005.

Based on 2005 and 2006 stock assessments, NMFS further revised shark management measures and rebuilding periods in Amendment 2 to the 2006 Consolidated HMS FMP on June 24, 2008 (73 FR 35778; corrected on July 15, 2008, 73 FR 40658) (NMFS 2008a). In the final rule, NMFS removed sandbar sharks from the LCS management group quota and established a non-sandbar LCS management group quota that was split into two regions (Atlantic and Gulf of Mexico). A shark research fishery was established in order to collect data on sandbar sharks. Amendment 2 also implemented new annual adjusted quotas for sandbar sharks, non-sandbar LCS, and a porbeagle shark commercial quota. In addition, Amendment 2 required that all sharks be landed with all fins attached to the carcass through landing and offloading. Stock

assessment results from 2007 for blacknose and shortfin mako sharks required changes to the management plan, which resulted in the publication of Amendment 3 to the 2006 Consolidated HMS FMP (75 FR 30484; June 1, 2010) (NMFS 2010). This amendment created a species-specific quota for blacknose sharks, modified the quota for the non-blacknose SCS, added smooth dogfish to the management unit and established a commercial quota, and established management measures to end overfishing of shortfin mako sharks at the international level as required by ICCAT.

Recently, NMFS updated the stock status determinations for blacknose, sandbar, and dusky sharks (76 FR 62331; October 7, 2011). The blacknose shark stock was split into two regions with the Atlantic stock being determined as overfished with overfishing occurring, and the Gulf of Mexico stock status was determined to be unknown. The status of sandbar sharks was determined to be overfished with no overfishing occurring, a change from the previous determination of overfished with overfishing occurring. We also determined that the status of the scalloped hammerhead shark stock is overfished with overfishing occurring (76 FR 23794; April 28, 2011). We also determined that the status of Gulf of Mexico blacktip sharks was Gulf of Mexico blacktip shark stock is not overfished and no overfishing is occurring (77 FR 70552; Nov 26, 2012).

#### **3.5.1.2 Recent Catch, Landings, and Discard Data**

The shark BLL observer program collects data on shark landings, species composition, bycatch, and discards in the BLL fishery. Since 2002, shark BLL vessels have been required to take an observer, if selected. Participants in the shark research fishery are required to take an observer when targeting sandbar sharks. Outside the research fishery and depending on the time of year and fishing season, vessels that target sharks, possess current valid directed shark permit, and report fishing with longline gear in the previous year are randomly selected for coverage with a target coverage level of 2-3 percent (Hale *et al.*, 2011). Details on the number of vessels observed, hauls observed, gear characteristics, and shark catch composition and disposition can be found in Chapter 4.5.2 in the 2012 SAFE Report (NMFS 2012b).

#### **3.5.1.3 Bottom Longline Bycatch**

Under the MMPA (16 U.S.C. § 1361 *et seq.*), the Atlantic shark BLL is classified as a Category III fishing activity (remote likelihood or no known serious injuries or mortalities expected to marine mammals) (November 29, 2011; 76 FR 73912). As required by the ESA, the NMFS Southeast Regional Office's Protected Resources Division prepared a Biological Opinion (BiOp) regarding the actions proposed under Amendments 3 and 4 to the 2006 Consolidated HMS FMP on December 12, 2012. The BiOp concluded, based on the best available scientific information, that the actions proposed in Amendments 3 and 4 to the 2006 Consolidated HMS FMP were not likely to jeopardize the continued existence of endangered green, leatherback, and Kemp's ridley sea turtles; the endangered smalltooth sawfish; the endangered Atlantic Sturgeon; or the threatened loggerhead sea turtle. The actions proposed to be implemented under Amendments 3 and 4 were not expected to jeopardize the continued existence of any endangered or threatened species. Furthermore, the BiOp concluded that the actions implemented under Amendments 3 and 4 were not likely to adversely affect any listed species of marine mammals, invertebrates

(i.e., listed species of coral) or other listed species of fishes (i.e., Gulf sturgeon and Atlantic salmon) in the action area.

Additional information regarding observed bycatch of protected resources in the BLL shark fishery can be found in the 2012 SAFE Report (NMFS 2012b).

### **3.5.2 Gillnet Fishery**

Gillnet is the primary gear for vessels directing on small coastal sharks. Vessels participating in the shark gillnet fishery typically possess permits for other Council and/or state managed fisheries and will deploy nets in several configurations based on target species including drift, strike, and sink gillnets. Information regarding the number of trips and sets, set configurations, and haulback times observed in 2011 can be found in the 2012 SAFE Report (NMFS 2012b).

#### **3.5.2.1 Domestic History and Current Management**

Many of the regulations for the Atlantic shark fishery are the same for both the BLL and gillnet fishery, including, but not limited to: seasons, quotas, species complexes, permit requirements, authorized/prohibited species, and retention limits (see section 3.4.1.1 above for more information on shark fishery management). Examples of regulations that are specific to shark gillnet fishing include: gillnet mesh size, requiring that gillnets remain attached to the vessel, and the need to conduct net checks every two hours when gear is deployed. More information about the effects of regulations on gillnet fishermen can be found in the 2012 SAFE Report (NMFS 2012b).

#### **3.5.2.2 Recent Catch, Landings, and Discards**

Every year the SEFSC's Panama City Laboratory publishes a report on the catch and bycatch in the U.S. Southeast Gillnet Fisheries that describes the target species, gear configuration, and soak time deployed by drift gillnet, strike gillnet, and sink gillnet fishermen. Additional information regarding shark species composition, disposition, and summary information for sharks caught during observed drift and sink gillnet trips with observers onboard in 2011 can be found in the 2012 SAFE Report (NMFS 2012b).

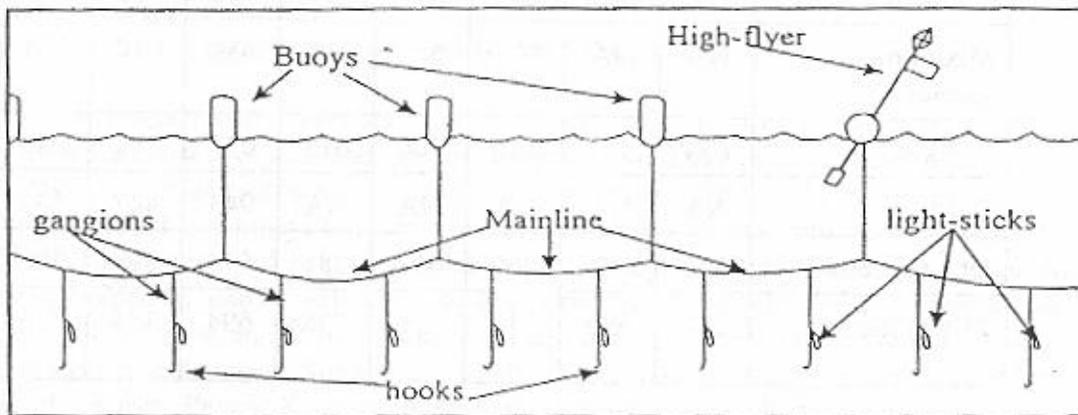
#### **3.5.2.3 Gillnet Bycatch**

Under the MMPA (16 U.S.C. § 1361 *et seq.*) the Atlantic shark gillnet fishery is classified as Category II (occasional serious injuries and mortalities) (November 8, 2010; 75 FR 68468). One green sea turtle (*Chelonia mydas*) was observed caught in sink gillnet gear in 2011 and was released alive (Gulak et al., 2012). No seabirds, marine mammals, or smalltooth sawfish were observed caught in gillnet gear in 2012 (Gulak et al. 2012). Information regarding protected species bycatch and finfish bycatch can be found in the 2012 SAFE Report (NMFS 2012).

### **3.5.3 Pelagic Longline Fishery**

#### **3.5.3.1 Domestic History and Current Management**

The U.S. PLL fishery for Atlantic HMS primarily targets swordfish, yellowfin tuna, and bigeye tuna in various areas and seasons. Secondary target species include dolphin, albacore tuna, and, to a lesser degree, sharks. Although this gear can be modified (e.g., depth of set, hook type, *etc.*) to target swordfish, tunas, or sharks, it is generally a multi-species fishery. Vessel operators are opportunistic, switching gear style and making subtle changes to target the best available economic opportunity of each individual trip. PLL gear sometimes attracts and hooks non-target finfish with little or no commercial value as well as species that cannot be retained by commercial fishermen due to regulations, such as billfish. Pelagic longliners may also interact with protected species, such as marine mammals, sea turtles, and seabirds. Thus, this gear has been classified as a Category I fishery with respect to the MMPA. Any species (or undersized catch of permitted species) that cannot be landed due to fishery regulations is required to be released, whether dead or alive.



**Figure 3.2** Typical U.S. PLL Gear; Source: Arocha 1996

PLL gear is composed of several parts (see Figure 3.2) (NMFS 1999). The primary fishing line, or mainline of the longline system, can vary from five to 40 miles in length, with approximately 20 to 30 hooks per mile. The depth of the mainline is determined by ocean currents and the length of the float line, which connects the mainline to several buoys, and periodic markers which can have radar reflectors or radio beacons attached. Each individual hook is connected by a leader, or gangion, to the mainline. Lightsticks, which contain chemicals that emit a glowing light, are often used, particularly when targeting swordfish. When attached to the hook and suspended at a certain depth, lightsticks attract baitfish, which may, in turn, attract pelagic predators (NMFS, 1999). The number of hooks per PLL set varies with line configuration and target species (Table 3.4) (NMFS, 1999).

**Table 3.4** Average Number of Hooks per PLL Set, 2002 - 2011. Source: PLL logbook data.

Target Species	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Swordfish	695	711	701	747	742	672	708	687	759	733
Bigeye tuna	755	967	400	634	754	773	751	755	653	802
Yellowfin tuna	715	720	696	691	704	672	678	689	687	635
Mix of tuna species	767	765	779	692	676	640	747	744	837	786

Target Species	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Shark	640	696	717	542	509	494	377	354	455	348
Dolphin	542	692	1,033	734	988	789	989	1,033	1,131	1,095
Other species	300	865	270	889	236	NA	NA	NA	467	400
Mix of species	756	747	777	786	777	757	749	781	761	749

### *Management of the U.S. Pelagic Longline Fishery*

The U.S. Atlantic PLL fishery is restricted by a swordfish quota, divided between the North and South Atlantic (separated at 5°N. Lat.). Other regulations include: minimum sizes for swordfish, yellowfin, bigeye, and bluefin tuna; bluefin tuna target catch requirements; shark quotas; protected species incidental take limits; reporting requirements (including logbooks); gear and bait requirements; limited access vessel permits, and mandatory workshop requirements. Current billfish regulations prohibit the retention of billfish by commercial vessels, or the sale of billfish from the Atlantic Ocean. As a result, all billfish hooked on PLL gear must be discarded, and are considered bycatch. PLL is a heavily managed gear type and is strictly monitored. Because it is difficult for PLL fishermen to avoid undersized or prohibited fish in some areas, NMFS has closed areas with the highest rates of bycatch in the Gulf of Mexico and along the east coast with the intent to decrease bycatch in the PLL fishery. There are also time/area closures for PLL fishermen designed to reduce the incidental catch of bluefin tuna and sea turtles. In order to enforce time/area closures and to monitor the fishery, NMFS requires all PLL vessels to report positions on an approved VMS.

In order to protect sea turtles, vessels with PLL gear onboard must, at all times, in all areas open to PLL fishing except the Northeast Distant statistical area (NED), possess onboard and/or use only 16/0 or larger non-offset circle hooks and/or 18/0 or larger circle hooks with an offset not to exceed 10 degrees. Only whole finfish and squid baits may be possessed and/or utilized with allowable hooks. Vessels fishing in the NED are required to use 18/0 or larger circle hooks with an offset not to exceed 10 degrees and whole mackerel or squid baits. All PLL vessels must possess and use sea turtle handling and release gear in compliance with NMFS careful release protocols. Additionally, all PLL vessel owners and operators must be certified in the use of the protected species handling and release gear. Certification must be renewed every three years and can be obtained by attending a training workshop. Approximately 18 - 24 workshops are conducted annually, and they are held in areas with significant numbers of PLL permit holders.

In 2009, to protect pilot whales and Risso's dolphins, the Pelagic Longline Take Reduction Plan (PLTRP) (74 FR 23349, May 19, 2009) included a requirement that PLL vessel operators fishing in the Cape Hatteras Special Research Area must contact NMFS at least 48 hours prior to a trip and carry observers if requested. The PLTRP also established a 20 nm upper limit on mainline length for all PLL sets in the mid-Atlantic Bight (MAB), and required that an informational placard be displayed in the wheelhouse and on the working deck of all active PLL vessels in the Atlantic fishery.

In April 2011, NMFS implemented a requirement for PLL vessels to use "weak hooks" - hooks that are designed to release large bluefin tuna while retaining yellowfin tuna and swordfish – when fishing in the Gulf of Mexico (76 FR 18653, April 5, 2011). This action provides protection for spawning bluefin tuna in the Gulf of Mexico and helps to better align landings and dead discards of bluefin tuna with the Longline category bluefin tuna subquota.

### Permits

The 1999 FMP established six different limited access permit (LAP) types (NMFS 1999): (1) directed swordfish, (2) incidental swordfish, (3) swordfish handgear, (4) directed shark, (5) incidental shark, and (6) Atlantic tunas longline. To reduce bycatch in the PLL fishery, these permits were designed so that the swordfish directed and incidental permits are valid only if the permit holder also holds both a tuna longline and a shark permit. Similarly, the tuna longline permit is valid only if the permit holder also holds both a swordfish (directed or incidental, not handgear) and a shark permit. This allows limited retention of species that might otherwise have been discarded.

As of October 2012, approximately 253 tuna longline LAPs had been issued. In addition, approximately 184 directed swordfish LAPs, 73 incidental swordfish LAPs, 215 directed shark LAPs, and 271 incidental shark LAPs had been issued (see Section 3.5 for more information on permits). Vessels with limited access swordfish and shark permits do not necessarily use PLL gear, but these are the only permits that allow for the use of PLL gear in HMS fisheries.

In 2010, the procedures for issuing the Atlantic tunas longline permits were consolidated within the SERO permits office in St. Petersburg, Florida, where the shark and swordfish permits are also issued. This streamlined PLL permitting process has made it easier for fishermen to obtain combinations of permits, when necessary, and made it more efficient to administer.

### Monitoring and Reporting

PLL fishermen and the dealers who purchase Atlantic HMS from them are subject to reporting requirements. NMFS has extended dealer reporting requirements to all swordfish importers as well as dealers who buy domestic swordfish from the Atlantic. These data are used to evaluate the impacts of harvesting on the stock and the impacts of regulations on affected entities.

Commercial HMS fisheries are monitored through a combination of vessel logbooks, dealer reports, port sampling, cooperative agreements with states, scientific observer coverage, and vessel monitoring systems. Logbooks contain information on fishing vessel activity, including dates of trips, number of sets, area fished, number of fish, and other marine species caught, released, and retained. In some cases, social and economic data, such as volume and cost of fishing input, are also required.

### PLL Observer Program

During 2011, NMFS observers recorded 864 PLL sets for overall non-experimental fishery coverage of 10.1 percent (Garrison and Stokes 2012b). Table 3.5 details the amount of observer coverage in past years for this fleet.

In the PLTRP (74 FR 23349; May 19, 2009), it was recommended that NMFS increase observer coverage to 12 to 15 percent throughout all Atlantic PLL fisheries that interact with pilot whales and Risso's dolphins to ensure representative sampling of fishing effort. If resources are not available to provide such observer coverage for all fisheries, regions, and seasons, the PLTRT recommended NMFS allocate observer coverage to fisheries, regions, and seasons with the highest observed or reported bycatch rates of pilot whales. The PLTRT recommended that additional coverage be achieved either by increasing the number of NMFS observers who have been specially trained to collect additional information supporting marine mammal research, or by designating and training special "marine mammal observers" to supplement traditional observer coverage. In 2011, total observer coverage, including experimental sets, was 10.9 percent (Table 3.5).

**Table 3.5 Total Observer Coverage of the PLL Fishery.** Source: Yeung, 2001; Garrison, 2003b; Garrison and Richards, 2004; Garrison, 2005; Fairfield-Walsh and Garrison, 2006; Fairfield-Walsh & Garrison, 2007; Fairfield & Garrison, 2008; Garrison, Stokes & Fairfield, 2009; Garrison and Stokes, 2010, 2012a, 2012b

Year	Number of Sets Observed			Percentage of Total Number of Sets		
1999	420			3.8		
2000	464			4.2		
2001*	Total	Non-NED	NED	Total	Non-NED	NED
	584	398	186	5.4	3.7	100
2002*	856	353	503	8.9	3.9	100
2003*	1,088	552	536	11.5	6.2	100
	Total	Non-EXP	EXP	Total	Non-EXP	EXP
2004**	702	642	60	7.3	6.7	100
2005**	796	549	247	10.1	7.2	100
2006	568	-	-	7.5	-	-
2007	944	-	-	10.8	-	-
2008***	1,190	-	101	13.6	-	100
2009***	1,588	1,376	212	17.3	15.0	100
2010***	884	725	159	11.0	9.7	100
2011***	879	864	15	10.9	10.1	100

\*In 2001, 2002, and 2003, 100 percent observer coverage was required in the NED research experiment.

\*\* In 2004 and 2005, there was 100 percent observer coverage in experimental fishing (EXP).

\*\*\* In 2008- 2011, 100 percent observer coverage was required in experimental fishing in the FEC, Charleston Bump, and GOM, but these sets are not included in extrapolated bycatch estimates because they are not representative of normal fishing.

### 3.5.3.2 Recent Catch and Landings

U.S. PLL catch (including bycatch, incidental catch, and target catch) is largely related to vessel characteristics and gear configuration. The reported catch is summarized for the whole fishery in Table 3.6.

Table 3.7 provides a summary of U.S. PLL landings, as reported to ICCAT. Additional information regarding U.S. landings and discards is available in the 2012 U.S. National Report to ICCAT (NMFS 2012).

**Table 3.6**      **Reported Catch in the U.S. Atlantic PLL, in Number of Fish, for 2003-2011.** Source: PLL Logbook Data.

<b>Species</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>
Swordfish Kept	51,835	46,440	41,139	38,241	45,933	42,800	45,378	33,831	38,012
Swordfish Discarded	11,829	10,675	11,134	8,900	11,823	11,194	7,484	6,107	8,510
Blue Marlin Discarded	595	712	567	439	611	687	1,013	504	539
White Marlin Discarded	809	1,053	989	557	744	670	1,064	605	921
Sailfish Discarded	277	424	367	277	321	506	774	312	556
Spearfish Discarded	108	172	150	142	147	197	335	212	281
Bluefin Tuna Kept	273	475	375	261	337	343	629	392	355
Bluefin Tuna Discarded	881	1,031	765	833	1,345	1,417	1,290	1,488	764
Bigeye, Albacore, Yellowfin, Skipjack Tunas Kept	63,321	76,962	57,132	73,058	70,390	50,108	57,461	51,786	68,401
Pelagic Sharks Kept	3,037	3,440	3,149	2,098	3,504	3,500	3,060	3,872	3,694
Pelagic Sharks Discarded	21,705	25,355	21,550	24,113	27,478	28,786	33,721	45,511	43,778
Large Coastal Sharks Kept	5,326	2,292	3,362	1,768	546	115	403	434	130
Large Coastal Sharks Discarded	4,813	5,230	5,877	5,326	7,133	6,732	6,672	6,726	6,085
Dolphin Kept	29,372	38,769	25,707	25,658	68,124	43,511	62,701	30,454	29,442
Wahoo Kept	3,919	4,633	3,348	3,608	3,073	2,571	2,648	749	1,848
Sea Turtle Interactions	399	369	152	128	300	476	137	94	66
<i>Number of Hooks (x 1,000)</i>	<i>7,008</i>	<i>7,276</i>	<i>5,911</i>	<i>5,662</i>	<i>6,291</i>	<i>6,498</i>	<i>6,979</i>	<i>5,729</i>	<i>5,530</i>

**Table 3.7 Reported Landings in the U.S. Atlantic Pelagic Longline Fishery (in mt ww) for 2003-2011.**  
Source: NMFS 2012a.

Species	2003	2004	2005	2006	2007	2008	2009	2010	2011
Yellowfin Tuna	2,164.0	2,492.2	1,746.2	2,009.9	2,394.5	1,324.5	1,700.1	1463.1	1,468.6
Skipjack Tuna	1.4	0.7	0.6	0.2	0.0	1.5	0.5	1.5	0.7
Bigeye Tuna	283.9	310.1	311.9	520.6	380.7	407.7	430.1	545.9	627.1
Bluefin Tuna*	133.9	180.1	211.5	204.6	185.2	232.5	334.3	211.5	220.4
Albacore Tuna	107.6	120.4	108.5	102.9	126.8	117.9	158.3	173.7	267.6
Swordfish N.*	2,756.3	2,518.5	2,272.8	1,960.8	2,474.0	2,353.6	2,691.1	2524.7	2,681.2
Swordfish S.*	20.5	15.7	0.0	0.0	0.0	0.0	0.0	0.3	0.0

\* Includes landings and estimated discards from scientific observer and logbook sampling programs

At this time, the direct use of observer data, rather than self-reported HMS logbooks, with pooling for estimating dead discards in the PLL fishery represents the best scientific information available for use in stock assessments. Direct use of observer data has been employed for a number of years to estimate dead discards in Atlantic and Pacific longline fisheries, including billfish, sharks, and undersized swordfish. Furthermore, the data have been used for scientific analyses by both ICCAT and the Inter-American Tropical Tuna Commission for a number of years.

Bycatch mortality of marlins, sailfish, swordfish, and bluefin tuna from all fishing nations may significantly reduce the ability of these populations to rebuild, and it remains an important management issue. In order to minimize bycatch and bycatch mortality in the domestic PLL fishery, NMFS implemented regulations to close certain areas to this gear type and has banned the use of live bait by PLL vessels in the Gulf of Mexico.

#### *Incidental bycatch*

Other species including marine mammals, turtles, seabirds, and finfish are occasionally hooked by PLL vessels. For detailed descriptions of interactions with these species, please refer to section 3.4.1.2 of the 2006 Consolidated HMS FMP (NMFS 2006).

#### **3.5.3.3 Safety Issues**

Like all offshore fisheries, PLL fishing can be dangerous. Although frequently closer to shore, BLL fishing can be equally dangerous. Trips are often long, the work is arduous, and the nature of setting and hauling longline gear may result in injury or death. Like all other HMS fisheries, longline fishermen are exposed to unpredictable weather. We do not wish to exacerbate unsafe conditions through the implementation of regulations. Therefore, we consider safety factors when implementing management measures in the PLL fishery, although we do not expect the action considered in this FEIS to pose particular safety concerns. Fishermen have pointed out that, due to decreasing profit margins, they may fish with fewer crew or less experienced crew or

may not have the time or money to complete necessary maintenance tasks. We encourage fishermen to be responsible in fishing and maintenance activities.

#### 3.5.3.4 International Issues and Catch

PLL fisheries for Atlantic HMS primarily target swordfish and tunas. Directed PLL fisheries in the Atlantic have been operated by Spain, the United States, and Canada since the late 1950s or early 1960s. The Japanese PLL tuna fishery began in 1956 and has operated throughout the Atlantic since then (NMFS, 1999). Many of the 48 other ICCAT parties now also operate PLL vessels. A detailed description of how ICCAT collects fishery data can be found in the 2011 SAFE Report (NMFS 2011a).

The U.S. PLL fleet represents a small fraction of the international PLL fleet that competes on the high seas for catches of tunas and swordfish. In recent years, the proportion of U.S. PLL landings of HMS, for the fisheries in which the United States participates, has remained relatively stable in proportion to international landings. Historically, the U.S. fleet has accounted for less than 0.5 percent of the landings of swordfish and tuna from the Atlantic Ocean south of 5° N. Lat. and does not operate at all in the Mediterranean Sea. Tuna and swordfish landings by foreign fleets operating in the tropical Atlantic and Mediterranean are greater than the catches from the north Atlantic area where the U.S. fleet operates. Within the area where the U.S. longline fleet operates, U.S. longline landings still represent a limited fraction of total landings. In recent years (2002 - 2011), U.S. longline landings have averaged 5.0 percent of total Atlantic longline landings, ranging from a high of 5.8 percent in 2011 to a low of 4.5 percent in 2010.

Stock assessments and data collection for international shark fisheries have improved in recent years due to increased reporting requirements adopted by ICCAT. Specifically, since 2004, there have been several shark-related Recommendations and Resolutions (e.g., 04-10, 06-10, 07-06, 08-07, 08-08, 09-07, 10-06, 10-07, 10-08, 11-08, and 12-05). Additionally, SCRS has assessed several species of sharks including blue, shortfin mako, and porbeagle sharks. For more information on ICCAT shark actions, see previous SAFE Reports and the ICCAT webpage (<http://www.iccat.int/en/>). Also, see the 2012 SAFE Report for the most recent catch totals for blue, shortfin mako, and porbeagle sharks (NMFS 2012).

To comply with ICCAT Recommendations 10-07 and 10-08, we implemented a final rule, effective September 28, 2011, prohibiting the retention of hammerhead sharks (except bonnethead sharks) and oceanic whitetip sharks in ICCAT fisheries (PLL fisheries; HMS angling and Charter/Headboat fisheries that have retained tunas, billfish, and swordfish). Similarly, we published a final rule on October 4, 2012 to prohibit silky sharks in ICCAT fisheries per ICCAT Recommendation 11-08.

#### 3.5.4 Recreational Handgear

The following section describes the recreational portion of the handgear fishery, and is primarily focused upon rod and reel fishing. The HMS Handgear (rod and reel, handline, buoy gear, and harpoon) fishery includes both commercial and recreational fisheries and is described fully in Section 2.5.8 of the 1999 FMP and 2006 Consolidated HMS FMP (NMFS 1999; NMFS 2006).

#### **3.5.4.1 Overview of History and Current Management**

All Atlantic HMS are targeted by domestic recreational fishermen using a variety of handgear including rod and reel gear. Since 2003, recreational fishing for any HMS-managed species requires an HMS Angling permit (67 FR 77434, December 18, 2002), and all non-tournament recreational landings of Atlantic marlins, sailfish, and swordfish must be reported. Additionally, all HMS fishing tournaments are required to register with NMFS at least four weeks prior to the commencement of tournament fishing activities. If selected, tournament operators are required to report the results of their tournament to the NMFS SEFSC.

The recreational shark fishery is managed using bag limits, minimum size requirements, and landing requirements (sharks must be landed with head and fins naturally attached). Additionally, there are 21 species of sharks of which possession is prohibited. Recreational fishermen are allowed to keep non-ridgeback LCSs, tiger sharks, pelagic sharks, SCSs, and smoothhound sharks. As of July 24, 2008, recreational fishermen have been prohibited from keeping sandbar or silky sharks.

#### **3.5.4.2 Most Recent Catch and Landings Data**

The recreational landings database for Atlantic HMS consists of information obtained through surveys including the Marine Recreational Information Program (MRIP), Large Pelagic Survey (LPS), Southeast Headboat Survey (HBS), Texas Headboat Survey, Recreational Billfish Survey (RBS) tournament data, and the recreational non-tournament swordfish and billfish landings database. Recreational data was also obtained through the Marine Recreational Fishery Statistics Survey (MRFSS) until 2011.

MRIP is a new data collection and analysis initiative being phased-in by NMFS beginning in 2012 to help ensure the long-term sustainability of America's fisheries and the health of our oceans. MRIP provides a more comprehensive and detailed picture of the number of trips being taken by recreational anglers, the amount and species of fish they are catching, the location and timeframe in which those fish are being caught, and the economic impact of recreational fishing on local, regional and national economies. Through the collection of more timely and accurate fishing data, MRIP provides policy makers with the information they need to make sound decisions based on the best science. As a program built on broad and continuing stakeholder input, MRIP also empowers anglers and other ocean enthusiasts to become a part of the resource management, conservation, and economic decision-making processes that impact their lives.

MRIP is a system of coordinated data collection programs designed to address specific regional needs for recreational fishing information. This regional approach, based on nationally consistent standards, will ensure that the appropriate targeted, place-based information is being collected to best meet the needs of managers and stakeholders, and that it is being done in a scientifically rigorous way. One MRIP objective is to improve the information available for the management of HMS. A project is currently underway to pilot test specialized data collection approaches for estimating HMS recreational catch and effort in Puerto Rico. Atlantic HMS projects funded through MRIP that were recently completed include:

- Characterization of Rod and Reel HMS Fisheries in the South Atlantic and Gulf of Mexico
- Florida HMS Private Angler Telephone Survey
- HMS For-Hire Survey – Florida Pilot Study
- Evaluation of the Sampling Distribution of Tournament Versus Non-tournament Trips in the LPS

### *Shark Recreational Fishery*

Recreational landings of sharks are an important component of HMS fisheries. Recreational shark fishing with rod and reel is a popular sport and sharks can be caught virtually anywhere in salt water. Recreational shark fisheries often occur in nearshore waters accessible to private vessels and charter/headboats; however, shore-based and offshore fishing also occur. Summaries of landings for each of the three species groups, LCS, pelagic sharks, and SCS can be found in the 2012 SAFE Report (NMFS 2012). Since 2003, the recreational fishery has been limited to rod and reel and handline gear only. Similar state regulations along the Atlantic seaboard are implemented through an ASMFC interstate FMP (ASMFC 2008). Recreational landings of individual shark species can be found in the following three tables (Table 3.8, Table 3.9, Table 3.10).

**Table 3.8 Recreational Harvest of Atlantic LCS by Species, in number of fish: 2003-2011.** Sources: Cortés and Neer 2005, Cortés, pers. comm.

LCS Species	2003	2004	2005	2006	2007	2008	2009	2010	2011
Basking**	0	0	0	0	0	0	0	0	0
Bignose*	0	17	0	0	55	0	0	0	0
Bigeye sand tiger**	0	0	0	0	0	0	0	0	0
Blacktip	40,044	30,885	43,408	31,038	28,864	13,318	12,921	23,640	16,005
Bull	3,743	5,186	1,561	4,262	5,849	1,735	6,811	260	1,639
Caribbean reef*	0	652	5	47	0	0	1	0	0
Dusky*	2,777	36	3,040	194	112	2,391	447	546	148
Galapagos*	0	0	0	0	0	0	0	0	0
Hammerhead, great	47	9	55	98	786	13	128	3	112
Hammerhead, scalloped	2,921	879	5,021	458	1,726	119	1,667	199	369
Hammerhead, smooth	1	0	0	2	0	0	0	0	0
Hammerhead, unclassified	0	0	2,676	1,099	807	0	0	0	0
Lemon	4,916	5,578	510	1,145	3	818	597	2,013	1,046
Night*	0	0	15	1	2	0	22	0	0
Nurse	563	3,463	2,341	1,553	334	268	822	251	1,312
Sandbar***	5,151	3,724	2,798	821	7,060	5,801	4,908	6,277	1,565
Sand tiger**	0	0	0	1,040	0	0	0	0	0
Silky***	1,870	399	3,576	2,108	1,973	1,226	782	157	438
Spinner	4,864	4,041	3,269	2,281	6,547	3,824	3,347	5,715	3,015
Tiger	110	1	1,321	1,309	1,815	1,418	4	473	89
Whale**	0	0	0	0	0	0	0	0	0
White**	0	0	0	0	0	0	0	0	0
Requiem shark unclassified	22,020	12,488	15,423	11,652	12,837	11,519	32,024	49,920	35,145
Total:	89,027	67,359	85,019	59,108	68,770	45,010	64,481	89,454	60,883

\*indicates species that were prohibited in the recreational fishery as of July 1, 1999.

\*\* indicates species that were prohibited as of April 1997.

\*\*\* indicates species that were prohibited as of July 2008.

**Table 3.9 Recreational Harvest of Atlantic Pelagic Sharks by Species, in number of fish: 2003-2011.**  
Sources: Cortés and Neer 2005, Cortés, pers. comm.

Pelagic Shark Species	2003	2004	2005	2006	2007	2008	2009	2010	2011
Bigeye thresher*	0	0	0	42	0	0	0	0	0
Bigeye sixgill*	0	0	0	0	0	0	0	0	0
Blue Shark	376	0	31	980	1,622	117	0	1,384	0
Mako, longfin*	0	0	0	0	0	0	0	0	0
Mako, shortfin	3,906	5,052	3,857	3,352	2,556	1,904	4,991	5,156	509
Mako, unclassified	0	0	0	0	0	0	9	0	4,562
Oceanic whitetip	0	0	0	0	0	0	0	0	0
Porbeagle	0	0	0	0	0	0	0	0	17
Sevengill*	0	0	0	0	0	0	0	0	0
Sixgill*	0	0	0	0	0	0	0	0	0
Thresher	0	0	1,504	12,171	4,822	755	2,768	267	0
Pelagic shark, unclassified	-	-	-	-	-	-	-	-	111
Total:	4,282	5,052	5,392	16,545	9,000	2,776	7,759	6,807	5,199

\* indicates species that were prohibited in the recreational fishery as of July 1, 1999.

**Table 3.10 Recreational Harvest of Atlantic SCS by Species, in number of fish: 2003-2011.** Sources: Cortés and Neer 2005, Cortés, pers. comm.

SCS Species	2003	2004	2005	2006	2007	2008	2009	2010	2011
Atlantic angel*	0	0	0	0	0	0	0	0	0
Blacknose	6,615	15,101	7,101	9,914	9,177	3,718	5,845	2,050	2,281
Bonnethead	41,314	42,429	32,227	24,885	42,444	22,973	28,743	14,683	57,023
Finetooth	1,788	366	3,129	572	4,048	2,308	797	862	67
Sharpnose, Atlantic	84,626	69,067	76,347	81,817	111,967	78,885	65,709	63,695	49,916
Sharpnose, Caribbean*	0	0	0	0	0	0	0	0	0
Smalltail*	0	67	71	0	0	0	0	0	0
Total:	134,343	127,030	118,875	117,188	167,636	107,884	101,094	81,290	109,287

\*indicates species that were prohibited in the recreational fishery as of July 1, 1999.

### 3.5.4.3 Bycatch Issues and Data Associated with the Fishery

Bycatch in the recreational rod and reel fishery is difficult to quantify because many fishermen simply value the experience of fishing and may not be targeting a particular pelagic species. Recreational “marlin” or “tuna” trips may yield dolphin, tuna, wahoo, and other species, both under- and legal-sized. Bluefin tuna trips may yield undersized bluefin tuna, or a seasonal closure may prevent landing of a bluefin tuna above a minimum or maximum size. Sharks may be discarded because they are a prohibited species or undersized. In these and similar cases, rod and reel catch may be discarded with the fish either alive or dead. The Magnuson-Stevens Act (16 U.S.C. 1802 MSA § 3 (2)) specifies that fish released under a recreational catch-and-release program are not considered bycatch.

Bycatch can result in death or injury to discarded fish; therefore, bycatch mortality is incorporated into fish stock assessments, and into the evaluation of management measures. Rod and reel discard estimates from Virginia to Maine from the months of June through October could be monitored through the expansion of survey data derived from the LPS (dockside and telephone surveys), or could be assessed through other monitoring programs such as logbooks. However, the actual numbers of fish discarded for many species are so low that presenting the data by area could be misleading, particularly if the estimates are expanded for unreported effort in the future. The number of kept and released fish reported or observed through the LPS dockside intercepts for 2002-2011 is presented in Table 3.11 and Table 3.12.

**Table 3.11 Observed or reported number of sharks kept in the rod and reel fishery, Maine through Virginia, 2003-2011.** Source: LPS Data.

Species	2003	2004	2005	2006	2007	2008	2009	2010	2011
Thresher shark	24	58	45	34	62	59	66	44	41
Mako shark	141	216	99	111	143	169	159	159	172
Sandbar shark	9	7	1	1	9	1	1	0	1
Dusky shark	1	0	0	3	6	1	0	1	0
Tiger shark	0	0	1	0	1	1	3	1	0
Porbeagle	0	1	1	1	0	0	0	2	2
Blacktip shark	1	0	1	1	0	-	-	0	0
Atlantic sharpnose shark	0	0	0	0	0	-	-	10	5
Blue shark	65	74	67	61	109	43	54	26	30
Hammerhead shark	0	1	0	0	0	1	0	0	0
Smooth hammerhead	0	0	0	0	0	1	0	0	0
Scalloped hammerhead	0	0	0	1	0	0	0	0	0
Unidentified hammerhead	0	0	0	0	0	0	0	0	0

**Table 3.12 Observed or Reported Number of Sharks Released in the Rod and Reel Fishery, Maine through Virginia, 2003-2011.** Source: LPS Data.

Species	2003	2004	2005	2006	2007	2008	2009	2010	2011
Thresher shark	8	27	9	15	24	35	23	21	9
Mako shark	208	350	142	177	190	242	250	276	224
Sandbar shark	26	68	37	158	168	222	219	37	45
Dusky shark	44	60	49	73	87	128	152	116	84
Tiger shark	12	0	6	7	11	20	11	13	25
Porbeagle	3	1	6	8	2	2	6	11	31
Blacktip shark	0	1	19	9	31	-	-	34	10
Atlantic sharpnose shark	0	0	11	0	0	-	-	5	3
Blue shark	2,060	2,242	920	884	1,978	2,735	4,185	3,333	3,752
Hammerhead shark	38	2	5	0	0	0	0	0	1
Smooth hammerhead	0	0	0	1	2	0	1	1	3
Scalloped hammerhead	0	0	0	0	0	4	2	0	0
Unidentified hammerhead	0	0	0	11	14	27	31	32	10

### 3.5.5 Fishery Data: Landings by Shark Species

The purpose of this section is to provide a summary of recent landings of sharks on a species by species basis, including sharks caught under special permits (such as exempted fishing permits (EFPs)), which are not recorded in commercial logbooks. Landings for sharks were compiled from the most recent stock assessment documents and updates provided from the SEFSC. Landings data tables can be found in the 2012 SAFE Report. The top large coastal sharks landed in the commercial shark fishery in 2011 were blacktip, bull, and unclassified hammerhead sharks at 572,209, 228,522, and 104,324 lb dw, respectively. There were 140,333 lb dw of sandbar

sharks landed in 2011, but those landings are only authorized by fishermen participating in the shark research fishery. Atlantic Sharpnose and finetooth sharks were the top two small coastal sharks landed in 2011 (261,295 and 211,876 lb dw, respectively). Shortfin mako and thresher sharks were the two most landed pelagic sharks in 2011 (207,630 and 47,462 lb dw, respectively) and made up approximately 90 percent.

### **3.6 HMS Permits and Tournaments**

This section provides updates for the number of permits that were issued in conjunction with HMS fishing activities as of October 2012. HMS fisheries permit numbers, and dealer permit numbers for shark, swordfish, and tunas are updated through October 2012.

NMFS' HMS Management Division continues to monitor capacity in HMS fisheries. Updated permit numbers for HMS and non-HMS fisheries as of October 2012 are included in Table 3.14. The overall number of HMS permits for Atlantic swordfish and sharks (directed and incidental) increased between 2008 and 2012 (Table 3.14), however, these numbers are subject to change based upon on-going permit renewal or expiration.

**Table 3.13 Distribution of active Shark Directed and Incidental Permits and Other Permits Held by Shark Fishermen in Other Fisheries. Summarized by State as of December 31, 2011.**

State	SHK-Directed	SHK Incidental	SWO Directed	SWO Incidental/Handgear	GOM Reef Fish	Dolphin Wahoo	Mackerel:		Spiny Lobster	Snapper-Grouper	Non-HMS Charter Head Boat General*
							King	Spanish			
ME	3	5	6	0	0	3	0	0	0	0	0
NH	1	1	1	0	0	0	0	0	0	0	0
MA	3	13	9	3	0	9	1	3	1	0	0
RI	0	3	0	3	0	1	0	0	0	0	0
CT	0	1	0	0	0	0	0	0	0	0	0
NY	13	14	19	5	1	21	0	3	0	1	4
NJ	28	34	33	17	0	39	12	22	1	1	3
DE	0	1	1	0	0	1	0	0	0	0	0
MD	3	3	5	0	0	6	0	1	0	0	6
VA	1	2	1	0	0	1	0	1	0	1	0
NC	20	17	13	7	0	34	22	23	3	18	15
SC	11	14	5	2	0	18	9	3	1	16	6
GA	2	1	0	0	0	3	3	3	2	3	0
FL	177	170	91	60	93	238	165	219	21	88	166
AL	6	1	0	0	2	3	3	4	0	0	0
MS	0	1	0	0	1	0	1	1	0	0	0
LA	10	40	35	4	9	6	7	5	0	0	2
TX	5	9	0	5	10	3	10	4	0	0	4
<b>Total 2011</b>	<b>283</b>	<b>330</b>	<b>219</b>	<b>106</b>	<b>116</b>	<b>386</b>	<b>233</b>	<b>292</b>	<b>29</b>	<b>128</b>	<b>206</b>

State	SHK-Directed	SHK Incidental	SWO Directed	SWO Incidental/ Handgear	GOM Reef Fish	Dolphin Wahoo	Mackerel:		Spiny Lobster	Snapper-Grouper	Non-HMS Charter Head Boat General*
							King	Spanish			
<b>Total 2010</b>	<b>215</b>	<b>265</b>	<b>177</b>	<b>147</b>	<b>**</b>	<b>**</b>	<b>**</b>	<b>**</b>	<b>**</b>	<b>**</b>	<b>**</b>
<b>Total 2009</b>	<b>221</b>	<b>282</b>	<b>183</b>	<b>79</b>	<b>112</b>	<b>309</b>	<b>188</b>	<b>222</b>	<b>21</b>	<b>108</b>	<b>152</b>
<b>Total 2008</b>	<b>214</b>	<b>285</b>	<b>181</b>	<b>76</b>	<b>**</b>	<b>**</b>	<b>**</b>	<b>**</b>	<b>**</b>	<b>**</b>	<b>**</b>

\* Non-HMS Charter Headboat (CHB) General includes: Atlantic CHB for dolphin/wahoo, South Atlantic (SA) CHB for pelagic fish, SA CHB for snapper/grouper, Gulf of Mexico (GOM) CHB for pelagic fish, and GOM CHB for reef fish.

\*\* 2008 and 2010 numbers taken from 2008 and 2010 SAFE Report. Not all permit totals are available.

### **3.6.1 HMS Commercial Fishing Permits**

The LAP program was implemented in the 1999 FMP and became effective on July 1, 1999 (64 FR 29090, May 28, 1999) (NMFS 1999). The program includes six different permit types for limited access provisions: Swordfish Directed, Swordfish Incidental, Swordfish Handgear, Shark Directed, Shark Incidental, and Atlantic Tuna Longline. To reduce bycatch concerns in the PLL fishery, these permits were designed so that the Swordfish Directed and Incidental permits are valid only if the permit holder also holds both an Atlantic Tuna Longline and a shark permit. Similarly, the Atlantic Tuna Longline permit is valid only if the permit holder also holds both a swordfish (Directed or Incidental, not Handgear) and a shark permit. No additional LAPs are required to make a Swordfish Handgear or any of the shark permits valid. There have been between 657 and 555 LAP holders annually from 2004 through 2012. Please see the 2012 SAFE Report for additional information (NMFS 2012).

### **3.6.2 HMS Charter/Headboat Permits**

In 2002, NMFS published a final rule (67 FR 77434, Dec. 18, 2002) expanding the HMS recreational permit from tuna only to include all HMS and defining HMS charter/headboat operations. This permit was effective March 2003 and established a requirement that owners of charter boats or headboats that are used to fish for, take, retain, or possess Atlantic tunas, sharks, swordfish, or billfish must obtain an Atlantic HMS Charter/Headboat permit. This permit replaced the Atlantic Tunas Charter/Headboat permit. A vessel issued an Atlantic HMS Charter/Headboat permit for a fishing year will not be issued an HMS Angling permit or any Atlantic Tunas permit in any category for that same fishing year, even if there is a change in the vessel's ownership. There were over 4,000 HMS Charter/Headboat permit holders in 2012. Please see the 2012 SAFE Report for additional information (NMFS 2012).

### **3.6.3 HMS Angling Permits**

Since March 2003 (67 FR 77434, Dec. 18, 2002), the HMS Angling Permit has been required to fish for, retain, or possess, including catch and release fishing, any federally regulated HMS. Species authorized for harvest with an HMS Angling permit include: sharks, swordfish, white and blue marlin, sailfish, roundscale spearfish, and federally regulated Atlantic tunas (bluefin tuna, yellowfin, bigeye, skipjack, and albacore). Atlantic HMS caught, retained, possessed, or landed by persons on board vessels with an HMS Angling Category permit may not be sold or transferred to any person for a commercial purpose. By definition, recreational landings of Atlantic HMS are those that cannot be marketed through commercial channels, therefore it is not possible to monitor anglers' catches through ex-vessel transactions as in the commercial fishery. Instead, NMFS conducts statistical sampling surveys of the recreational fisheries. There were 23,061 HMS Angling permits issued in 2012. For more information, please see the 2012 SAFE Report (NMFS 2012).

#### 3.6.4 Dealer Permits

Dealer permits are required for commercial receipt of Atlantic tuna, swordfish, and sharks, and are described in further detail in the 2006 Consolidated HMS FMP (NMFS 2006). Dealer permits are open access. An Atlantic shark dealer permit is required for any entity, person, or company to purchase, trade, or barter of any Atlantic shark or part of an Atlantic shark. Shark dealers, or a proxy for each location that first receives sharks, must attend and successfully complete an Atlantic Shark Identification Workshop, and be issued a certificate in order to obtain or renew their shark dealer permit. Also, trucks or other conveyances which are extensions of a shark dealer's place of business must possess a copy of a valid Atlantic Shark Identification Workshop Certificate. On August 8, 2012, NMFS published a final rule requiring electronic reporting for Atlantic sharks, swordfish, and bigeye, albacore, yellowfin, skipjack (BAYS) tunas dealers (77 FR 47303) through one centralized electronic reporting system. The system became effective on January 1, 2013. All permitted dealers are required to submit reports detailing the nature of their business. Swordfish and shark dealer permit holders must submit weekly dealer reports on all HMS they purchase. NMFS continues to automate and improve its permitting and dealer reporting systems and plans to make additional permit applications and renewals available online in the near future. There were 681 Atlantic HMS dealer permits distributed in 2012, as of October 2012. 313 of those permits were for bluefin and BAYS tunas, 179 were for swordfish and 92 were for sharks. Please see the 2012 SAFE Report for additional information (NMFS 2012).

### **3.5.5 Exempted Fishing Permits (EFPs), Display Permits, Chartering Permits, and Scientific Research Permits (SRPs)**

EFPs, display permits, letters of acknowledgement (LOAs) and shark research permits (SRPs) are issued under the authority of the Magnuson-Stevens Act (16 U.S.C. 1801 *et seq.*) and/or ATCA (16 U.S.C. 971 *et seq.*). EFPs are issued to individuals for the purpose of conducting research or other fishing activities using private (non-NOAA) vessels, whereas an SRP would be issued to agency scientists who are using NOAA vessels as their research platform. Similar to SRPs, LOAs are issued to individuals conducting research from “bona fide” research vessels on species that are only regulated by Magnuson-Stevens Act and not ATCA. NMFS does request research plans for these activities and indicates concurrence by issuing an LOA. Display permits are issued to individuals who are fishing for, catching, and then transporting HMS to certified aquariums for public display. Regulations at 50 C.F.R. § 600.745 and 50 C.F.R. § 635.32 govern scientific research activity, exempted fishing, and exempted educational activity with respect to Atlantic HMS. Amendment 1 to the 1999 FMP implemented and created a separate display permitting system, which operates apart from the exempted fishing activities that are focusing on scientific research (NMFS 2003). The application process for display permits is similar to that required for EFPs and SRPs. When NMFS implemented Amendment 2 to the 2006 Consolidated HMS FMP (73 FR 35788 June, 24 2008), the shark quota for EFPs, display permits, and SRPs remained the same (NMFS 2008a). However, the quota for sandbar shark was reduced to 1.4 mt authorized for display and 1.4 mt authorized for research under EFPs and SRPs.

In 2008, NMFS established a shark research fishery (NMFS 2008a). This research fishery is conducted under the auspices of the exempted fishing program. Research fishery permit holders assist NMFS in collecting valuable shark life history data and data for future shark stock assessments. Fishermen must fill out an application for a shark research permit under the exempted fishing program to participate in the shark research fishery. In 2012, NMFS received 13 applications for participation in the 2013 shark research fishery of which 12 applicants were determined to meet all of the qualifications. From the 12 qualified applicants, NMFS randomly selected six participants after considering how to meet research objectives in particular regions. Shark research fishery participants are subject to 100 percent observer coverage in addition to other terms and conditions of the research permit. The terms and conditions of the permits, including specifications on how many sharks can be caught, have changed every year depending on the research objectives for that year. The data collected so far has been used in recent shark assessments, including the most recent sandbar shark assessment.

Issuance of EFPs, display permits, and SRPs may be necessary because possession of certain shark and billfish species are otherwise prohibited, possession of billfishes onboard commercial fishing vessels is prohibited, the commercial fisheries for bluefin tuna, swordfish and LCS may be closed for extended periods during which collection of live animals and/or biological samples would otherwise be prohibited, or for other reasons. These EFPs, SRPs, and display permits would authorize collections of tunas, swordfish, billfishes, and sharks from Federal waters in the Atlantic Ocean and Gulf of Mexico for the purposes of scientific data collection and public display. In addition, NMFS regulations at 50 C.F.R. § 635.32 regarding implantation or

attachment of pop-up satellite archival tags in Atlantic HMS require prior authorization and a report on implantation activities.

In order to implement the chartering recommendations of ICCAT, NMFS published a rule on December 6, 2004 (69 FR 70396), requiring U.S. vessel owners with HMS permits to apply for and obtain a chartering permit before fishing under a chartering arrangement outside U.S. waters. These permits are issued in a manner similar to other EFPs. Under this final rule and consistent with the ICCAT recommendations, vessels issued a chartering permit are not authorized to use the quota or entitlement of the United States until the chartering permit expires or is terminated. This is because of the fact that under a chartering arrangement that U.S. vessels have attained authorization to harvest another ICCAT Contracting Parties' quota. Having a chartering permit does not obviate the need to obtain a fishing license, permits, or other authorizations issued by the chartering nation in order to fish in foreign waters, or obtain other authorizations such as a High Seas Fishing Compliance Act Permit, 50 C.F.R. § 300.10 *et seq.* A U.S. vessel shall not be authorized to fish under more than one chartering arrangement at the same time. NMFS will issue chartering permits only if it determines that the chartering arrangement is in conformance with ICCAT's conservation and management programs.

The number of EFPs, display permits, and SRPs issued from 2007-2012 by category and species are listed in Table 3.15. Year-end reports for permits issued for 2012 are required and are expected to be submitted to NMFS in early 2013.

**Table 3.14** Number of Atlantic HMS EFPs, Display Permits, and Scientific Research Permits SRPs issued between 2008 and 2012. Does not include the permits for the shark research fishery.  
Source: NMFS 2012

Permit type		2008	2009	2010	2011	2012*
Exempted Fishing Permit	Sharks for display	5	4	2	3	4
	HMS for display	1	2	2	2	2
	Tunas for display	0	0	0	0	0
	Shark research on a non-scientific vessel	4	4	9	8	10
	Tuna research on a non-scientific vessel	4	4	5	5	5
	HMS research on a non-scientific vessel	7	5	2	2	3
	Billfish research on a non-scientific vessel	3	1	2	2	1
	Shark Fishing	0	0	0	0	0
	HMS Chartering	0	0	0	0	0
	Tuna Fishing	0	0	0	0	0
	<b>TOTAL</b>	<b>24</b>	<b>20</b>	<b>22</b>	<b>22</b>	<b>25</b>
Scientific Research Permit	Shark research	0	4	1	3	4
	Tuna research	0	0	1	1	3
	Billfish research	0	0	0	0	0
	HMS (multi-species) research	1	0	4	6	4
	<b>TOTAL</b>	<b>1</b>	<b>4</b>	<b>6</b>	<b>10</b>	<b>11</b>
Letters of Acknowledgement	Shark research	6	5	8	7	7
	<b>TOTAL</b>	<b>6</b>	<b>5</b>	<b>8</b>	<b>7</b>	<b>7</b>

\*Permit numbers for 2012 are as of October 1, 2012.

### 3.5.6 Atlantic HMS Tournaments

Fishing tournaments are an important component of HMS recreational fisheries. HMS regulations define a tournament as any fishing competition involving Atlantic HMS in which participants must register or otherwise enter or in which a prize or award is offered for catching or landing such fish. Since 1999, Federal regulations have required that tournament registration with NMFS take place at least four weeks prior to the commencement of tournament fishing activities. Tournament operators may be selected for reporting, in which case a record of tournament catch and effort must be maintained and submitted to NMFS within seven days of the conclusion of the tournament.

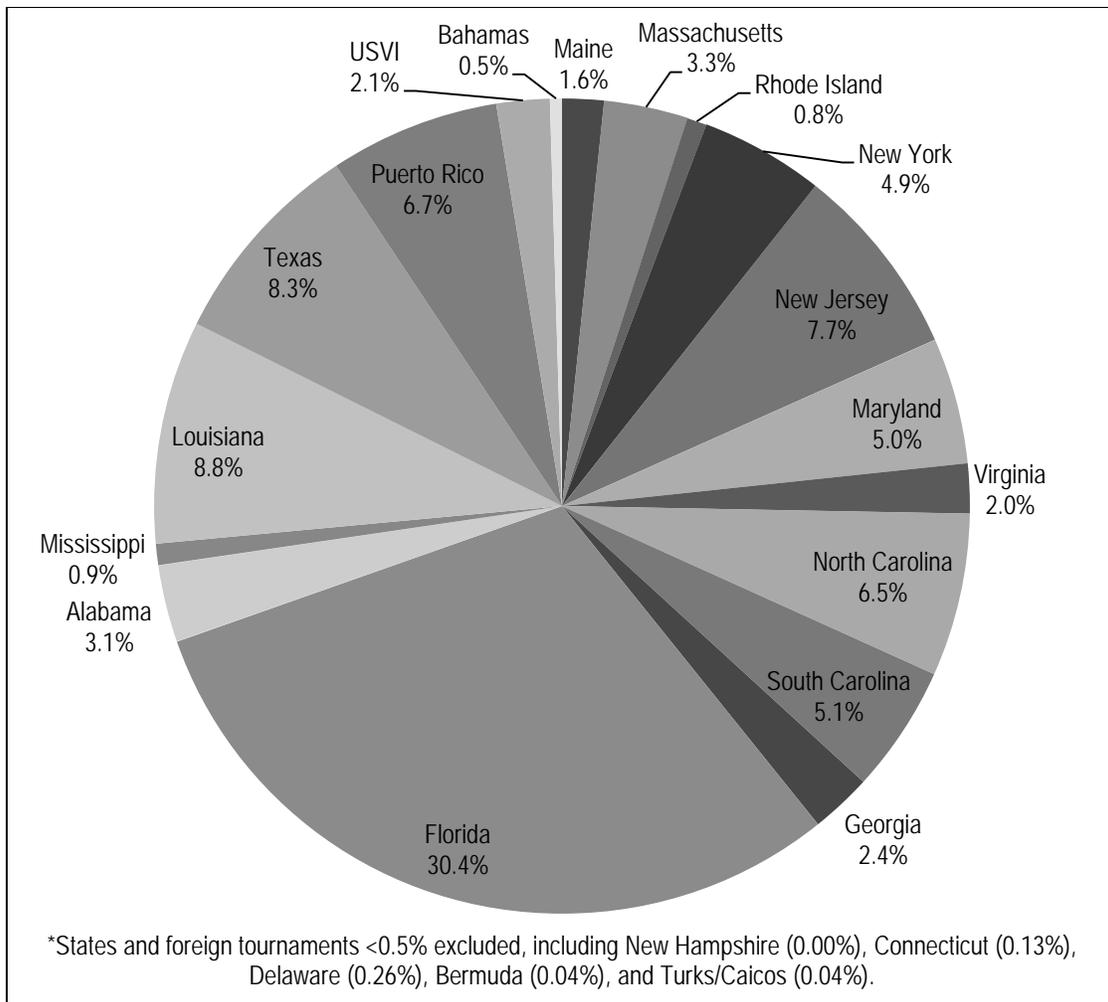
Atlantic HMS tournaments vary in size. They may range from relatively small, “members-only” club events with as few as ten participating boats (40 – 60 anglers) to larger, statewide tournaments with 250 or more participating vessels (1,000 – 1,500 anglers). Larger tournaments often involve corporate sponsorship from tackle manufacturers, marinas, boat dealers, marine suppliers, beverage distributors, resorts, radio stations, publications, chambers of commerce, restaurants, and other local businesses.

The total number of tournaments that registered with the Atlantic HMS tournament registry for each year from 2003 to 2012 is shown in Table 3.16. On average, 259 HMS tournaments register each year. In 2011, 249 tournaments that were conducted along the U.S. Atlantic coast, including the Gulf of Mexico and Caribbean, registered with the HMS Management Division. The highest number of HMS tournament registrations received in one year was 299 in 2007.

**Table 3.15** Number of registered Atlantic HMS tournaments by year (2003-2012). Source: NMFS Atlantic HMS Tournament Registration Database

Year	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Average
<b>Total</b>	244	215	256	259	299	267	270	270	247	238	257

Figure 3.3 shows the distribution of HMS fishing tournaments among the coastal states of the Atlantic and Gulf of Mexico, as well as the U.S. Caribbean, based on data from 2003-2011. In 2012, most HMS fishing tournaments were conducted in Florida (65), Texas (23), New Jersey (22), Louisiana (19), North Carolina (18), South Carolina (14), Puerto Rico (12), Maryland (12), New York (12), Massachusetts (10), Alabama (9), and the U.S. Virgin Islands (7). Since 2003, Florida has consistently been the state with the highest number of registered HMS tournaments.



**Figure 3.3** Percentage of Atlantic HMS tournaments from 2003 to 2012 by state. Source: NMFS Atlantic HMS Tournament Registration Database.

The number of Atlantic HMS tournaments per species is listed in Table 3.17 in 2010 and 2011 that indicated points or prizes would be awarded for the catch or landing of each species. From 2010 to 2011, the number of tournaments decreased for swordfish and all species of billfish, sharks, and tunas except for bigeye. Bigeye tuna was registered as a category in 2 more tournaments in 2011 than it was in 2010. Roundscale spearfish was not added to the list of HMS until the end of the 2010 tournament season; therefore, it was not indicated as a target species in any 2010 tournament registrations and is not listed below. It was, however, indicated as a target species in 30 tournament registrations in 2011.

**Table 3.16** Number of 2010 and 2011 Atlantic HMS tournaments by species. Source: NMFS Atlantic HMS Tournament Registration Database.

Species	2010	2011
Blue Marlin	157	146
White Marlin	146	134
Longbill Spearfish	75	66
Sailfish	160	149
Swordfish	83	75
Bigeye Tuna	83	85
Albacore Tuna	40	36
Yellowfin Tuna	151	137
Skipjack Tuna	23	21
Bluefin Tuna	91	86
Pelagic Sharks	69	55
Small Coastal Sharks	18	15
Non-Ridgeback Sharks	21	16
Ridgeback Sharks	20	17

Sailfish, blue marlin, yellowfin tuna, and white marlin are the predominant target species in HMS fishing tournaments. Although Table 3.17 indicates the number of tournaments awarding points or prizes decreased between 2010 and 2011 for each species except bigeye tuna, Figure 3.4 shows that these numbers as a percentage of all HMS tournaments indicate a relative increase in tournament targeting of bigeye tuna, bluefin tuna, white marlin, blue marlin, and sailfish.

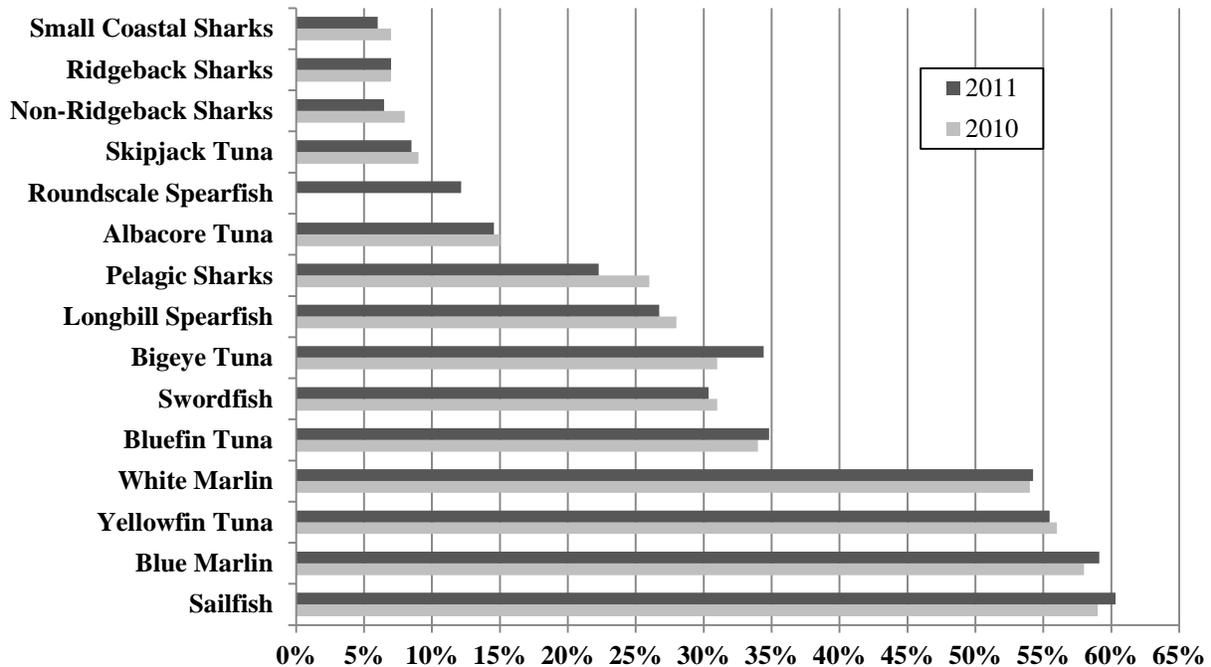


Figure 3.4 Percentage of total Atlantic HMS tournaments registered in 2010 (270) and 2011 (247) by species. Source: NMFS Atlantic HMS Tournament Registration Database.

### 3.7 Economic Status of HMS Shark Fisheries

The review of each rule, and of HMS fisheries as a whole, is facilitated when there is an economic baseline against which the rule or fishery may be evaluated. In this analysis, NMFS used the past eight years of data to facilitate the analysis of trends. It also should be noted that all dollar figures are reported in nominal dollars (*i.e.*, current dollars). If analysis of real dollar (*i.e.*, constant dollar) trends controlled for inflation is desired, price indexes for 2002 to 2011 are provided in Table 3.18. To determine the real price in base year dollars, divide the base year price index by the current year price index, and then multiply this result by the price that is being adjusted for inflation. From 2001 to 2010, the Consumer Price Index (CPI) indicates that prices have risen by 23.1 percent, the Gross Domestic Product (GDP) Implicit Price Deflator indicates that prices have risen 23.1 percent, and the Producer Price Index (PPI) for unprocessed finfish indicates a 116.6 percent rise in prices. From 2008 to 2009, the CPI, GDP Deflator, and the PPI for unprocessed finfish indicate prices changed by -0.4 percent, 0.9 percent, and 1.8 percent respectively. From 2009 to 2010, the CPI, GDP Deflator, and the PPI for unprocessed finfish indicate prices changed by 1.7 percent, 1.7 percent, and 24.3 percent respectively.

**Table 3.17**

**Inflation Price Indexes.** The CPI is the standard Consumer Price Index for all urban consumers (1982-1984=100) produced by U.S. Department of Labor Bureau of Labor Statistics. The source of the Producer Price Index (PPI) for unprocessed finfish (1982=100) is also the Bureau of Labor Statistics. The Gross Domestic Product Implicit Price Deflator (2005=100) is produced by the U.S. Department of Commerce Bureau of Economic Analysis and obtained from the Federal Reserve Bank of St. Louis (<http://www.stlouisfed.org/>).

Year	CPI	GDP Deflator	PPI Unprocessed Finfish
2002	179.9	92.1	201.5
2003	184.0	94.1	195.8
2004	188.9	96.8	224.1
2005	195.3	100.0	253.1
2006	201.6	103.3	334.6
2007	207.3	106.3	318.1
2008	215.3	108.6	301.6
2009	214.5	109.6	306.9
2010	218.1	111.5	381.5
2011	224.9	113.4	388.1

### 3.7.1 Commercial Fisheries

In 2011, the total commercial shark landings at ports in the 50 states by U.S. fishermen were valued at \$8.6 million. Total commercial ex-vessel shark revenues in the Atlantic and Gulf of Mexico was virtually unchanged from 2010 to 2011, remaining at \$3.1 million. The 2011 ex-vessel price indicated that prices for shark fins decreased by 15 percent since 2010, while the weight of fins did not change. Landings by weight for LCS decreased 2 percent from 2010 to 2011, while landing by weight for SCS increased 63 percent. For a summary of all pricing, see Table 3.20.

#### 3.7.1.1 Ex-Vessel Prices

The average ex-vessel prices per lb dw for 2003-2010 by shark species complex and area are summarized in Table 3.19. In this table, prices are reported in nominal dollars. The ex-vessel price depends on a number of factors including the quality of the fish (e.g., freshness, fat content, method of storage), the weight of the fish, the supply of fish, and consumer demand.

**Table 3.18 Average ex-vessel prices per lb (in U.S. dollars) for shark by area, 2003-2011.**

Species	Area	2003	2004	2005	2006	2007	2008	2009	2010	2011
LCS	Gulf of Mexico	1.01	0.73	0.86	0.75	0.42	0.40	0.66	0.48	0.38
	S. Atlantic	0.44	0.46	0.50	0.47	0.40	0.72	0.55	0.78	0.61
	Mid-Atlantic	0.25	0.36	0.29	0.27	0.55	0.66	0.57	0.61	0.54
	N. Atlantic	-	0.66	-	-	-	-	-	-	-
Pelagic sharks	Gulf of Mexico	1.05	1.15	1.19	1.21	1.29	1.18	1.25	1.47	1.54
	S. Atlantic	1.24	1.26	1.26	1.26	1.36	1.36	1.34	1.34	1.46
	Mid-Atlantic	0.70	0.89	1.21	1.15	1.10	1.20	1.15	1.17	1.30

Species	Area	2003	2004	2005	2006	2007	2008	2009	2010	2011
	N. Atlantic	1.29	1.08	0.92	0.73	0.85	0.93	1.23	1.28	1.48
Small coastal sharks	Gulf of Mexico	0.35	0.35	0.47	0.51	0.58	0.62	0.69	0.55	0.58
	S. Atlantic	0.54	0.67	0.71	0.68	0.80	0.78	0.71	0.79	0.81
	Mid-Atlantic	0.38	0.44	0.39	0.44	0.43	0.48	0.57	0.54	0.59
	N. Atlantic	-	-	-	-	-	-	-	-	-
Shark fins	Gulf of Mexico	14.70	15.76	16.22	16.40	13.22	14.94	15.09	16.48	15.11
	S. Atlantic	13.83	12.55	13.93	13.24	11.44	12.73	13.15	15.35	14.91
	Mid-Atlantic	10.09	7.72	10.55	9.72	6.12	3.74	3.60	5.70	3.50
	N. Atlantic	2.30	1.39	4.55	6.23	3.24	3.00	3.67	2.40	1.60

The average ex-vessel price LCS decreased in all areas in 2011. The average ex-vessel prices for pelagic sharks increased in 2011. The average ex-vessel prices for SCS increased in all regions in 2011. Shark fin prices decreased in all regions in 2011.

### 3.7.1.2 Revenues

Table 3.20 summarizes the average annual revenues of the shark fisheries based on average ex-vessel prices and the weight reported landed as per the U.S. National Report to ICCAT (NMFS 2012), the information used in the shark stock assessments, and information given to the ICCAT (Cortés pers. comm., 2011). These values indicate that the estimated total annual revenue of shark fisheries between 2003 and 2010 peaked in 2006, decreased, and has since remained fairly stable. Prices did not follow a similar trend.

**Table 3.19** Estimates of the total ex-vessel annual revenues of Atlantic shark fisheries, 2004-2011. Sources: CFDBS, QMS, and NMFS 2012

Species		2004	2005	2006	2007	2008	2009	2010	2011
Large coastal sharks	Ex-vessel \$/lb dw	\$0.57	\$0.64	\$0.52	\$0.48	\$0.70	\$0.54	\$0.60	\$0.53
	Weight lb dw	3,213,896	3,147,196	3,808,662	2,329,272	1,363,021	1,513,201	1,519,603	1,485,467
	Fishery Revenue	\$1,831,921	\$2,014,205	\$2,361,370	\$1,118,051	\$954,115	\$817,129	\$911,762	\$787,298
Pelagic sharks	Ex-vessel \$/lb dw	\$0.99	\$1.19	\$1.17	\$1.12	\$1.21	\$1.18	\$1.22	\$1.35
	Weight lb dw	679,469	252,815	192,843	262,179	234,546	225,575	312,195	314,314
	Fishery Revenue	\$672,674	\$300,850	\$225,626	\$293,640	\$283,801	\$266,179	\$380,878	\$424,324
Small coastal sharks	Ex-vessel \$/lb dw	\$0.62	\$0.65	\$0.61	\$0.70	\$0.69	\$0.69	\$0.69	\$0.75
	Weight lb dw	451,651	634,885	763,327	618,191	623,848	667,815	3557,855	583,364
	Fishery Revenue	\$280,024	\$412,675	\$465,629	\$432,734	\$430,455	\$460,792	\$246,920	\$437,523
Shark fins (weight = 5% of all sharks landed)	Ex-vessel \$/lb dw	\$12.87	\$14.22	\$14.80	\$11.63	\$12.43	\$12.45	\$13.99	\$11.90
	Weight lb dw	217,251	201,745	238,242	160,482	111,071	120,330	110,539	110,539
	Fishery Revenue	\$2,796,018	\$2,868,811	\$3,525,976	\$1,866,407	\$1,380,609	\$1,498,103	\$1,531,662	\$1,417,971
<b>Total sharks</b>	<b>Fishery Revenue</b>	<b>\$5,580,636</b>	<b>\$5,596,542</b>	<b>\$6,578,602</b>	<b>\$3,710,832</b>	<b>\$3,048,980</b>	<b>\$3,042,202</b>	<b>\$3,071,222</b>	<b>\$3,067,116</b>

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

### 3.7.2 Recreational Fisheries

Existing studies indicate that HMS recreational fishing provides significant positive economic impacts to coastal communities. These positive economic impacts derive from individual angler expenditures, recreational charters, tournaments, and the shore-side businesses that support those activities. The net economic and social benefits of HMS recreational fishing in the United States are likely positive and some of the ecological impacts are mitigated by the strong catch-and-release ethic in this fishery.

The Deepwater Horizon/BP Oil Spill in the Gulf of Mexico affected recreational fisheries in the Gulf of Mexico due to a series of fishery closures of various sizes that began on May 2, 2010 and continued until April 19, 2011. More information about the Deepwater Horizon/BP Oil Spill is available at [http://sero.nmfs.noaa.gov/deepwater\\_horizon\\_oil\\_spill.htm](http://sero.nmfs.noaa.gov/deepwater_horizon_oil_spill.htm). The impacts of the oil spill and related fishery closures continue to be investigated.

NMFS recently published the ‘Fisheries Economics of the United States’ report, which includes economics and sociocultural information for recreational fishermen in the United States. In 2011, there were approximately 11 million recreational saltwater anglers who took 70 million saltwater fishing trips and spent \$4.5 billion on those trips and \$22 billion on durable fishing-related equipment (NMFS 2013). More information on the report can be found here: [http://www.st.nmfs.noaa.gov/economics/publications/feus/fisheries\\_economics\\_2011](http://www.st.nmfs.noaa.gov/economics/publications/feus/fisheries_economics_2011)

The 2011 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation was released in August 2012 by the USFWS. The 2011 National Survey data show that hunters, anglers, and wildlife watchers spent \$145 billion in the previous year on related gear, trips, and other purchases such as licenses, tags, and land-leasing or ownership. The survey found that in the United States, 8.9 million anglers went on approximately 86.2 million fishing trips and spent \$10.3 billion on those trips and equipment (USFWS 2012). Those participation rates are up from the 2006 survey, which found 7.7 million saltwater anglers spent approximately \$8.9 billion on 67 million fishing trips (USFWS 2006). More information on the survey and the survey itself can be found here: [http://wsfrprograms.fws.gov/Subpages/NationalSurvey/National\\_Survey.htm](http://wsfrprograms.fws.gov/Subpages/NationalSurvey/National_Survey.htm)

Specific information regarding angler expenditures for trips targeting HMS species was extracted from the recreational fishing expenditure survey add-on (1998 in the Northeast, 1999 – 2000 in the Southeast) to the MRFSS. These angler expenditure data were analyzed per person per trip-day level and reported in 2003 dollars. The expenditure data include the costs of tackle, food, lodging, bait, ice, boat fuel, processing, transportation, party/charter fees, access/boat launching, and equipment rental. The overall average expenditure on HMS related trips is estimated to be \$122 per person per day. Specifically, expenditures are estimated to be \$85 per person per day on pelagic shark directed trips, \$95 on LCS directed trips, and \$81 on SCS directed trips.

The American Sportfishing Association (ASA) also has a report listing the 2006 economic impact of sportfishing on specific states (ASA 2008). This report states that all sportfishing (in both federal and state waters) has an overall economic importance of \$125 billion dollars. ASA estimates 8,528,000 anglers participate in saltwater fishing. These saltwater anglers spent \$11 billion in retail sales, resulting in 263,000 jobs and \$9 billion in salaries, wages, and business

earnings in 2006. Saltwater fishing contributed \$30 billion of the overall economic impact estimated. Florida, Texas, South Carolina, and North Carolina are among the top ten states in terms of overall economic expenditures for both saltwater and freshwater fishing. Florida is also one of the top states in terms of economic impact of saltwater fishing with \$3.0 billion in angler expenditures, \$5.1 billion in overall economic impact, \$1.6 billion in salaries and wages related to fishing, and 51,588 fishing related jobs (ASA, 2008).

At the end of 2004 and 2012, NMFS collected market information regarding advertised charterboat rates. This analysis of the data collected focused observations of advertised rates on the internet for full day charters. Full day charters vary from six to 14 hours long with a typical trip being 10 hours. Most vessels can accommodate six passengers, but this also varies from two to 12 passengers. The average price for a full day boat charter was \$1,053 in 2004 and \$1,200 in 2012. Sutton et al., (1999) surveyed charterboats throughout Alabama, Mississippi, Louisiana, and Texas in 1998 and found the average charterboat base fee to be \$762 for a full day trip. Holland et al. (1999) conducted a similar study on charterboats in Florida, Georgia, South Carolina, and North Carolina and found the average fee for full day trips to be \$554, \$562, \$661, and \$701, respectively. Comparing these two studies conducted in the late 1990s to the average advertised daily HMS charterboat rate in 2004 and 2012, it is apparent that there has been a significant gain in charterboat rates (NMFS 2012).

Generally, HMS tournaments last from three to seven days, but lengths can range from one day to an entire fishing season. Similarly, average entry fees can range from approximately \$0 to \$5,000 per boat (average approximately \$500/boat – \$1,000/boat), depending largely upon the magnitude of the prize money that is being awarded. The entry fee would pay for a maximum of two to six anglers per team during the course of the tournament. Additional anglers can, in some tournaments, join the team at a reduced rate of between \$50 and \$450. The team entry fee did not appear to be directly proportional to the number of anglers per team, but rather with the amount of money available for prizes and, possibly, the species being targeted. Prizes may include citations, T-shirts, trophies, fishing tackle, automobiles, boats, or other similar items, but most often consists of cash awards. In general, it appears that billfish and tuna tournaments charge higher entry fees and award more prize money than shark and swordfish tournaments, although all species have a wide range. Prize money is often determined by the number of tournament participants. Compared to recent previous years, overall prize money and number of participants declined noticeably in 2011.

Several tournaments target sharks. Many shark tournaments occur in New England, New York, and New Jersey, although other regions hold shark tournaments as well. In 2011, the 31<sup>st</sup> Annual South Jersey Shark Tournament hosted 113 boats and awarded over \$238,626 in prize money, with an entry fee of \$545 per boat. In 2011, the 25<sup>th</sup> Annual Oak Bluffs Monster Shark Tournament in Martha's Vineyard hosted 104 boats.

While fishing tournaments are an important component of Atlantic HMS recreational fisheries and provide socioeconomic benefits to associated communities, there are some organizations that oppose these tournaments. For the past several years, for example, the Humane Society of the United States has petitioned NMFS to halt all shark tournaments.

In addition to official prize money, many fishing tournaments may also conduct a “calcutta” whereby anglers pay from \$200 to \$5,000 to win more money than the advertised tournament prizes for a particular fish. Tournament participants do not have to enter calcuttas. Tournaments with calcuttas generally offer different levels depending upon the amount of money an angler is willing to put down. Calcutta prize money is distributed based on the percentage of the total amount entered into that Calcutta. Therefore, first place winner of a low level Calcutta (entry fee ~\$200) could win less than a last place winner in a high level calcutta (entry fee ~\$1000). On the tournament websites, it was not always clear if the total amount of prizes distributed by the tournament included prize money from the calcuttas or the estimated price of any equipment. As such, the range of prizes discussed above could be a combination of fish prize money, calcutta prize money, and equipment/trophies.

Fishing tournaments can sometimes generate a substantial amount of money for surrounding communities and local businesses. Ditton et al., (2000) estimated that the total expenditure (direct economic impact) associated with the 1999 Pirates Cove Billfish Tournament, not including registration fees, was approximately \$2,072,518. The total expenditure (direct economic impact) associated with the 2000 Virginia Beach Red, White, and Blue Tournament was estimated at approximately \$450,359 (Thailing et al., 2001). These estimated direct expenditures do not include economic effects that may ripple through the local economy leading to a total impact exceeding that of the original purchases by anglers (i.e., the multiplier effect). Less direct, but equally important, fishing tournaments may serve to generally promote the local tourist industry in coastal communities. In a survey of participants in the 1999 Pirates Cove Billfish Tournament, Ditton et al., (2000) found that almost 80 percent of tournament anglers were from outside of the tournament’s county. For this reason, tourism bureaus, chambers of commerce, resorts, and state and local governments often sponsor fishing tournaments.

More information can be found in the 2012 HMS SAFE Report (NMFS 2012).

### **3.8 Community and Social Update**

According to National Standard 8, conservation and management measures should, consistent with conservation requirements,

“take into account the importance of fishery resources to fishing communities by utilizing economic and social data [based on the best available information] in order to (A) provide for the sustained participation of such communities, (B) to the extent practicable, minimize adverse economic impacts on such communities.”

The information presented here addresses new data concerning the social and economic well-being of participants in the fishery and considers the impact of significant regulatory measures enacted in the past year.

#### **3.8.1 Overview of Current Information and Rationale**

The Magnuson-Stevens Act requires, among other things, that all FMPs include a fishery impact statement intended to assess, specify, and describe the likely effects of the measures on fishermen and fishing communities (MSA, sec. 303(a)(9)).

NEPA also requires federal agencies to consider the interactions of natural and human environments by using a “systematic, interdisciplinary approach which will ensure the integrated use of the natural and social sciences . . . in planning and decision making . . .” (NEPA, sec 102(2)(A)). Moreover, agencies need to address the aesthetic, historic, cultural, economic, social, or health effects, which may be direct, indirect, or cumulative. Consideration of social impacts is a growing concern as fisheries experience increased participation and/or declines in stocks. The consequences of management actions need to be examined to better ascertain and, if necessary and possible, mitigate regulatory impacts on affected constituents.

Social impacts are generally the consequences to human populations resulting from some type of public or private action. Those consequences may include alterations to the ways in which people live, work or play, relate to one another, and organize to meet their needs. In addition, cultural impacts, which may involve changes in values and beliefs that affect people’s way of identifying themselves within their occupation, communities, and society in general are included under this interpretation. Social impact analyses help determine the consequences of policy action in advance by comparing the status quo with the projected impacts. Community profiles are an initial step in the social impact assessment process. Although public hearings and scoping meetings provide input from those concerned with a particular action, they do not constitute a full overview of the fishery.

The Magnuson-Stevens Act includes ten National Standards that apply to all fishery management plans. Specifically, National Standard 8 notes that:

“Conservation and management measures, consistent with the conservation requirements of this Act (including the prevention of overfishing and rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities by utilizing economic and social data that meet the requirements of paragraph (2), in order to: (A) provide for the sustained participation of such communities; and, (B) to the extent practicable, minimize adverse economic impacts on such communities.” (50 C.F.R. § 301(a)(8)). See also 50 C.F.R. § 600.345 for National Standard 8 Guidelines.

“Sustained participation” is defined to mean continued access to the fishery within the constraints of the condition of the resource (50 C.F.R. § 600.345(b)(4)). It should be clearly noted that National Standard 8 “does not constitute a basis for allocation of resources to a specific fishing community nor for providing preferential treatment based on residence in a fishing community” (50 C.F.R. § 600.345(b)(2)). The Magnuson-Stevens Act further defines a “fishing community” as:

“ ... a community that is substantially dependent upon or substantially engaged in the harvest or processing of fishery resources to meet social and economic needs, and includes fishing vessel owners, operators, crew, and fish processors that are based in such communities.” (MSA, sec 3(16)).

NMFS (2001) guidelines for social impact assessments specify that the following elements are utilized in the development of FMPs and FMP amendments:

1. The size and demographic characteristics of the fishery-related work force residing in the area; these determine demographic, income, and employment effects in relation to the work force as a whole, by community and region.
2. The cultural issues of attitudes, beliefs, and values of fishermen, fishery-related workers, other stakeholders, and their communities.
3. The effects of proposed actions on social structure and organization; that is, on the ability to provide necessary social support and services to families and communities.
4. The non-economic social aspects of the proposed action or policy; these include life-style issues, health and safety issues, and the non-consumptive and recreational use of living marine resources and their habitats.
5. The historical dependence on and participation in the fishery by fishermen and communities, reflected in the structure of fishing practices, income distribution and rights.

From the 255 communities identified as involved in the 2001 commercial fishery, Amendment 1 to the 1999 FMP for Atlantic Tunas, Swordfish and Sharks focused on specific towns based on shark landings data, the size of the shark fishing fleet, the relationship between the geographic communities and the fishing fleets, and the existence of other community studies (NMFS 2003). While the recreational fishery is an important component in the shark fishery, participation and landings were not documented in a manner that allowed community identification. Wilson et al. (1998) selected only the recreational fisheries found within the commercial fishing communities for a profile due to the lack of community-based data for the sport fishery. The study also investigated the social and cultural characteristics of fishing communities in five states and one U.S. territory: Massachusetts, New Jersey, North Carolina, Florida, Louisiana, and Puerto Rico. These areas were selected because they each had important fishing communities that could be affected by the 1999 FMP and Atlantic Billfish Amendment, and because they are fairly evenly spread along the Atlantic and Gulf coasts and the Caribbean.

The 2006 Consolidated HMS FMP used information from the Wilson et al. (1998) study along with information gathered under the contract with the Virginia Institute of Marine Science (VIMS) at the College of William and Mary to re-evaluate several of the baseline communities (Kirkley 2005). The VIMS study gathered a profile of basic sociological information for the principal states involved with the Atlantic shark fishery. A detailed description of additional information used in the community profiles analysis can be found in Section 9.2.2 of the 2006 Consolidated HMS FMP (NMFS 2006).

As of 2012, 80 percent of shark permit holders are located in Florida, Louisiana, New Jersey and North Carolina. Communities in these states are expected potentially to be the most affected by the measures proposed in Amendment 5. Several other chapters in this document include information that addresses the requirements described in Chapter 9. In addition to the community profile information found in the Consolidated HMS FMP, NMFS is considering

additional information in assessing community impacts, including a report by MRAG Americas, Inc., and Jepson (2008) titled “Updated Profiles for HMS Dependent Fishing Communities” can be found in Appendix E of Amendment 2 to the 2006 Consolidated HMS FMP (NMFS 2008a). This report includes updated community profiles and new social impacts assessments for HMS fishing communities along the Atlantic and Gulf of Mexico coasts. Community profile information along with demographic information from the 2010 U.S. Census can be found in the 2011 and 2012 SAFE Reports (NMFS 2011a, NMFS 2012). Please also refer to the Economic Evaluation in Chapter 6, the Regulatory Impact Review (RIR) in Chapter 7, and the Final Regulatory Flexibility Analysis (FRFA) in Chapter 8. Furthermore, each of the management alternatives in Chapter 4 includes an assessment of the potential social and economic impacts associated with the proposed alternatives.

The 2006 Consolidated HMS FMP provides a thorough analysis, by state, of HMS fisheries including the shark fishery for in the Atlantic and Gulf of Mexico states and will not be duplicated here (NMFS 2006).

### **3.9 International Trade and Fish Processing**

Regional fishery management organizations (RFMOs) including ICCAT have taken steps to improve collection of international trade data to further international conservation policy for management of some shark species. While RFMOs use trade data to assess stock status, this information can be used provisionally to estimate landings related to these fisheries and to identify potential compliance problems with certain ICCAT management measures. In addition, it is important to keep in mind that ICCAT collects detailed information only on some pelagic sharks: shortfin mako and blue shark and has also conducted some analysis on porbeagle shark. ICCAT also requires submission of bycatch information and, in 2011, adopted a recommendation requesting information on how CPCs plan to implement these reporting requirements. United States participation in shark and all HMS related international trade programs, as well as a review of trade activity, is discussed in this section. This section also includes a review of the available information on the processing industry for shark species.

The United States collects general trade monitoring data through the U.S. Bureau of Customs and Border Protection (CBP; imports) and the U.S. Bureau of the Census (Census Bureau; exports and imports). These programs collect data on the amount and value of imports and exports categorized under the Harmonized Tariff Schedule (HTS). Many HMS have distinct HTS codes, and some species are further subdivided by product (*e.g.*, fresh or frozen, fillets, steaks, *etc.*). NMFS provides Census Bureau trade data for all marine fish products online for the public at <http://www.st.nmfs.gov/st1/trade/index.html>. Shark species are grouped together, which can limit the value of these data for fisheries management when species-specific information is needed. Often the utility of these data are further limited if the ocean area of origin for each product is not distinguished.

Trade data for Atlantic HMS, including shark species, are more useful as a conservation tool when they include more detailed information, such as the flag of the harvesting vessel, the ocean of origin, and the species for each transaction. Under the authority of ATCA and the Magnuson-Stevens Act, NMFS collects this more detailed information through catch and statistical document programs while monitoring international trade of bluefin tuna, swordfish, southern

bluefin tuna, and frozen bigeye tuna. These trade programs implement ICCAT recommendations and support rebuilding efforts by collecting data necessary to identify nations and individuals that may be fishing in a manner that diminishes the effectiveness of ICCAT fishery conservation and management measures. In support of these programs, NMFS implemented the HMS International Trade Permit (ITP) in 2005 (69 FR 67268, November 17, 2004) to identify importers and exporters of HMS products that require trade monitoring documentation. Traders of shark fins must also be permitted. Copies of the ITP application and all trade monitoring documents associated with these programs are found on the NMFS HMS Management Division webpage at <http://www.nmfs.noaa.gov/sfa/hms/>. Other actions, such as the recent CITES Appendix II listings of oceanic whitetip, porbeagle, and great, smooth, and scalloped hammerhead sharks may require additional compliance action in order to trade these species (See Chapter 3.1.2.3). For more information regarding U.S. imports and exports of HMS, please see the 2012 SAFE Report.

### **3.10 Bycatch, Incidental Catch, and Protected Species**

Bycatch in commercial and recreational fisheries has become an important issue for the fishing industry, resource managers, scientists, and the public. Interactions with non-target species can result in death or injury to the discarded fish, and it is essential that this component of total fishing-related mortality be incorporated into fish stock assessments and evaluation of management measures. Bycatch precludes other more productive uses of fishery resources and decreases the efficiency of fishing operations. Although not all discarded fish die, bycatch can (in some fisheries) become a large source of mortality, which can slow the rebuilding of overfished stocks. Bycatch imposes direct and indirect costs on fishing operations by increasing sorting time and decreasing the amount of gear available to catch target species. Incidental catch concerns also apply to populations of marine mammals, sea turtles, seabirds, and other components of ecosystems which may be protected under other applicable laws and for which there are no commercial or recreational uses but for which existence values may be high.

In 1998, NMFS developed a national bycatch plan, *Managing the Nation's Bycatch* (NMFS 1998), which includes programs, activities, and recommendations for federally managed fisheries. The national goal of the Agency's bycatch plan activities is to implement conservation and management measures for living marine resources that will minimize, to the extent practicable, bycatch and the mortality of bycatch that cannot be avoided. Inherent in this goal is the need to avoid bycatch, rather than create new ways to utilize bycatch. The plan also established a definition of bycatch as fishery discards, retained incidental catch, and unobserved mortalities resulting from a direct encounter with fishing gear. NMFS developed a *National Bycatch Strategy* in 2003, which was based on the 1998 plan. This document requires that each NMFS Regional Office, Science Center, and the HMS Management Division develop annual bycatch action items and progress updates. This allows us to keep abreast of efforts made across the agency to monitoring bycatch and keep track of reduction activities and progress. In 2011, we published the first edition of the *U.S. National Bycatch Report* (NMFS 2011b), which is the first national compilation of bycatch estimates for living marine resources of the United States.

### 3.10.1 **Bycatch Reduction and the Magnuson-Stevens Act**

The Magnuson-Stevens Act defines bycatch as “fish which are harvested in a fishery, but are not sold or kept for personal use, and includes economic and regulatory discards”. Fish is defined as finfish, mollusks, crustaceans, and all other forms of marine animal and plant life other than marine mammals and birds. Birds and marine mammals are therefore not considered bycatch under the Magnuson-Stevens Act but are examined as incidental catch. Bycatch does not include fish released alive under a recreational catch-and-release fishery management program.

National Standard 9 of the Magnuson-Stevens Act requires that fishery conservation and management measures shall, to the extent practicable, minimize bycatch and minimize the mortality of bycatch that cannot be avoided. In many fisheries, it is not practicable to eliminate all bycatch and bycatch mortality. Some relevant examples of fish caught in Atlantic HMS fisheries that are included as bycatch or incidental catch are marlin, undersized swordfish, and bluefin tuna caught and released by commercial fishing gear; undersized swordfish and tunas in recreational hook and line fisheries; species for which there is little or no market such as blue sharks; and species caught and released in excess of a bag limit.

There are benefits associated with the reduction of bycatch, including the reduction of uncertainty concerning total fishing-related mortality, which improves the ability to assess the status of stocks, to determine the appropriate relevant controls, and to ensure that overfishing levels are not exceeded. It is also important to consider the bycatch of HMS in fisheries that target other species as a source of mortality for HMS and to work with fishery constituents and resource manager partners on an effective bycatch strategy to maintain sustainable fisheries. This strategy may include a combination of management measures in the domestic fishery, and if appropriate, multi-lateral measures recommended by international bodies such as ICCAT or coordination with Regional Fishery Management Councils or States. The bycatch in each fishery is summarized annually in the SAFE Report for Atlantic HMS fisheries. The effectiveness of the bycatch reduction measures is evaluated based on this summary.

A number of options are currently employed (\*) or available for bycatch reduction in Atlantic HMS fisheries. These include:

#### Commercial

1. \*Gear Modifications (including hook and bait types)
2. \*Circle Hooks
3. \*Weak Hooks
4. \*Time/Area Closures
5. Performance Standards
6. \*Education/Outreach
7. \*Effort Reductions (*i.e.*, Limited Access)
8. Full Retention of Catch
9. \*Use of De-hooking Devices (mortality reduction only)

## Recreational

1. Use of Circle Hooks (mortality reduction only)
2. Use of De-hooking Devices (mortality reduction only)
3. Full Retention of Catch
4. \*Formal Voluntary or Mandatory Catch-and-Release Program for all Fish or Certain Species
5. Time/Area Closures

There are probably no fisheries in which there is zero bycatch because none of the currently legal fishing gears are perfectly selective for the target of each fishing operation (with the possible exception of the swordfish/tuna harpoon fishery and speargun fishery). Therefore, to totally eliminate bycatch of all non-target species in Atlantic HMS fisheries would be impractical. The goal then is to minimize the amount of bycatch to the extent practicable and minimize the mortality of species caught as bycatch.

### 3.10.2 Standardized Reporting of Bycatch

Section 303(a)(11) of the Magnuson-Stevens Act requires that an FMP establish a standardized reporting methodology to assess the amount and type of bycatch occurring in the fishery. In 2004, NMFS published a report entitled “*Evaluating Bycatch: A National Approach to Standardized Bycatch Monitoring Programs*,” which described the current status of and guidelines for bycatch monitoring programs (NMFS 2004a). The data collection and analyses that are used to estimate bycatch in a fishery constitute the “standardized bycatch reporting methodology” (SBRM) for that fishery (NMFS 2004a). Appendix 5 of the report specifies the protocols for SBRMs established by NMFS throughout the country.

As part of the Agency’s National Bycatch Strategy, NMFS established a National Working Group on Bycatch (NWGB) to develop a national approach to standardized bycatch reporting methodologies and monitoring programs. This work is to be the basis for regional teams, established in the National Bycatch Strategy, to make fishery-specific recommendations.

The NWGB reviewed regional issues related to fisheries and bycatch and discussed advantages and disadvantages of various methods for estimating bycatch including: (1) fishery-independent surveys; (2) self-reporting through logbooks, trip reports, dealer reports, port sampling, and recreational surveys; (3) at-sea observation, including observers, digital video cameras, digital observers, and alternative platform and remote monitoring; and (4) stranding networks. All of the methods may contribute to useful bycatch estimation programs, but at-sea observation (observers or electronic monitoring) provides the best mechanism to obtain reliable and accurate bycatch estimates for many fisheries. Often, observer programs also will be the most cost-effective of these alternatives. However, observers are not always the most cost-effective or practicable method for assessing bycatch (NMFS 2004a).

The effectiveness of any SBRM depends on its ability to generate estimates of the type and quantity of bycatch that are both precise and accurate enough to meet the conservation and

management needs of a fishery. The National Bycatch Report (NMFS 2004a) contains an in-depth examination of the issues of precision and accuracy in estimating bycatch. Accuracy refers to the closeness between the estimated value and the (unknown) true value that the statistic was intended to measure. Precision refers to how closely multiple measurements of the same statistic are to one another when obtained under the same protocol. The precision of an estimate depends on how consistent independent measurements are to one another; the tighter the cluster, or the greater the consistency in independent measurements, the more precise the estimate. The precision of an estimate is often expressed in terms of the coefficient of variation (CV) defined as the standard error of the estimator divided by the estimate. The lower the CV, the more precise the estimate is considered to be. A precise estimate is not necessarily an accurate estimate. The National Bycatch Report (NMFS 2004a) contains an extensive discussion of how precision relates to sampling and to assessments.

The other important aspect of obtaining bycatch estimates that are useful for management purposes is accuracy. Accuracy is the difference in the mean of the sample and the true value of that property in the sampled universe (NMFS 2004a). In other words, accuracy refers to how correct the estimate is. Efficient allocation of sampling effort within a stratified survey design improves the precision of the estimate of overall discard rates (Rago et al. 2005). Accuracy of sample estimates can be evaluated by comparing performance measures (e.g., landings, trip duration) between vessels with and without observers present. While there are differences between the terms accuracy and bias they have been used interchangeably. A “biased” estimate is inaccurate while an “accurate” estimate is unbiased (Rago et al. 2005).

The NWGB recommended that at-sea sampling designs should be formulated to achieve precision goals for the least amount of observation effort, while also striving to increase accuracy (NMFS 2004a). This can be accomplished through random sample selection, developing appropriate sampling strata and sampling allocation procedures, and by implementing appropriate tests for bias. Sampling programs will be driven by the precision and accuracy required by managers to address management needs for estimating management quantities such as allowable catches through a stock assessment, for evaluating bycatch relative to a management standard such as allowable take, and for developing mitigation mechanisms.

The recommended precision goals for estimates of bycatch are defined in terms of the CV of each estimate. For marine mammals and other protected species, including seabirds and sea turtles, the recommended precision goal is a 20 to 30 percent CV for estimates of interactions for each species/stock taken by a fishery. For fishery resources, excluding protected species, caught as bycatch in a fishery, the recommended precision goal is a 20 to 30 percent CV for estimates of total discards (aggregated over all species) for the fishery; or if total catch cannot be divided into discards and retained catch, then the goal is a 20 to 30 percent CV for estimates of total catch (NMFS 2004a). The report also states that attainment of these goals may not be possible or practical in all fisheries and should be evaluated on a case-by-case basis.

The CV of an estimate can be reduced and the precision increased by increasing sample size. In the case of observer programs, this would entail increasing the number of trips or gear deployments observed. Increasing the number of trips observed increases both the cost in terms of funding, but also the logistical complexities and safety concerns. However, the improvements

in precision will decline at a decreasing rate as sample size is increased to a point where it will not be cost-effective to increase sample size any further. This concept is illustrated in Figure 1 of the National Bycatch Report (NMFS 2004a). As a result of this statistical relationship, fishery managers select observer coverage levels that should achieve the desired or required balance between precision of bycatch estimates and cost.

While the relationship between precision and sample size is relatively well known (NMFS 2004a), the relationship between sample size and accuracy is not reliable. Observer programs strive to achieve samples that are representative of both fishing effort and catches. Representativeness of the sample is critical not only for obtaining accurate (i.e., unbiased) estimates of bycatch, but also for collecting information about factors that may be important for mitigating bycatch. Bias may be introduced at several levels: when vessels are selected for coverage, when hauls are selected for sampling, or when only a portion of the haul can be sampled (NMFS 2004a).

Rago et al. (2005) examined potential sources of bias in commercial fisheries of the Northeast Atlantic by comparing measures of performance for vessels with and without observers. Bias can arise if the vessels with observers onboard consistently catch more or less than other vessels, if trip durations change, or if vessels fish in different areas. Average catches (pounds landed) for observed and total trips compared favorably and the expected differences of the stratum specific means and standard deviations for both kept weight and trip duration was near zero (Rago et al. 2005). Although mean trip duration was slightly longer on observed trips, the difference was not significantly different from zero. The spatial distribution of trips matched well based on a comparison of VMS data with observed trips (Murawski 2005). The authors concluded that the level of precision in discard ratios as a whole was high and that there was little evidence of bias. The results of this study indicate that bias may not be as large an issue in self-reported data as has been suggested by Babcock et al. (2003), but additional analyses would need to be conducted to determine the applicability to HMS fisheries.

A simplistic approach in trying to get more accurate bycatch estimates is to increase observer coverage. A report by Babcock et al. (2003) suggests that relatively high percentages of observer coverage are necessary to adequately address potential bias in bycatch estimates from observer programs. However, the examples cited by Babcock et al. (2003) as successful in reducing bias through high observer coverage levels are fisheries comprised of relatively few vessels compared to many other fisheries, including the Atlantic HMS fisheries. Their examples are not representative of the issues facing most observer programs and fishery managers, who must work with limited resources to cover large and diverse fisheries. It is also incorrect to assume that simply increasing observer coverage ensures accuracy of the estimates (Rago et al. 2005). Bias due to unrepresentative sampling may not be reduced by increasing sample size due to logistical constraints, such as if certain classes of vessels cannot accommodate observers. Increasing sample size may only result in a larger, but still biased, sample.

Although the precision goals for estimating bycatch are important factors in determining observer coverage levels, other factors are also considered when determining actual coverage levels. These may result in lower or higher levels of coverage than that required to achieve the precision goals for bycatch estimates. In general, factors that may justify lower coverage levels

include lack of adequate funding; incremental coverage costs that are disproportionately high compared to benefits; and logistical consideration such as lack of adequate accommodations on a vessel, unsafe conditions, and lack of cooperation by fishermen (NMFS 2004a).

Factors that may justify higher coverage levels include incremental coverage benefits that are disproportionately high compared to costs and other management focused objectives for observer programs. The latter include total catch monitoring, in-season management of total catch or bycatch, monitoring bycatch by species, monitoring compliance with fishing regulations, monitoring requirements associated with the granting of EFPs, or monitoring the effectiveness of gear modifications or fishing strategies to reduce bycatch. In some cases, management may require one or even two observers to be deployed on every fishing trip. Increased levels of coverage may also be desirable to minimize bias associated with monitoring “rare” events with particularly significant consequences (such as takes of protected species), or to encourage the introduction of new “standard operating procedures” for the industry that decrease bycatch or increase the ease with which bias can be monitored (NMFS 2004a).

NMFS utilizes self-reported logbook data (Fisheries Logbook System (FLS) and the supplemental discard report form in the reef fish/snapper-grouper/king and Spanish mackerel/shark logbook program), at-sea observer data, and survey data (recreational fishery dockside intercept and telephone surveys) to produce bycatch estimates in HMS fisheries. The number and location of discarded fish are recorded, as is the disposition of the fish (i.e., released alive vs. released dead). Post-release mortality of HMS can be accounted for in stock assessments to the extent that the data allow.

The FLSs in place are mandatory programs, and it is expected that the reporting rates are generally high (Garrison 2005). Due to the management focus on HMS fisheries, there has been close monitoring of reporting rates, and observed trips can be directly linked to reported effort. In general, the gear characteristics and amount of observed effort is consistent with reported effort. However, under-reporting is possible, which can lead to a negative bias in bycatch estimates. Cramer (2000) compared dead discards of undersized swordfish, sailfish, white and blue marlin, and pelagic sharks from HMS logbook and pelagic observer program (POP) data in the U.S. Atlantic PLL fishery. Cramer (2000) provided the ratio of catch estimated from the POP data divided by the reported catch in the HMS logbooks. The ratio indicated the amount of underreporting for each species in a given area. However, the data analyzed by Cramer (2000), was based on J-hook data from 1997 – 1999 and that gear is now illegal. In some instances, logbooks are used to provide effort information against which bycatch rates obtained from observers are multiplied to estimate bycatch. In other sectors/fisheries, self-reporting provides the primary method of reporting bycatch because of limited funding, priorities, *etc.*

The following section provides a review of the bycatch reporting methodologies for all shark fisheries: the U.S. PLL fishery, the shark BLL fishery, the shark gillnet fishery, and the recreational handgear fishery. Future adjustments may be implemented based on evaluation of the results of studies developed as part of the HMS Bycatch Reduction Implementation Plan, or as needed due to changing conditions in the fisheries. In addition, NMFS published in 2011 a National Bycatch Report (NMFS 2011b) that identified eight national and regional

recommendations to improve bycatch data collection and estimation. Further analyses of bycatch in the various HMS fisheries may be conducted as time, resources, and priorities allow.

### 3.10.2.1 U.S. Atlantic Pelagic Longline Fishery

NMFS utilizes both self-reported data (mandatory logbooks for all vessels) and observer data to monitor bycatch in the PLL fishery. The observer program has been in place since 1992 to document finfish bycatch, characterize fishery behavior, and quantify interactions with protected species (Beerkircher *et al.*, 2002). The program is mandatory for those vessels selected, and all vessels with directed and indirect swordfish permits are selected. The program had a target coverage level of five percent of the U.S. fleet within the North Atlantic (waters north of 5° N. latitude), as was agreed to by the United States at ICCAT. Actual coverage levels achieved from 1992-2003 ranged from two to nine percent depending on quarter and year. Observer coverage was 100 percent for vessels participating in the NED experimental fishery during 2001-2003. Overall observer coverage in 2003 was 11.5 percent of the total sets made, including the NED experiment. There was 100 percent observer coverage for experimental sets in 2004-2005 and 2008-2011 (no experimental sets were conducted in 2006-2007). The program began requiring an eight percent coverage rate due to the requirements of the 2004 BiOp for Atlantic PLL Fishery for HMS (NMFS, 2004b). Observer coverage in 2005-2011 ranged from 7.5-17.3 percent. In 2011, total observer coverage, including experimental sets, was 10.9 percent. NMFS increased the coverage of the longline fleet operating in the Gulf of Mexico during March/April through June for 2007-2010 to monitor bluefin tuna interactions, attempting 100% observer coverage from 2007-2009 and 50% in 2010 and 2011. Since 1992, data collection priorities have been to collect catch and effort data of the U.S. Atlantic PLL fleet on HMS, although information is also collected on bycatch of protected species.

Fishery observer effort is allocated among eleven large geographic areas and calendar quarter based upon the historical fishing range of the fleet (Walsh and Garrison, 2006). The target annual coverage is eight percent of the total reported sets, and observer coverage is randomly allocated based upon reported fishing effort during the previous fishing year/quarter/statistical reporting area (Beerkircher *et al.* 2002). Bycatch rates of protected species (catch per 1,000 hooks) are quantified based upon observer data by year, fishing area, and quarter (Garrison, 2005). The estimated bycatch rate is then multiplied by the fishing effort (number of hooks) in each area and quarter reported to the FLS program to obtain estimates of total interactions for each species of marine mammal and sea turtle (Garrison, 2005).

### 3.10.2.2 Shark Bottom Longline Fishery

Vessels participating in the BLL fishery for sharks are required to submit snapper/grouper/reef fish/shark logbooks to report their catch and effort, including bycatch species. All vessels having Shark LAPs are required to report. Observers have monitored the shark BLL fishery since 1994. The program has been mandatory for vessels selected to carry observers beginning in 2002. Prior to that, it was a voluntary program relying on cooperating vessels/captains to take observers. From 2002-2005, the objective of the vessel selection was to achieve a representative five percent level of coverage of the total fishing effort in each fishing area (North Atlantic, South Atlantic, and Gulf of Mexico) and during each fishing season of that year (Smith *et al.* 2006). Since 2006, target coverage level has been 3.9 percent of the total fishing effort. This

level is estimated to attain a sample size needed to provide estimates of sea turtle, smalltooth sawfish, or marine mammal interactions with an expected CV of 0.3 (Carlson, unpubl., as cited in Smith et al. 2006).

Since August 2001, selected federal permit holders that report on the Gulf of Mexico reef fish, South Atlantic snapper-grouper, king and Spanish mackerel, and shark fisheries logbook have been required to report all species and quantities of discarded (alive and dead) sea turtles, marine mammals, birds, and finfish on a supplemental discard form. A randomly selected sample of 20 percent of the vessels with active permits in the above fisheries is selected each year. The selection process is stratified across geographic area (Gulf of Mexico and South Atlantic), gear (handline, longline, troll, gillnet, and trap), and number of fishing trips (ten or less trips and more than 11 trips). Shark fishermen can also use the PLL HMS logbook or the northeast Vessel Trip Reports (VTR) depending on the permits held by the vessel. If they use either the HMS logbook or VTR, they need to report all of the catch and effort, as well as all the bycatch or incidental catch.

The Final Rule for Amendment 2 to the Consolidated HMS FMP established, among other things, a shark research fishery to maintain time series data for stock assessments and to meet NMFS' 2009 research objectives (NMFS 2008a). The shark research fishery permits authorize participation in the shark research fishery and the collection of sandbar and non-sandbar LCS from federal waters in the Atlantic Ocean, Gulf of Mexico, and Caribbean Sea for the purposes of scientific data collection subject to 100 percent observer coverage. The commercial vessels selected to participate in the shark research fishery are the only vessels authorized to land/harvest sandbars subject to the sandbar quota available for each year. The base quota is 116.6 mt dw/year, although this number may be reduced in the event of overharvests, if any. The selected vessels would also have access to the non-sandbar LCS, SCS, and pelagic shark quotas. Commercial vessels not participating in the shark research fishery may only land non-sandbar LCS, SCS, and pelagic sharks subject to the retention limits and quotas per 50 C.F.R. § 635.24 and 635.27, respectively.

### **3.10.2.3 Shark Gillnet Fishery**

Vessels participating in the gillnet fishery for sharks are required to submit logbooks to report their catch and effort, including bycatch species. An observer program for the directed shark gillnet fishery has been in place from 1993-1995 and from 1998 to the present. The objectives of this program are to obtain estimates of catch and bycatch and bycatch mortality rates of protected species, juvenile sharks, and other fish species. Protected resources interactions are estimated to meet the mandates of the Atlantic Large Whale Take Reduction Plan (LWTRP) and the May 2008 BiOp. There are special regulations in place for gillnetters during certain times of the year; however, coverage levels and the process by which vessels are selected are consistent. Vessels are randomly selected on a quarterly basis and then observed for a minimum of three trips during that time, with a goal of estimating protected resources interactions corresponding to the sample size necessary to provide estimates of sea turtle or marine mammal interactions with an expected CV of 0.3.

#### 3.10.2.4 Recreational Handgear Fishery

The recreational landings database for Atlantic HMS consists of information obtained through surveys including the MRFSS (now known as MRIP), LPS, HBS, Texas Headboat Survey, RBS tournament data, and the recreational non-tournament swordfish and billfish landings database. Descriptions of these surveys, the geographic areas they include, and their limitations were discussed in Section 2.6.2 of the 1999 FMP and Section 2.3.2 of the 1999 Billfish Amendment (NMFS 1999). Additional information about the recreational databases is also available on the SEFSC, NEFSC, and NMFS Office of Science and Technology's websites.

Historically, fishery survey strategies (including the MRFSS, LPS, and RBS) have not captured all landings of recreationally-caught swordfish. Although some swordfish handgear fishermen have commercial permits, many others land swordfish strictly for personal consumption; therefore, NMFS has implemented regulations to improve recreational swordfish and billfish monitoring and conservation. These regulations stipulate that all non-tournament recreational landings of swordfish and billfish must be reported by phone or web portal at <http://www.hmspermits.gov>. All reported recreational swordfish landings are counted toward the incidental swordfish quota.

#### 3.10.3 Bycatch Reduction in HMS Fisheries

The NMFS HMS bycatch reduction program includes an evaluation of current data collection programs, implementation of bycatch reduction measures such as gear modifications and time/area closures, and continued support of data collection and research relating to bycatch. Additional details on bycatch and bycatch reduction measures can be found in Section 3.5 of the 1999 FMP (NMFS 1999), Regulatory Amendment 1 to the 1999 FMP (NMFS 2000), Regulatory Adjustment 2 to the 1999 FMP (NMFS 2002), Amendment 1 to the 1999 FMP (NMFS, 2003a), and in the Consolidated HMS FMP (NMFS 2006). In addition, an HMS Bycatch Reduction Implementation Plan was developed in late 2003, which identified priority issues to be addressed in the following areas: 1) monitoring; 2) research; 3) management; and 4) education/outreach. Individual activities in each of these areas were identified and new activities may be added or removed as they are addressed or identified.

### 3.11 Evaluation and Monitoring of Bycatch

The identification of bycatch in Atlantic HMS fisheries is the first step in reducing bycatch and bycatch mortality. The Magnuson-Stevens Act requires the amount and type of bycatch to be summarized in the annual SAFE Reports.

PLL dead discards of LCS and pelagic sharks are estimated using data from NMFS observer reports and pelagic logbook reports. Shark BLL and shark gillnet discards can be estimated using logbook data and observer reports as well. Shark gillnet discards have also been estimated using logbook data when observer coverage is equal to 100 percent.

There is concern about the accuracy of discard estimates in the recreational rod and reel fishery for Atlantic HMS due to the low number of observations by the LPS and the MRFSS. Recreational bycatch estimates (numbers of fish released alive and dead) are not currently

available, except for bluefin tuna. For some species, encounters are considered rare events, which might result in bycatch estimates with considerable uncertainty. Due to improvements in survey methodology, increased numbers of intercepts (interviews with fishermen) have been collected since 2002. NMFS intends to develop bycatch estimates (live and dead discards) and estimates of uncertainty from the recreational fishery from the LPS. These data will be included in future SAFE Reports. Bycatch estimates may also be examined by using tournament data for the recreational fishery.

### **3.11.1 Bycatch Mortality**

#### **3.11.1.1 Introduction**

The reduction of bycatch mortality is an important component of National Standard 9. Physical injuries may not be apparent to the fisherman who is quickly releasing a fish because there may be injuries associated with the stress of being hooked or caught in a net. Little is known about the mortality rates of many shark species but there are some data for certain species. Information on bycatch mortality should continue to be collected, and in the future, could be used to estimate bycatch mortality in stock assessments. For a summary of bycatch species in BLL and gillnet fisheries, please refer to Table 3.21. For all other fisheries, please refer to Table 3.107 in the Consolidated HMS FMP.

NMFS submits annual data (Task II) to ICCAT on mortality estimates (dead discards). These data are included in the SAFE Reports and National Reports to ICCAT to evaluate bycatch trends in HMS fisheries.

**Table 3.20 Summary of bycatch species in HMS fisheries, MMPA category, ESA requirements, data collection, and management measures by fishery/gear type.** (Source data 2012 SAFE Report)

<b>Fishery/Gear Type</b>	<b>Bycatch Species</b>	<b>MMPA Category</b>	<b>ESA Requirements</b>	<b>Bycatch Data Collection</b>	<b>Management Measures</b>
Shark BLL	Prohibited shark species Target species after closure Sea turtles Smalltooth sawfish Non-target finfish	Category III	ITS, Terms & Conditions, RPMs	Permit requirement (1993); logbook requirement (1993); observer coverage (1994)	Quotas (1993); trip limit (1994); gear marking (1999); handling & release guidelines (2001); line clippers, dipnets, corrodible hooks, de-hooking devices, move 1 nm after an interaction (2004); South Atlantic closure, VMS (2005); shark identification workshops for dealers (2007); sea turtle control device (2008); shark research fishery (2008)
Shark Gillnet	Prohibited shark species Sea turtles Marine mammals Non-target finfish Smalltooth sawfish	Category II	ITS, Terms & Conditions, RPMs	Permit requirement (1993); logbook requirement (1993); observer coverage (1994)	Quotas (1993); trip limit (1994); gear marking (1999); deployment restrictions (1999); 30-day closure for leatherbacks (2001); handling & release guidelines (2001); net checks (2002); whale sighting (2002); VMS (2004); closure for right whale mortality (2006); shark identification workshops for dealers (2007)
PLL	Bluefin tuna Billfish Undersize target species Marine mammals Sea turtles Seabirds Non-target finfish Prohibited shark species Large Coastal Shark species after closure	Category I	Jeopardy findings in 2000 & 2004; Reasonable and Prudent Alternative implemented 2001-04; ITS, Terms & Conditions, RPMs	Permit requirement (1985); logbook requirement (SWO-1985; SHK - 1993); observer requirement (1992), EFPs (2001-present)	BFT target catch requirements (1981); quotas (SWO - 1985; SHK - 1993); prohibit possession of billfish (1988); minimum size (1995); gear marking (1999); line clippers, dipnets (2000); MAB closure (1999); limited access (1999); limit the length of mainline (1996-1997 only); move 1 nm after an interaction (1999); voluntary vessel operator workshops (1999); GOM closure (2000); FL, Charleston Bump, NED closures (2001); gangion length, corrodible hooks, de-hooking devices, handling & release guidelines (2001); NED experiment (2001-03); VMS (2003); circle hooks and bait requirements (2004); mandatory safe handling and release workshops (2006); sea turtle control device (2008); closed area research (2008-10); marine mammal handling and release placard, 20 nm mainline restriction in MAB, observer and research reqts in Cape Hatteras Spec. Research Area (CHSRA), increased obs coverage in Atl PLL fishery (2009); weak hook requirement in GOM (2011)

### 3.11.1.2 Mortality by Fishery

#### ***3.11.1.2.1 Bottom Longline Fishery***

The shark BLL fishery has relatively low observed bycatch rates. Historically, finfish bycatch has averaged approximately five percent in the BLL fishery. Observed protected species bycatch (sea turtles) has typically been much lower, less than 0.01 percent of the total observed catch. See Section 3.4.1.3 for more information. Disposition of discards is recorded by observers and can be used to estimate discard mortality.

#### *Pelagic Longline Fishery*

NMFS collects data on the disposition (released alive or dead) of bycatch species from logbooks submitted by fishermen in the PLL fishery. Observer reports also include disposition of the catch as well as information on hook location, trailing gear, and injury status of protected species interactions. These data are used to estimate post-release mortality of sea turtles and marine mammals based on guidelines for each (Angliss and DeMaster 1998, Ryder et al. 2006). See Section 7.4 for estimates of sea turtle and marine mammal bycatch estimates.

#### *Recreational Handgear Fishery*

The LPS collects data on disposition of bycatch (released alive or dead) in recreational HMS fisheries. Rod and reel discard estimates from Virginia to Maine during June through October can be monitored through the expansion of survey data derived from the LPS (dockside and telephone surveys). However, the actual numbers of fish discarded for many species are low. Post-release mortality studies have been conducted on few HMS at this time. Summaries of those studies can be found in previous SAFE reports.

For shark gillnet and commercial handgear mortality summaries, please refer to Chapter 7.2.1 of 2012 HMS SAFE Report (NMFS 2012).

### 3.11.1.3 Code of Angling Ethics

NMFS developed a Code of Angling Ethics as part of implementing Executive Order 12962 – Recreational Fisheries. NMFS implemented a national plan to support, develop, and implement programs that were designed to enhance public awareness and understanding of marine conservation issues relevant to the wellbeing of fishery resources in the context of marine recreational fishing. This code is consistent with National Standard 9, minimizing bycatch and bycatch mortality. These guidelines are discretionary, not mandatory, and are intended to inform the angling public of NMFS views regarding what constitutes ethical angling behavior. Part of the code covers catch-and-release fishing and is directed towards minimizing bycatch mortality. For a detailed description of the code, please refer to Section 3.9.8.3 of the 2006 Consolidated HMS FMP (NMFS 2006).

### 3.11.2 Protected Species

This section examines the interaction between protected species and Atlantic HMS fisheries managed under the 2006 Consolidated HMS FMP. As a point of clarification, interactions are different than bycatch. Interactions take place between fishing gears and marine mammals, and seabirds while bycatch consists of the incidental take and discard of non-targeted finfish, shellfish, mollusks, crustaceans, sea turtles, and any other marine life other than marine mammals and seabirds. Following a brief review of the three acts (Marine Mammal Protection Act, Endangered Species Act, and Migratory Bird Treaty Act) affecting protected species, the interactions between HMS gears and each species is examined. Additionally, the interaction of seabirds and longline fisheries are considered under the auspices of the United States “National Plan of Action for Reducing the Incidental Catch of Seabirds in Longline Fisheries” (NPOA – Seabirds).

#### 3.11.2.1 Interactions and the MMPA

The MMPA of 1972 as amended is one of the principal Federal statutes guiding marine mammal species protection and conservation policy. In the 1994 amendments, Section 118 established the goal that the incidental mortality or serious injury of marine mammals occurring during the course of commercial fishing operations be reduced to insignificant levels approaching a zero mortality rate goal (ZMRG) and serious injury rate within seven years of enactment (i.e., April 30, 2001). In addition, the amendments established a three-part strategy to govern interactions between marine mammals and commercial fishing operations. These include the preparation of marine mammal stock assessment reports, a registration and marine mammal mortality monitoring program for certain commercial fisheries (Category I and II), and the preparation and implementation of take reduction plans (TRP).

NMFS relies on both fishery-dependent and fishery-independent data to produce stock assessments for marine mammals in the Atlantic Ocean, Gulf of Mexico, and the Caribbean Sea. Draft stock assessment reports are typically published in January and final reports are typically published in the fall. Final 2012 stock assessment reports can be obtained on the web at: <http://www.nmfs.noaa.gov/pr/sars/species.htm>.

The following list of species outlines the marine mammal species that occur off the Atlantic and Gulf Coasts that are or could be of concern with respect to potential interactions with HMS fisheries.

#### **Common Name**

Atlantic spotted dolphin  
Blue whale  
Bottlenose dolphin  
Common dolphin  
Fin whale  
Harbor porpoise  
Humpback whale  
Killer whale  
Long-finned pilot whale

#### **Scientific Name**

*Stenella frontalis*  
*Balaenoptera musculus*  
*Tursiops truncatus*  
*Delphinis delphis*  
*Balaenoptera physalus*  
*Phocoena phocoena*  
*Megaptera novaeangliae*  
*Orcinus orca*  
*Globicephela melas*

Minke whale	<i>Balaenoptera acutorostrata</i>
Northern bottlenose whale	<i>Hyperoodon ampullatus</i>
Northern right whale	<i>Eubalaena glacialis</i>
Pantropical spotted dolphin	<i>Stenella attenuata</i>
Pygmy sperm whale	<i>Kogia breviceps</i>
Risso's dolphin	<i>Grampus griseus</i>
Sei whale	<i>Balaenoptera borealis</i>
Short-beaked spinner dolphin	<i>Stenella clymene</i>
Short-finned pilot whale	<i>Globicephala macrorhynchus</i>
Sperm whale	<i>Physeter macrocephalus</i>
Spinner dolphin	<i>Stenella longirostris</i>
Striped dolphin	<i>Stenella coeruleoalba</i>
White-sided dolphin	<i>Lagenorhynchus acutus</i>

Under MMPA requirements, NMFS produces an annual list of fisheries (LOF) that classifies domestic commercial fisheries, by gear type, relative to their rates of incidental mortality or serious injury of marine mammals. The LOF includes three classifications:

1. Category I fisheries are those with frequent serious injury or incidental mortality to marine mammals;
2. Category II fisheries are those with occasional serious injury or incidental mortality; and
3. Category III fisheries are those with remote likelihood of serious injury or known incidental mortality to marine mammals.

The final 2012 MMPA LOF was published on November 29, 2011 (76 FR 73912). The Atlantic Ocean, Caribbean, and Gulf of Mexico large PLL fishery is classified as Category I (frequent serious injuries and mortalities incidental to commercial fishing) and the southeastern Atlantic shark gillnet fishery is classified as Category II (occasional serious injuries and mortalities). The following Atlantic HMS fisheries are classified as Category III (remote likelihood or no known serious injuries or mortalities): Atlantic tuna purse seine; Gulf of Maine and Mid-Atlantic tuna, shark and swordfish, hook-and-line/harpoon; southeastern Mid-Atlantic and Gulf of Mexico shark BLL; and Mid-Atlantic, southeastern Atlantic, and Gulf of Mexico pelagic hook-and-line/harpoon fisheries. Commercial passenger fishing vessel (charter/headboat) fisheries are subject to Section 118 and are listed as a Category III fishery. Recreational vessels are not categorized since they are not considered commercial fishing vessels. Beginning with the 2009 LOF, high seas fisheries are included in the LOF. Many fisheries operate in both U.S. waters and on the high seas thereby making the high seas component an extension of a fishery already on the LOF. NMFS categorizes the majority of high seas fisheries on the LOF as Category II based on the lack of marine mammal stock abundance information from the high seas. Exceptions to this are high seas fisheries that also operate in U.S. waters that have already been categorized as I, II, or III. For additional information on the fisheries categories and how fisheries are classified, see <http://www.nmfs.noaa.gov/pr/interactions/lof/>.

Fishermen participating in Category I or II fisheries are required to register under the MMPA and to accommodate an observer aboard their vessels if requested. Vessel owners or operators,

or fishermen, in Category I, II, or III fisheries must report all incidental mortalities and serious injuries of marine mammals during the course of commercial fishing operations to NMFS. There are currently no regulations requiring recreational fishermen to report takes, nor are they authorized to have incidental takes (i.e., they are illegal).

The Pelagic Longline Take Reduction Team (PLTRT) was formed to address the incidental mortality and serious injury of long-finned pilot whales (*Globicephala melas*) and short-finned pilot whales (*Globicephala macrorhynchus*) in the mid-Atlantic region of the Atlantic PLL fishery. Under section 118 of the MMPA, the PLTRT is charged with developing a Take Reduction Plan to reduce bycatch of pilot whales in the Atlantic PLL fishery to a level approaching a zero mortality rate within 5 years of implementation of the plan. The PLTRT developed a final TRP (May 19, 2009, 74 FR 23349) effective June 18, 2009. The TRP implemented a suite of management strategies to reduce mortality and serious injury of pilot whales and Risso's dolphins in the Atlantic PLL fishery. NMFS finalized the following three regulatory measures: (1) establish a Cape Hatteras Special Research Area (CHSRA), with specific observer and research participation requirements for fishermen operating in that area; (2) set a 20-nm (37.02-km) upper limit on mainline length for all PLL sets within the MAB; and (3) require an informational placard on handling and release of marine mammals be displayed both in the wheelhouse and on the working deck of all active PLL vessels in the Atlantic fishery. NMFS also finalized the following non-regulatory measures: (1) increased observer coverage in the MAB to 12-15 percent to ensure representative sampling of pilot whales and Risso's dolphins; (2) encourage vessel operators to maintain daily communication with other local vessel operators regarding protected species interactions throughout the PLL fishery with the goal of identifying and exchanging information relevant to avoiding protected species bycatch; (3) recommending that NMFS update the guidelines for handling and releasing marine mammals and NMFS and the industry to develop new technologies, equipment, and methods for safer and more effective handling and release of marine mammals; and (4) recommending NMFS pursue research and data collection goals in the PLTRT regarding pilot whales and Risso's dolphins. More information on the PLTRT can be found at <http://www.nmfs.noaa.gov/pr/interactions/trt/pl-trt.htm>. The Team most recently met in August 2012 in St. Petersburg, FL, to discuss progress under the Plan.

### 3.11.2.2 Interactions and Species listed under the ESA

The ESA of 1973, as amended (16 U.S.C. 1531 *et seq.*), provides for the conservation and recovery of endangered and threatened species of fish, wildlife, and plants. The listing of a species is based on the status of the species throughout its range or in a specific portion of its range in some instances. Threatened species are those likely to become endangered in the foreseeable future (16 U.S.C. § 1532(20)) if no action is taken to stop the decline of the species. Endangered species are those in danger of becoming extinct throughout all or a significant portion of their range (16 U.S.C. § 1532(20)). Species can be listed as endangered without first being listed as threatened. The Secretary of Commerce, acting through NMFS, is authorized to list marine and anadromous fish species, marine mammals (except for walrus and sea otter), marine reptiles (such as sea turtles), and marine plants. The Secretary of the Interior, acting through the USFWS, is authorized to list walrus and sea otter, seabirds, terrestrial plants and wildlife, and freshwater fish and plant species.

In addition to listing species under the ESA, the relevant agency (NMFS or USFWS) generally must designate critical habitat for listed species concurrently with the listing decision to the “maximum extent prudent and determinable” (16 U.S.C. § 1533(a)(3)). The ESA defines critical habitat as those specific areas that are occupied by the species at the time it is listed that are essential to the conservation of a listed species and that may be in need of special consideration, as well as those specific areas that are not occupied by the species that are essential to their conservation. Federal agencies are prohibited from undertaking actions that are likely to destroy or adversely modify designated critical habitat.

**Marine Mammals**

	<b><u>Status</u></b>
Blue whale ( <i>Balaenoptera musculus</i> )	Endangered
Fin whale ( <i>Balaenoptera physalus</i> )	Endangered
Humpback whale ( <i>Megaptera novaeangliae</i> )	Endangered
Northern right whale ( <i>Eubalaena glacialis</i> )	Endangered
Sei whale ( <i>Balaenoptera borealis</i> )	Endangered
Sperm whale ( <i>Physeter macrocephalus</i> )	Endangered

**Sea Turtles**

Green turtle ( <i>Chelonia mydas</i> )	*Endangered/Threatened
Hawksbill sea turtle ( <i>Eretmochelys imbricata</i> )	Endangered
Kemp’s ridley sea turtle ( <i>Lepidochelys kempii</i> )	Endangered
Leatherback sea turtle ( <i>Dermochelys coriacea</i> )	Endangered
Loggerhead sea turtle ( <i>Caretta caretta</i> )	Threatened
Olive ridley sea turtle ( <i>Lepidochelys olivacea</i> )	Threatened

**Critical Habitat**

Northern right whale	Endangered
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**Elasmobranchs**

Scalloped Hammerhead shark ( <i>Sphyrna lewini</i> )	**Proposed Endangered/Threatened
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**Finfish**

Smalltooth sawfish ( <i>Pristis pectinata</i> )	Endangered
Atlantic Sturgeon ( <i>Acipenser oxyrinchus oxyrinchus</i> )	***Endangered/Threatened

\*Green sea turtles in U.S. waters are listed as threatened except for the Florida breeding population, which is listed as endangered. Due to the inability to distinguish between the populations away from the nesting beaches, green sea turtles are considered endangered wherever they occur in U.S. waters.

\*\* We are currently proposing to list four of the six distinct population segments under the ESA, two as endangered (Eastern Atlantic and Eastern Pacific) and two as threatened (Central and Southwest Atlantic and Indo-West Pacific).

\*\*\* Atlantic sturgeon have five distinct population segments. The population in the Gulf of Mexico is considered threatened. The other populations in the New York bight, Chesapeake Bay, Carolina, and South Atlantic are all considered endangered.

***3.11.2.2.1 Sea Turtles***

NMFS has taken several significant steps to reduce sea turtle bycatch and bycatch mortality in domestic longline fisheries. On March 30, 2001, we implemented via interim final rule requirements for U.S. flagged vessels with PLL gear on board to have line clippers and dipnets to remove gear on incidentally captured sea turtles (66 FR 17370). Specific handling and release

guidelines designed to minimize injury to sea turtles were also implemented. We published a final report which provides the detailed guidelines and protocols (NMFS 2008c) and a copy can be found at

[http://www.nmfs.noaa.gov/sfa/hms/Protected%20Resources/TM580\\_color\\_standard\\_1\\_7\\_09.pdf](http://www.nmfs.noaa.gov/sfa/hms/Protected%20Resources/TM580_color_standard_1_7_09.pdf)

A BiOp completed on June 14, 2001, found that the actions of the PLL fishery as proposed would jeopardize the continued existence of loggerhead and leatherback sea turtles. This document reported that the PLL fishery interacted with an estimated 991 loggerhead and 1,012 leatherback sea turtles in 1999. The estimated take levels for 2000 were 1,256 loggerhead and 769 leatherback sea turtles (Yeung, 2001).

On July 13, 2001 (66 FR 36711), we published an emergency rule that closed the NED area to PLL fishing (effective July 15, 2001), modified how PLL gear may be deployed effective August 1, 2001, and required that all longline vessels (pelagic and bottom) post safe handling guidelines for sea turtles in the wheelhouse. On December 13, 2001 (66 FR 64378), we extended the emergency rule for 180 days through July 8, 2002. On July 9, 2002, we published a final rule (67 FR 45393) that closed the NED to PLL fishing. As part of the Reasonable and Prudent Alternative, the BiOp required NMFS to conduct an experiment with commercial fishing vessels to test fishery-specific gear modifications to reduce sea turtle bycatch and mortality. This rule also required the length of any gangions to be 10 percent longer than the length of any floatline on vessels where the length of both is less than 100 meters; prohibited stainless steel hooks; and required gillnet vessel operators and observers to report any whale sightings and required gillnets to be checked every 0.5 to 2 hours.

The experimental program required in the BiOp was initiated in the NED area in 2001 in cooperation with the U.S. PLL fleet that historically fished on the Grand Banks fishing grounds. The goal of the experiment was to test and develop gear modifications that might prove useful in reducing the incidental catch and post-release mortality of sea turtles captured by PLL gear while striving to minimize the loss of target catch. The experimental fishery had a three year duration and utilized 100 percent observer coverage to assess the effectiveness of the measures. The gear modifications tested in 2001 included blue-dyed squid and moving gangions away from floatlines. In 2002, the NED experimental fishery examined the effectiveness of whole mackerel bait, squid bait, circle and “J” hooks, and reduced daylight soak time in reducing the capture of sea turtles. The experiment tested various hook and bait type combinations in 2003 to verify the results of the 2002 experiment.

On November 28, 2003, based on the conclusion of the three-year NED experiment, and preliminary data that indicated that the Atlantic PLL fishery may have exceeded the Incidental Take Statement in the June 14, 2001 BiOp, we published a Notice of Intent to prepare a Supplemental Environmental Impact Statement (SEIS) to assess the potential effects on the human environment of proposed alternatives and actions under a proposed rule to reduce sea turtle bycatch (68 FR 66783). A new BiOp for the Atlantic PLL fishery was completed on June 1, 2004 (NMFS, 2004b). The BiOp concluded that long-term continued operation of the Atlantic PLL fishery as proposed was not likely to jeopardize the continued existence of loggerhead, green, hawksbill, Kemp’s ridley, or olive ridley sea turtles; and was likely to jeopardize the continued existence of leatherback sea turtles.

On July 6, 2004, NMFS implemented additional regulations for the Atlantic PLL fishery to further reduce the mortality of incidentally caught sea turtles (69 FR 40734). These measures include requirements on hook type, hook size, bait type, dipnets, line clippers, and safe handling guidelines for the release of incidentally caught sea turtles. These requirements were developed based on the results of the 2001-2003 NED experiment (Watson et al. 2003; Watson et al. 2004; Shah et al. 2004). These requirements are predicted to decrease the number of total interactions, as well as the number of mortalities, of both leatherback and loggerhead sea turtles (NMFS 2004c). Post-release mortality rates are expected to decline due to a decrease in the number of turtles that swallow hooks which engage in the gut or throat, a decrease in the number of turtles that are foul-hooked and improved handling and gear removal protocols. NMFS is working to export this new technology to PLL fleets of other nations to reduce global sea turtle bycatch and bycatch mortality. U.S gear experts have presented this bycatch reduction technology and data from research activities at approximately 15 international events that included fishing communities and resource managers between 2002 and mid-2005 (NMFS 2005a).

On February 7, 2007, we published a rule that required BLL vessels to carry the same dehooking equipment as the PLL vessels. To date, all bottom and PLL vessels with commercial shark permits are required to have NMFS-approved sea turtle dehooking equipment onboard (PLL: July 6, 2004, 69 FR 40734; BLL: February 7, 2007, 72 FR 5639).

A December 12, 2012 BiOp issued under Section 7 of the ESA for Amendments 3 and 4 to the 2006 Consolidated HMS FMP concluded, based on the best available scientific information, that Amendments 3 and 4 to the Consolidated HMS FMP was not likely to jeopardize the continued existence of endangered green, leatherback, and Kemp's ridley sea turtles; the endangered smalltooth sawfish; the endangered Atlantic Sturgeon; or the threatened loggerhead sea turtle.

Internationally, the United States is pursuing sea turtle conservation through international, regional, and bilateral organizations such as ICCAT, the Asia Pacific Fishery Commission, and FAO Committee on Fisheries (COFI). The United States intends to provide a summary report to FAO for distribution to its members on bycatch of sea turtles in U.S. longline fisheries and the research findings as well as recommendations to address the issue. At the 24<sup>th</sup> session of COFI held in 2001, the United States distributed a concept paper for an international technical experts meeting to evaluate existing information on turtle bycatch, to facilitate and standardize collection of data, to exchange information on research, and to identify and consider solutions to reduce turtle bycatch. COFI agreed that an international technical meeting could be useful despite the lack of agreement on the specific scope of that meeting. The United States has developed a prospectus for a technical workshop to address sea turtle bycatch in longline fisheries as a first step. Other gear-specific international workshops may be considered in the future. More information on sea turtle bycatch mitigation can be found in the 2012 SAFE Report.

#### ***3.11.2.2 Scalloped Hammerhead sharks***

We received petitions to list scalloped hammerhead and great hammerhead sharks under the ESA. The 90-day finding for the scalloped hammerhead shark petition concluded that the petition presented substantial scientific or commercial information indicating that the petitioned

action may be warranted. Consistent with legal requirements, a status review was conducted to determine if the petitioned action is warranted. The 90-day finding alone does not result in legal obligations pertaining to management of the species. NMFS is now proposing to list four populations of scalloped hammerhead sharks under the ESA, two as threatened and two as endangered (78 FR 20717). However, the species will not be listed in the majority of U.S. waters due to steps fisheries managers and fishermen have already taken to help protect these species NMFS would have to consider management implications for the species if it is listed, consistent with ESA requirements. Two other petitions to list great hammerhead sharks are currently awaiting 90-day findings.

#### ***3.11.2.2.3 Smalltooth sawfish***

On April 1, 2003, NMFS listed smalltooth sawfish as an endangered species (68 FR 15674) under the ESA. After reviewing the best scientific data and commercial fisheries information, the status review team determined that the U.S. DPS (Distinct Population Segment) of smalltooth sawfish is in danger of extinction throughout all or a significant portion of its range from a combination of the following four listing factors: the present or threatened destruction, modification, or curtailment of habitat or range; over utilization for commercial, recreational, scientific, or educational purposes; inadequacy of existing regulatory mechanisms; and other natural or manmade factors affecting its continued existence. NMFS is working on designating critical habitat for smalltooth sawfish.

Smalltooth sawfish takes in the shark gillnet fishery should be rare given the low reported number of takes and high rate of observer coverage. The fact that there were no smalltooth sawfish caught during 2001, when 100 percent of the fishing effort was observed, indicates that smalltooth sawfish takes (observed or total) most likely do not occur on an annual basis. Based on this information, the 2003 BiOp estimated that one incidental capture of a sawfish (released alive) over five years, would occur as a result of the use of gillnets in this fishery (NMFS 2003a). No smalltooth sawfish were observed in shark gillnet fisheries for 2010.

Smalltooth sawfish have been observed caught (eight known interactions, seven released alive, one released in unknown condition) in shark BLL fisheries from 1994 through 2004 (NMFS, 2003a). Based on these observations, expanded sawfish take estimates for 1994-2002 were developed for the shark BLL fishery (NMFS 2003a). A total of 466 sawfish were estimated to have been taken in this fishery during 1994 - 2002, resulting in an average of 52 per year. All were released alive except one. Estimates of sawfish bycatch for 2003-2006 have been developed and range from 0 to 161 interactions per year (Richards 2007a; 2007b). However, due to the sparseness of observations (interactions) and effort variables chosen for the various approaches to estimating total interactions, the results were not very precise. A total of ten smalltooth sawfish were observed caught in 2010 by vessels fishing BLL gear for sharks in the Gulf of Mexico and South Atlantic (Hale et al. 2011).

A small BLL time-area closure to protect smalltooth sawfish southwest of Key West, Florida, was considered during the development of the Consolidated HMS FMP (NMFS 2006). The closure was not implemented due to the lack of information regarding critical habitat for this

species and a proposed rule to designate critical habitat for smalltooth sawfish published on November 20, 2008 (73 FR 70290).

### 3.11.2.3 Interactions with Seabirds

The NPOA-Seabirds was released in February 2001. The NPOA for Seabirds calls for detailed assessments of longline fisheries, and, if a problem is found to exist within a longline fishery, for measures to reduce seabird bycatch within two years. NMFS, in collaboration with the appropriate Councils and in consultation with the USFWS, will prepare an annual report on the status of seabird mortality for each longline fishery. The United States is committed to pursuing international cooperation, through the Department of State, NMFS, and USFWS, to advocate the development of NPOAs within relevant international fora. NMFS intends to meet with longline fishery participants and other members of the public in the future to discuss possibilities for complying with the intent of the plan of action. Because interactions appear to be relatively low in Atlantic HMS fisheries, the adoption of immediate measures is unlikely.

Gannets, gulls, greater shearwaters, and storm petrels are occasionally hooked by Atlantic PLLs. These species and all other seabirds are protected under the MBTA. Seabird populations are often slow to recover from excess mortality as a consequence of their low reproductive potential (one egg per year and late sexual maturation). The majority of longline interactions with seabirds occur as the gear is being set. The birds eat the bait and become hooked on the line. The line then sinks and the birds are subsequently drowned.

Bycatch of seabirds in the shark BLL fishery has been virtually non-existent. A single pelican has been observed killed from 1994 through 2010. No expanded estimates of seabird bycatch or catch rates for the BLL fishery have been made due to the rarity of seabird takes.

### 3.11.3 Additional Measures to Address Protected Species Concerns

Bycatch reduction measures have been implemented through the 1999 FMP (NMFS 1999), in Regulatory Amendment 1 to the 1999 FMP (NMFS 2000), in Regulatory Adjustment 2 to the 1999 FMP (NMFS 2002), in Amendment 1 to the 1999 FMP (NMFS 2003), and in the June 2004 Final Rule for Reduction of Sea Turtle Bycatch and Bycatch Mortality in the Atlantic PLL Fishery (69 FR 40734). We closed the Southeast U.S. Restricted Area to gillnet fisheries from February 15, 2006, to March 31, 2006, as a result of an entanglement and subsequent mortality of a right whale with gillnet gear (71 FR 8223). We continue to monitor observed interactions with marine mammals and sea turtles on a quarterly basis and reviews data for appropriate action, if any, as necessary. A final rule requiring the possession and use of an additional sea turtle control device as an addition to the existing requirements for sea turtle bycatch mitigation gear in pelagic and BLL fisheries was effective October 23, 2008 (73 FR 54721). We finalized the PLTRT TRP effective June 18, 2009 (74 FR 23349), which implemented a suite of management strategies to reduce mortality and serious injury of pilot whales and Risso's dolphins in the Atlantic PLL fishery.

**Table 3.21 Estimated sea turtle interactions by species in the US Atlantic pelagic longline fishery, 2003-2011, and Incidental Take Levels (ITS).**

PLL Fishery	2003	2004	2005	2006	2007	2008	2009	2010	2011	3 year ITS 2004-06/2007-09 <sup>1</sup>
										Total
Leatherback	1,112	1,362	368	415	500	385	286	168	239	1,981 / 1,764
Loggerhead	727	734	282	558	542	772	243	344	438	1,869 / 1,905
Other/Unidentified sea turtles	38	0	0	11	1	0	0	3	4	105 / 105
Marine mammals	300	164	372	313	151	265	144	238	452	NA

<sup>1</sup> Applies to all subsequent 3-year ITS periods

### 3.11.4 Bycatch of HMS in Other Fisheries

We are concerned about bycatch mortality of Atlantic HMS in any federal or state-managed fishery that captures them. We plan to address bycatch of these species in the appropriate FMPs through coordination with the responsible management body. For example, capture of swordfish and tunas incidental to squid trawl operations is addressed in the Squid, Mackerel, and Butterfish FMP. Capture rates of tunas in coastal gillnet fisheries may be explored through issuance of exempted fishing permits and reporting requirements. We continue to solicit bycatch data on HMS from all state, interjurisdictional, and Federal data collection programs.

#### 3.11.4.1 Shrimp Trawl Fishery

Shark bycatch in the shrimp trawl fishery consists mainly of sharks too small to be highly valued in the commercial market. As a result, few sharks are retained. Bycatch estimates of LCS in this fishery have been generated and were reviewed in a recent LCS assessment (SEDAR 11, 2006). Bycatch estimates of the SCS management group were generated for both the Gulf of Mexico and South Atlantic shrimp trawl fisheries for a recent SCS stock assessment. Requirements for turtle excluder devices in these fisheries have probably resulted in less bycatch because sharks are physically excluded from entering the gear. Bycatch of the SCS management group in the Gulf of Mexico shrimp trawl fishery consists mainly of Atlantic sharpnose and bonnethead sharks (SEDAR 13, 2007). Estimates of bycatch (numbers of fish) of small coastal sharks in the U.S. south Atlantic and Gulf of Mexico shrimp trawl fisheries and BLL fishery relative to total catch for 1992-2009 can be found in Table 3.23 and Table 3.24. More recent estimates of blacknose shark bycatch in the shrimp fisheries can be found in the most recent stock assessment (SEDAR 21, 2011). Finetooth sharks were added as a select species for the shrimp trawl observer program in 2005 to help determine if this fishery has bycatch of finetooth sharks. Prior to this, data on finetooth shark bycatch was not recorded.

**Table 3.22 Estimates of bycatch (numbers of fish) of blacknose sharks in the U.S. Gulf of Mexico shrimp trawl fisheries and bottom longline fishery relative to total catch.**

Source: SEDAR 2011.

Year	Shrimp Bycatch	Percent of Total Catch	Bottom Longline Discards	Percent of Total Catch	Total Gulf of Mexico Catch
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1992	34,392	75.31	2,321	5.08	45,669
1993	32,511	72.76	2,515	5.63	44,682
1994	30,019	56.98	2,708	5.14	52,679
1995	30,909	58.09	9,245	17.38	53,205
1996	33,461	66.26	2,106	4.17	50,499
1997	38,115	69.90	1,744	3.20	54,524
1998	38,961	73.15	1,450	2.72	53,265
1999	36,315	82.83	84	0.19	43,842
2000	35,703	72.17	2,671	5.40	49,468
2001	38,769	70.21	0	0.00	55,216
2002	43,518	67.45	3,045	4.72	64,515
2003	34,529	76.67	1,552	3.45	45,036
2004	31,306	63.77	652	1.33	49,091
2005	22,953	49.99	6,475	14.10	45,918
2006	19,554	35.72	8,416	15.37	54,740
2007	17,381	60.37	967	3.36	28,790
2008	13,193	67.69	368	1.89	19,489
2009	15,668	61.73	896	3.53	25,382

**Table 3.23** Estimates of bycatch (numbers of fish) of blacknose sharks in the U.S. south Atlantic shrimp trawl fisheries and bottom longline fishery relative to total catch. Source: SEDAR 2011.

<b>Year</b>	<b>Shrimp Bycatch</b>	<b>Percent of Total Catch</b>	<b>Bottom Longline Discards</b>	<b>Percent of Total Catch</b>	<b>Total Atlantic Catch</b>
1992	2,249	10.74	1,437	6.86	20,948
1993	2,126	9.51	1,556	6.96	22,358
1994	1,963	8.03	1,676	6.86	24,448
1995	2,021	25.20	564	7.03	8,019
1996	2,188	9.19	156	0.66	23,807
1997	2,493	5.77	580	1.34	43,205
1998	2,548	10.80	0	0.00	23,587
1999	2,375	7.94	637	2.13	29,916
2000	2,335	4.07	9,318	16.23	57,402
2001	2,535	6.71	2,517	6.66	37,800
2002	2,846	10.17	3,071	10.97	27,989
2003	2,258	8.91	2,453	9.68	25,346
2004	2,047	13.31	1,319	8.58	15,381
2005	1,501	10.14	184	1.24	14,798
2006	1,279	7.76	456	2.77	16,481
2007	1,137	6.50	163	0.93	17,500

2008	863	3.57	90	0.37	24,159
2009	1,025	3.27	0	0.00	31,339

### 3.11.5 Evaluation of Other Bycatch Reduction Measures

We continue to monitor and evaluate bycatch in HMS fisheries through direct enumeration (pelagic and BLL observer programs, shark gillnet observer program), evaluation of management measures (closed areas, trip limits, gear modifications, *etc.*), and VMS.

The following section provides a review of additional management measures or issues that may address bycatch reduction:

#### *Atlantic Large Whale Take Reduction Plan regulations*

Major changes to the ALWTRP were implemented in a final rule that published on October 5, 2007 (72 FR 57104). Regulations that affect HMS fisheries specifically gillnet fisheries, include: 1) a closed area for all gillnet fisheries from November 15-April 15 from 29° 00' N to 32° 00' N from shore eastward to 80° 00' W and off SC, within 35 nautical miles of the coast (Southeast US Restricted Area North); 2) a restricted area from December 1-March 31 from 27° 51' N to 29° 00' N from shore eastward to 80° 00' W (Southeast US Restricted Area South); 3) additional seasonal boundaries for EEZ waters east of 80° 00' W from 26° 46.50' N to 32° 00' N (Other Southeast Gillnet Waters); and 4) a monitoring area specific to the Atlantic shark gillnet fishery that extends from the area along the coast from 27° 51' N south to 26° 46.50' N eastward to 80° 00' W (Southeast US Monitoring Area) effective December 1-March 31. Specific compliance requirements for fishing in these areas vary and are summarized in the Guide to the Atlantic Large Whale Take Reduction Plan. For additional information please see the ALWTRP website <http://www.nero.noaa.gov/whaletrp/index.html>.

#### *Atlantic Bottlenose Dolphin Take Reduction Team*

NMFS published a final rule on April 22, 2006, to implement the TRP. Included in the final rule are: 1) effort reduction measures; 2) gear proximity requirements; 3) gear or gear deployment modifications; and 4) outreach and education measures to reduce dolphin bycatch below the stock's potential biological removal level. The final rule also includes time/area closures and size restrictions on large mesh fisheries to reduce incidental takes of endangered and threatened sea turtles as well as to reduce dolphin bycatch.

#### *Harbor Porpoise Take Reduction Plan*

NMFS published a final rule on February 19, 2010 (79 FR 7383) which amended the Harbor Porpoise TRP (HPTRP) that was originally published on December 1, 1998 (63 FR 66464), corrected on December 23, 1998 (63 FR 71041), and modified on January 11, 2001 (66 FR 2336). The plan is divided into New England and Mid-Atlantic portions. The New England portion of the HPTRP pertains to all fishing with sink gillnets and other gillnets capable of catching multispecies in New England waters from Maine through Rhode Island east of 72° 30' W longitude. Vessels using pelagic gillnets/baitnets (as described in 50 C.F.R. § 648.81

(f)(2)(ii)) are exempt from this plan. It includes time and area closures, some of which are complete closures. Others are closures to multispecies gillnet fishing unless pingers are used in the prescribed manner. The HPTRP also establishes "consequence closure areas" in New England, which are specific areas of historically high harbor porpoise bycatch that will seasonally close if bycatch rates averaged over two consecutive management seasons indicate that harbor porpoise takes are greater than a specified bycatch rate. The Mid-Atlantic portion of the HPTRP pertains to waters west of 72° 30' W. longitude to the Mid-Atlantic shoreline from the Connecticut/New York border to the North Carolina/South Carolina border. It includes time and area closures to gillnet fishing unless the gear meets certain specifications. Gillnet fishing in Mid-Atlantic waters during regulated periods is regulated differently for small mesh and large mesh gear. The plan also includes some time and area closures in which gillnet fishing is prohibited regardless of the gear specifications. More information please see the HPTRP website: <http://www.nero.noaa.gov/protected/porptrp/index.html>.

#### *Atlantic Offshore Cetacean Take Reduction Team*

We have disbanded the Atlantic Offshore Cetacean Take Reduction Team (AOCTRT) due to the fact that two of the three fisheries addressed by the AOCTRT were closed by fishery management actions, leaving only the PLL fishery in operation. This fishery has been the subject of recent fishery management actions and increased observer coverage related to bycatch. As discussed below, a take reduction team specific to the PLL fishery has been formed.

#### *Pelagic Longline Take Reduction Team*

NMFS appointed a PLTRT in June 2005, to address issues in the longline fishery and marine mammals, specifically pilot whales. A proposed rule to implement the TRP has been developed and published on June 24, 2008 (73 FR35623). The PLTRT recommended a suite of management strategies to reduce mortality and serious injury of pilot whales and Risso's dolphins in the Atlantic PLL fishery. NMFS proposed the following three regulatory measures: (1) Establish a CHSRA, with specific observer and research participation requirements for fishermen operating in that area; (2) set a 20-nm (37.02-km) upper limit on mainline length for all pelagic longline sets within the MAB; and (3) develop and publish an informational placard that must be displayed in the wheelhouse and the working deck of all active PLL vessels in the Atlantic fishery. The final rule for this action published May 19, 2009 (74 FR 23349).

#### *Vessel Monitoring System HMS Fisheries*

NMFS implemented fleet-wide VMS requirements in the Atlantic PLL fishery in September 2003. Starting in 2004, gillnet vessels with a directed shark permit and gillnet gear onboard were required to install and operate a VMS unit from November 15 – March 31 of each year. In an attempt to better quantify bycatch, NMFS required all vessels with shark LAPs to participate in the Directed Shark Gillnet Observer program. Directed shark BLL vessels located between 33° N and 36° 30' N need to install and operate a VMS unit from January through July each year.

On December 2, 2011, NMFS published a final rule requiring all HMS vessels currently required to replace their Mobile Transmitting Unit VMS with Enhanced Mobile Transmitting Unit VMS units. These installations have to be performed by a qualified marine electrician. These units are

capable of two way communication, therefore, vessel operators would also have to provide information on target species and fishing gear onboard by sending a hail out message using their VMS at least two-hours prior to leaving port. Vessels would then be required to send a hail-in message indicating when and where they would be returning to port with their VMS two hours before returning. Because of unforeseen circumstances, these updated requirements were delayed for just over a year and vessels could continue to adhere to the previous VMS requirements. The new requirements went into effect on January 1, 2013 (77 FR 61727, October 11, 2012), and vessels must now have the E-MTU units.

### **3.12 Effectiveness of Existing Time/Area Closures in Reducing Bycatch**

Since 2000, we have implemented a number of time/area closures and gear restrictions in the Atlantic Ocean and Gulf of Mexico for the PLL fishery to reduce discards and bycatch of a number of species (juvenile swordfish, BFT, billfish, sharks, sea turtles, etc.). Circle hooks are required for the entire PLL fishery since July 2004. In May 2011, we implemented a requirement that only “weak” circle hooks be used in the Gulf of Mexico PLL fishery in order to reduce the bycatch of BFT. Weak hooks are made with thinner wire (no larger than 3.65mm in diameter) than standard hooks, which allows them to bend more easily and release large BFT quickly, thus allowing them to escape. Further analysis of the effectiveness of weak hooks is being conducted. Preliminary analyses of the effectiveness of the closures and combined closures and circle hook requirement are summarized below. A brief summary of the prohibition of live bait in the Gulf of Mexico PLL fishery is available in the 2011 HMS SAFE Report.

The combined effects of the individual area closures and circle hook gear restrictions were examined by comparing the reported catch and discards from 2005-2011 to the averages for 1997-1999 throughout the entire U.S. Atlantic fishery. Previous analyses attempted to examine the effectiveness of the time/area closures only by comparing the 2001-2003 reported catch and discards to the base period (1997-1999) chosen and are included in the tables below as well for reference. The percent changes in the reported numbers of fish caught and discarded were compared to the predicted changes from the analyses in Regulatory Amendment 1 to the 1999 FMP (NMFS 2000). Overall effort, expressed as the number of hooks reported per set, declined by 28 percent during 2005-2011 from 1997-1999 (Table 3.25). Declines were noted in both the numbers of kept and discards of almost all species examined including swordfish, tunas, sharks, billfish, and sea turtles. The only positive changes from the base period were the numbers of BFT and dolphin kept. The reported number of bluefin tuna kept increased by 62.9 percent for 2005-2011 compared to 1997-1999 (Table 3.25). The number of reported discards of bluefin tuna increased by almost 30 percent between the same time periods, which is almost triple the predicted 11 percent increase from the analyses in Regulatory Amendment 1, while the number of dolphin kept increased by 2.7 percent (Table 3.26). Billfish (blue and white marlin, sailfish) discards reportedly decreased by 60-67 percent from 1997-1999 to 2005-2011 (Table 3.26). The reported discards of spearfish declined by only 1.6 percent, although the absolute number of discards was also low (less than 200 fish in most years). The reported number of turtle interactions decreased by 67.5 percent from 1997-1999 to 2005-2011.

The reported declines in swordfish kept and discarded, LCS kept, and dolphin kept decreased more than the predicted values developed for Regulatory Amendment 1. Reported discards of pelagic sharks, all billfish (with the exception of spearfish for which no predicted change was

developed in Regulatory Amendment 1), and total BAYS tunas kept also declined more than the predicted values. The number of LCS discards remained almost unchanged from 1997-1999 to 2005-2011, while the number of bluefin tuna discards and dolphin kept increased more than predicted.

The reported distribution of effort over the same time periods was also examined for changes in fishing behavior (Table 3.27). Declines in the number of hooks set were noted for almost all areas with the exception of the Sargasso (SAR) area, where reported effort has increased almost eight-fold from the 1997-1999 period. However, this effort represents only 3.5 percent of the overall effort reported in this fishery. Overall, reported effort decreased by 28 percent from 1997-1999 to 2005-2011. Reported effort declined by only 4.3 percent in the MAB area, 4.6 percent in the South Atlantic Bight (SAB), and 8.1 percent in the Florida East Coast (FEC). Reported effort declined by 45 percent or more in all other areas with the exception of the SAR and the Gulf of Mexico. As a result of the Deepwater Horizon/BP oil spill in the Gulf of Mexico and the subsequent closures, reported effort for 2010 was dramatically reduced, less than one third of the reported effort of the previous year (2009). Although reported effort declined by 61 percent in the south Atlantic area (Tuna North and Tuna South combined), recent effort has shown an increasing trend. Reported effort in 2011 increased slightly from 2010, but was still below the pre-spill effort. Although reported effort declined by 77.5 percent in the SAT area (Tuna North and Tuna South combined), this represents less than one percent of total reported effort.

Concern over the status of bluefin tuna and the effects of the PLL fishery on the species led to a re-examination of a previous analysis which compared the reported catch and discards of select species or species groups from the MAB and NEC to that reported from the rest of the fishing areas (Table 3.27). The number of BFT discards reported from the MAB/NEC has increased over the last few years while the discards from the other areas has remained relatively constant. The increase in bluefin tuna discards in the MAB/NEC does not appear to be effort-related as the reported number of hooks set has also been relatively stable (MAB) or in decline (NEC).

**Table 3.24** Total number of swordfish, bluefin tuna, yellowfin tuna, bigeye tuna, total BAYS (bigeye, albacore, yellowfin and skipjack tuna), reported landed or discarded in the U.S. Atlantic PLL fishery, 1997 – 2011, and percent change from 1997-99. Predicted values from Regulatory Amendment 1 where Pred<sup>1</sup> = without redistribution of effort, Pred<sup>2</sup> = with redistribution of effort. Source: HMS Logbook data

Year	Number of hooks set (x1000)	Swordfish kept	Swordfish discards	Bluefin tuna kept	Bluefin tuna discards	Yellowfin tuna kept	Yellowfin tuna discards	Bigeye tuna kept	Bigeye tuna discards	Total BAYS kept	Total BAYS discards
<b>1997-99</b>	8,533.1	69,131	21,519	238	877	72,342	2,489	21,308	1,133	101,477	4,224
<b>A) 2001-03</b>	7,364.1	50,838	13,240	212	607	55,166	1,827	13,524	395	76,116	3,069
<b>2004</b>	7,325.9	46,950	10,704	476	1,031	64,128	1,736	8,266	486	77,989	3,452
<b>2005</b>	5,922.6	41,239	11,158	376	766	43,833	1,316	8,383	369	57,237	2,545
<b>2006</b>	5,662.0	38,241	8,900	261	833	55,821	1,426	12,491	257	73,058	2,865
<b>2007</b>	6,290.6	45,933	11,823	357	1,345	56,062	1,452	8,913	249	70,390	3,031
<b>2008</b>	6,498.1	48,000	11,194	343	1,417	33,774	1,717	11,254	356	50,108	3,427
<b>2009</b>	6,978.9	45,378	7,484	629	1,290	40,912	1,701	10,379	397	57,461	3,555
<b>2010</b>	5,729.1	33,813	6,107	392	1,488	32,567	748	12,561	476	51,786	1,590
<b>2011</b>	5,914.5	38,012	8,510	355	764	40,993	728	16,338	453	68,401	2,830
<b>B) 2005-11</b>	6,142.3	41,517	9,311	388	1,129	43,423	1,298	11,474	365	61,206	2,835
<b>% dif (A)</b>	-13.7	-26.5	-38.5	-10.9	-30.7	-23.7	-26.6	-36.5	-65.2	-25.0	-27.3
<b>% dif (B)</b>	-28.0	-40.0	-56.7	62.9	28.7	-40.0	-47.8	-46.2	-67.8	-39.7	-32.9
<b>Pred<sup>1</sup></b>		-24.6	-41.5		-1.0					-5.2	
<b>Pred<sup>2</sup></b>		-13.0	-31.4		10.7					10.0	

**Table 3.25 Total number of pelagic sharks, LCS, dolphin (mahi mahi), and wahoo reported landed or discarded and number of billfish (blue and white marlin, sailfish, spearfish) and sea turtles reported caught and discarded in the U.S. Atlantic PLL fishery, 1997 – 2011, and percent change from 1997-99. Predicted values from Regulatory Amendment 1 where Pred <sup>1</sup> = without redistribution of effort, Pred <sup>2</sup> = with redistribution of effort. Source: HMS logbook data.**

Year	Pelagic sharks kept	Pelagic shark discards	Large coastal sharks kept	Large coastal shark discards	Dolphin kept	Dolphin discards	Wahoo kept	Wahoo discards	Blue marlin discards	White marlin discards	Sailfish discards	Spearfish discards	Sea turtles
<b>1997-99</b>	3,898	52,093	8,860	6,308	39,711	608	5,172	175	1,621	1,973	1,342	213	596
<b>A) 2001-03</b>	3,237	23,017	5,306	4,581	29,361	322	3,776	74	815	1,045	341	139	429
<b>2004</b>	3,460	25,414	2,304	5,144	39,561	295	4,674	35	713	1,060	425	172	370
<b>2005</b>	3,150	21,560	3,365	5,881	25,709	556	3,360	280	569	990	367	155	154
<b>2006</b>	2,098	24,113	1,768	5,326	25,658	1,041	3,608	100	439	557	277	142	128
<b>2007</b>	3,504	27,478	546	7,133	68,124	467	3,073	52	611	744	321	147	300
<b>2008</b>	3,500	28,786	115	6,732	43,511	404	2,571	82	686	669	505	196	476
<b>2009</b>	3,060	33,721	403	6,672	62,701	433	2,648	81	1,013	1,064	774	335	137
<b>2010</b>	3,872	45,511	434	6,726	30,454	174	749	26	504	605	312	212	94
<b>2011</b>	3,694	43,778	130	6,085	29,442	335	1,848	50	539	921	556	281	66
<b>B) 2005-11</b>	3,268	32,135	966	6,365	40,800	487	2,551	96	623	793	445	210	194
<b>% dif (A)</b>	-17.0	-55.8	-40.1	-27.4	-26.1	-47.0	-27.0	-57.8	-49.7	-47.0	-74.6	-34.6	-28.1
<b>% dif (B)</b>	-16.2	-38.3	-89.1	0.9	2.7	-19.9	-50.7	-45.2	-61.6	-59.8	-66.9	-1.6	-67.5
<b>Pred <sup>1</sup></b>	-9.5	-2.0	-32.1	-42.5	-29.3				-12.0	-6.4	-29.6		-1.9
<b>Pred <sup>2</sup></b>	4.1	8.4	-18.5	-33.3	-17.8				6.5	10.8	-14.0		7.1

**Table 3.26**      **Reported distribution of hooks set by area, 1997-2011, and percent change from 1997-99** (CAR=Caribbean, GOM=Gulf of Mexico, FEC=Florida East Coast, SAB=South Atlantic Bight, MAB=Mid-Atlantic Bight, NEC=Northeast Coastal, NED=Northeast Distant, SAR=Sargasso, NCA=North Central Atlantic, and SAT=Tuna North & Tuna South). Source: HMS logbook data

Year	CAR	GOM	FEC	SAB	MAB	NEC	NED	SAR	NCA	SAT	Total
<b>1997-99</b>	328,110	3,346,298	722,580	813,111	1,267,409	901,593	511,431	14,312	191,478	436,826	8,533,148
<b>A) 2001-03</b>	175,195	3,682,536	488,838	569,965	944,929	624,497	452,430	76,130	222,070	127,497	7,364,086
<b>2004</b>	298,129	4,118,468	264,524	672,973	856,521	462,171	455,862	128,582	20,990	47,730	7,325,950
<b>2005</b>	180,885	3,037,968	323,551	467,680	835,091	356,696	462,490	110,107	55,716	92,382	5,922,566
<b>2006</b>	73,774	2,577,231	281,239	544,647	1,085,640	406,199	339,586	135,575	64,500	153,620	5,662,011
<b>2007</b>	32,650	2,914,475	345,486	737,873	1,319,056	326,532	285,827	100,336	11,409	207,598	6,281,242
<b>2008</b>	87,190	2,368,381	642,846	846,984	1,423,136	579,244	224,635	147,969	16,148	152,763	6,489,246
<b>2009</b>	34,783	3,037,197	830,348	847,525	1,199,657	481,110	262,003	107,172	0	179,152	6,978,947
<b>2010</b>	77,710	1,005,764	1,097,929	1,002,748	1,295,242	657,892	211,465	141,713	3,096	235,553	5,729,112
<b>2011</b>	29,600	1,247,892	1,129,555	984,858	1,330,542	665,706	173,038	206,923	11,270	135,069	5,914,453
<b>B) 2005-11</b>	73,799	2,312,701	664,422	776,045	1,212,623	496,197	279,863	135,685	23,163	165,162	6,139,654
<b>% dif (A)</b>	-46.6	10.0	-32.3	-29.9	-25.4	-30.7	-11.5	431.9	16.0	-70.8	-13.7
<b>% dif (B)</b>	-77.5	-30.9	-8.1	-4.6	-4.3	-45.0	-45.3	848.1	-87.9	-62.2	-28.1

### Chapter 3 References

- Angliss, R.P. and D.P. DeMaster. 1998. Differentiating serious and non-serious injury of marine mammals taken incidental to commercial fishing operations. NOAA Tech. Mem. NMFSOPR-13: 48p.
- American Sportfishing Association 2008. Sportfishing in America.
- ASMFC. 2008. Interstate Fishery Management Plan for Atlantic Coastal Sharks. Fishery Management Report No. 46, Atlantic States Marine Fisheries Commission, Arlington, VA.
- Babcock, E.A., E.K. Pikitch, and C.G. Hudson. 2003. How much observer coverage is enough to adequately estimate bycatch? Report of the Pew Institute for Ocean Science, Rosenstiel School of Marine and Atmospheric Science, University of Miami, Miami, FL. 36 pp. On-line version: <http://www.oceana.org/uploads/BabcockPikitchGray2003FinalReport.pdf>
- Beerkircher, L.R., C.J. Brown, and D.W. Lee. 2002. SEFSC Pelagic Observer Program Data Summary for 1992-2000. NOAA Tech. Mem. NMFS-SEFSC-486. 26 pp.
- Branstetter, S. and R. Stiles. 1987. Age and growth estimates of the bull shark, *Carcharhinus leucas*, from the northern Gulf of Mexico. Environ. Biol. Fishes 20(3): 169-181.
- Brown, C.A. and S.H. Gruber. 1988. Age assessment of the lemon shark, *Negaprion brevirostris*, using tetracycline validated vertebral centra. Copeia 1988(3): 747-753.
- Casey, J.G.H.L. Pratt, Jr., and C.E. Stillwell. 1985. Age and growth of the sandbar shark (*Carcharhinus plumbeus*) from the western North Atlantic. Can. J. Fish. Aquat. Sci. 42(5):963-975.
- Cortés, E. and J. Neer. 2002. Updated catches of sharks. NOAA Fisheries, SEFSC, Panama City Lab. Document SB/02/15 of the 2002 Shark Evaluation Workshop. Panama City, FL, June 24-28, 2002. 62 p.
- Cortés, E. 2003. Updated catches of Atlantic sharks. SFD Contribution 2003-0031. NMFS, Southeast Fisheries Science Center, Panama City, Florida. 75 p.
- Cortés, E. and J.A. Neer. 2005. Updated catches of Atlantic sharks. LCS05/06-DW-16. NMFS, Southeast Fisheries Science Center, Panama City, Florida. 58 p.
- Cramer, J. and H. Adams. 2000. Large Pelagic Logbook Newsletter: 1998. NOAA Tech. Memo. NMFS-SEFSC - 433. 25 pp.
- Ditton, R.B., D.K. Anderson, J.F. Thigpen III, B.L. Bohnsack, and S.G. Sutton. 2000. 1999 Pirates Cove Big Game Tournaments: Participants' Characteristics, Participation in Fishing, Attitudes, Expenditures, and Economic Impacts. Human Dimensions of Fisheries Laboratory Report #HD-615, Texas A & M University, College Station, TX. 126 pp.

- Fairfield Walsh, C. and L. P. Garrison. 2006. Estimated bycatch of marine mammals and turtles in the U.S. Atlantic pelagic longline fleet during 2005. NOAA Tech. Memo. NMFS-SEFSC-539, 52 pp.
- Fairfield-Walsh, C. and L. P. Garrison. 2007. Estimated bycatch of marine mammals and turtles in the U.S. Atlantic pelagic longline fleet during 2006. NOAA Tech. Memo. NMFS-SEFSC-560, 54 pp.
- Garrison, L.P. 2003. Estimated bycatch of marine mammals and turtles in the U.S. Atlantic pelagic longline fleet during 2001 - 2002. National Oceanic and Atmospheric Administration Technical Memorandum. NMFS-SEFSC-515. 52 pp.
- Garrison, L.P. and P.M. Richards. 2004. Estimated bycatch of marine mammals and turtles in the U.S. Atlantic pelagic longline fleet during 2003. National Oceanic and Atmospheric Administration Technical Memorandum. NMFS-SEFSC-527. 57 pp.
- Garrison, L.P. 2005. Estimated bycatch of marine mammals and turtles in the U.S. Atlantic pelagic longline fleet during 2004. National Oceanic and Atmospheric Administration Technical Memorandum. NMFS-SEFSC-531. 52 pp.
- Garrison, L. P., L. Stokes and C. Fairfield. 2009. Estimated bycatch of marine mammals and turtles in the U.S. Atlantic pelagic longline fleet during 2008. NOAA Tech. Memo. NMFS-SEFSC-591, 63 pp.
- Garrison, L.P. and L. Stokes. 2010. Estimated bycatch of marine mammals and sea turtles in the U.S. Atlantic Pelagic Longline Fleet during 2009. NOAA Technical Memorandum, NOAA NMFS-SEFSC-607: 63p.
- Garrison and Stokes. 2012a. Estimated bycatch of marine mammals and sea turtles in the U.S. Atlantic Pelagic Longline Fleet during 2009. NOAA Technical Memorandum, NOAA NMFS-SEFSC-624: 59p.
- Garrison and Stokes. 2012b. Estimated bycatch of marine mammals and sea turtles in the U.S. Atlantic pelagic longline fleet during 2011. NOAA Technical Memorandum NMFS-SEFSC-632: 61p.
- Gulak, S.J.B., M.S. Passerotti, and J.K. Carlson. 2012. Catch and bycatch in the U.S. southeast gillnet fisheries, 2011. NOAA Technical Memorandum NMFS-SEFSC-629: 28p.
- Hale, L. F., S.J.B. Gulak, A.M. Napier, and J.K. Carlson. 2010. Characterization of the shark bottom longline fishery, 2009. NOAA Technical Memorandum NMFS-SEFSC-596, 35p.
- Hale, L. F., S.J.B. Gulak, A.M. Napier, and J.K. Carlson. 2011. Characterization of the shark bottom longline fishery, 2010. NOAA Technical Memorandum NMFS-SEFSC-611, 35p.
- Hayes, C.G., Y. Jiao, and E. Cortes. 2009. Stock assessment of scalloped hammerheads in the western North Atlantic ocean and Gulf of Mexico. North American Journal of Fisheries Management 29:1406-1417.

- Heist, E.J., J.E. Graves, and J.A. Musick. 1995. Population genetics of the sandbar shark, *Carcharhinus plumbeus*, in the Gulf of Mexico and Mid-Atlantic Bight. *Copeia* 1995(3): 555-562.
- Holland, S. M., A. J. Fedler, and J. W. Milon. 1999. The operations and economics of the charter and head boat fleets of the Eastern Gulf of Mexico and South Atlantic Coasts. Memo NOAA Fisheries - F/SPO-38.
- Kirkley, J.E. 2005. The Communities of the Atlantic Highly Migratory Species (HMS) Fishery: An Overview of Change Associated with the HMS Fishery Management Plan. Department of Coastal and Ocean Policy, School of Marine Science, Virginia Institute of Marine Science, College of William and Mary, Gloucester Point, Virginia. (NOAA-NMFS-HMS contract report).
- MRAG, Americas, Inc., and M. Jepson. 2008. Updated Profiles for HMS Dependent Fishing Communities: Social Impact Assessment Services for HMS Fishing Communities. Solicitation Number: DG133F06RQ0381, 84, pp.
- Murawski, S.A. 2005. The New England groundfish resource: a history of population change in relation to harvesting. In: Buschbaum, R., Pederson, J., and Robinson, W.E., eds. *The Decline of Fisheries Resources in New England: Evaluating the Impact of Overfishing, Contamination, and Habitat Degradation*. Cambridge (MA): MIT Sea Grant Program, MITSG 05-5, p. 11-24.
- NMFS. 1998. *Managing the Nation's Bycatch: Programs, Activities, and Recommendations for the National Marine Fisheries Service*. 174 pp.
- NMFS. 1999. *Fishery Management Plan for Atlantic Tunas, Swordfish and Sharks*. National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Office of Sustainable Fisheries, Highly Migratory Species Management Division, Silver Spring, MD. Public Document.
- NMFS. 2000. *Regulatory Amendment One to the 1999 HMS FMP. Reduction of Bycatch, Bycatch Mortality, and Incidental Catch in the Atlantic Pelagic Longline Fishery*, June 14, 2000. NOAA, NMFS, HMS Management Division.
- NMFS. 2001. *NMFS Operational Guidelines – Fishery Management Process: Appendix 2(g): Guidelines for Assessment of the Social Impact of Fishery Management Actions*. Silver Spring, MD: U.S. Department of Commerce, National Marine Fisheries Service.
- NMFS. 2002. *Regulatory Adjustment 2 to the Atlantic Tunas, Swordfish, and Sharks Fishery Management Plan*. NOAA, NMFS, Highly Migratory Species Management Division, 174 pp.
- NMFS. 2003. *Final Amendment 1 to the Fishery Management Plan for Atlantic Tunas, Swordfish, and Sharks, and Highly Migratory*. NOAA, National Marine Fisheries Service, Highly Migratory Species Management Division, Silver Spring, MD. Public Document.

- NMFS. 2004a. Evaluating Bycatch: A National Approach to Standardized Bycatch Monitoring Programs. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-F/SPO-66, 108 p.
- NMFS. 2004b. Endangered Species Act-Section 7 Re-initiation of Consultation on the Atlantic Pelagic Longline Fishery for Highly Migratory Species. Biological Opinion, June 1, 2004. 154 pp.
- NMFS. 2004c. Final Supplemental Environmental Impact Statement. Reduction of Sea Turtle Bycatch and Bycatch Mortality in the Atlantic Pelagic Longline Fishery. NOAA, National Marine Fisheries Service, HMS Management Division, Silver Spring, MD.
- NMFS. 2005a. United States National Report to ICCAT, 2005. NAT-038.
- 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. 2008a. Final Amendment 2 to the Fishery Management Plan for Atlantic Tunas, Swordfish, and Sharks, and Highly Migratory. NOAA, National Marine Fisheries Service, Highly Migratory Species Management Division, Silver Spring, MD. Public Document.
- NMFS, 2008b. Final Amendment 1 to the Consolidated Atlantic Highly Migratory Species Fishery Management Plan Essential Fish Habitat. NOAA, NMFS, Highly Migratory Species Management Division, Silver Spring, MD
- NMFS. 2008c. National Marine Fisheries Service Southeast Fisheries Science Center. 2008. Careful release protocols for sea turtle release with minimal injury. NOAA Technical Memorandum NMFS-SEFSC-580, 130 pp.
- NMFS. 2011a. Stock assessment and fishery evaluation (SAFE) report for Atlantic highly migratory species. Highly Migratory Species Management Division, 1315 East West Highway, Silver Spring, MD 20910.
- NMFS. 2011b. U.S. National Bycatch Report [W.A. Karp, L.L. Desfosse, S.G. Brooke, Editors]. U.S. Depart. Commerica, NOAA Technical Memo. NMFS-F-SPO-117C. 508p2010. Final Amendment 3 to the Consolidated Atlantic Highly Migratory Species Fishery Management Plan. NOAA< NMFS< Highly Migratory Species Management Division, Silver Spring, MD.
- NMFS. 2012. Stock assessment and fishery evaluation (SAFE) report for Atlantic highly migratory species. Highly Migratory Species Management Division, 1315 East West Highway, Silver Spring, MD 20910.
- NMFS, 2013. Fisheries Economics of the United States, 2011. U.S. Dept. Commerce, NOAA Technical Memorandum NMFS-F/SPO-118. 175pp.

- Rago, P.J., S.E. Wigley, and M.J. Fogarty. 2005. NEFSC Bycatch Estimation Methodology: Allocation, Precision, and Accuracy. NOAA, NMFS, NEFSC Ref. Doc. 05-09.
- Restrepo, V.R., G.G. Thompson, P.M. Mace, W.L. Gabriel, L.L. Low, A.D. MacCall, D. Methot, J.E. Powers, B.L. Taylor, P.R. Wade, J.F. Witzig, 1998. Technical guidance on the use of precautionary approaches to implementing National Standard 1 of the Magnuson-Stevens Fishery Conservation and Management Act. NOAA Tech Memo NMFS-S/SPO, 54 pp.
- Richards, P.M. 2007a. Estimated takes of protected species in the commercial directed shark bottom longline fishery 2003, 2004, and 2005. NMFS Southeast Fisheries Science Contribution PRD 06/07-08. 21 p.
- Richards, P.M. 2007b. Estimated takes of protected species in the commercial directed shark bottom longline fishery 2006. PRBD-07/08-05, 15 p.
- Ryder, C.E., T.A. Conant, and B.A. Schroeder. 2006. Report of the Workshop on Marine Turtle Longline Post-Interaction Mortality. USDOC, NOAA Tech. Mem. NMFS-F/OPR-29.
- SEDAR 2006. SEDAR 11 Stock Assessment Report: Large Coastal Shark Complex, Blacktip and Sandbar Shark. Highly Migratory Species Management Division, 1315 East West Highway, Silver Spring, MD 20910. 257 pp.
- SEDAR 2007. SEDAR 13 Stock Assessment Report: Small Coastal Sharks, Atlantic Sharpnose, Blacknose, Bonnethead, and Finetooth Shark. Highly Migratory Species Management Division, 1315 East West Highway, Silver Spring, MD 20910. 375 pp.
- SEDAR, 2011. SEDAR 21 Stock Assessment Reports: Sandbar, Dusky, and Blacknose Sharks. SEDAR, 4055 Faber Place Drive, Suite 201, North Charleston, SC 29405. 415p.
- SEDAR, 2012a. SEDAR 29 Stock Assessment Report: HMS Gulf of Mexico Blacknose Sharks. SEDAR, 4055 Faber Place Drive, Suite 201, North Charleston, SC 29405. 415p.
- SEDAR. 2012b. SEDAR 29 HMS GOM Blacktip Shark Post-Review Updates and Projections. SEDAR, 4055 Faber Place Drive, Suite 201, North Charleston, SC 29405. 21p.
- Shah, A., J.W., Watson, D. Foster, and S. Epperly. 2004. Experiments in the Western Atlantic Northeast Distant Waters to Evaluate Sea Turtle Mitigation Measures in the Pelagic Longline Fishery – Summary of Statistical Analysis. NOAA, NMFS, SEFSC, Pascagoula, MS. Unpublished Report.
- Sminkey, T.R. and J.A. Musick. 1995. Age and growth of the sandbar sharks, *Carcharhinus plumbeus*, before and after population depletion. Copeia 1995(4): 871-83.
- Smith, P.C., L.F. Hale, and J.K. Carlson. 2006. The Directed Shark Longline Fishery: Catch and Bycatch, 2005. NMFS Panama City Laboratory Contr. 06-04. 14 pp.
- Sutton, S.G., R.B. Ditton, J.R. Stoll, and J.W. Milon. 1999. A cross-sectional study and longitudinal perspective on the social and economic characteristics of the charter and party

- boat fishing industry of Alabama, Mississippi, Louisiana, and Texas. Report prepared for the National Marine Fisheries Service with MARFIN funding support (Grant Number NA 77FF0551.) Human Dimensions of Fisheries Research Laboratory Report #HD-612. Texas A&M University, College Station. 198p.
- Thailing, C.E., R.B. Ditton, and D.K. Anderson. 2001. The 2000 Virginia Beach Red, White and Blue Fishing Tournament: Participants' Characteristics, Attitudes, Expenditures, and Economic Impact. VIMS, College of William and Mary, Virginia Marine Resource Report No. 2001-9, BSF-01-88 (VA Sea Grant Publication Number)
- U.S. Department of the Interior, Fish and Wildlife Service, and U.S. Department of Commerce, U.S. Census Bureau. 2006. 2006 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation. FHW/-6-NAT.
- U.S. Department of the Interior, U.S. Fish and Wildlife Service, and U.S. Department of Commerce, U.S. Census Bureau. 2012. 2011 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation.
- Walsh, C.F. and L.P. Garrison. 2006. Estimated bycatch of marine mammals and turtles in the U.S. Atlantic pelagic longline fleet during 2005. National Oceanic and Atmospheric Administration Technical Memorandum. NMFS-SEFSC-539. 51 pp.
- Watson, J.W., D.G. Foster, S. Epperly, and A. Shah. 2003. Experiments in the Western Atlantic Northeast Distant Waters to Evaluate Sea Turtle Mitigation Measures in the Pelagic Longline Fishery – Summary of Statistical Analysis. National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Southeast Fisheries Science Center, Pascagoula, MS. Unpublished report.
- Watson, J.W., D.G. Foster, S. Epperly, and A. Shah. 2004. Experiments in the Western Atlantic Northeast Distant Waters to Evaluate Sea Turtle Mitigation Measures in the Pelagic Longline Fishery: Report on experiments conducted in 2001–2003. February 4, 2004. National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Southeast Fisheries Science Center, Pascagoula, MS. 123 pp.
- Wilson, D., B.J. McCay, D. Estler, M. Perez-Lugo, J. LaMargue, S. Seminski, and A. Tomczuk. 1998. Social and Cultural Impact Assessment of the Highly Migratory Species Fishery Management Plan and the Amendment to the Atlantic Billfish Fisheries Management Plan. The Ecopolicy Center for Agriculture, Environmental, and Resource Issues, New Jersey Agricultural Experiment Station, Cook College, Rutgers, the State University of New Jersey (NOAA-NMFS-HMS contract report).
- Yeung, C. 2001. Estimates of marine mammal and marine turtle bycatch by the U.S. Atlantic pelagic longline fleet in 1999 - 2000. NOAA Technical Memorandum NMFS-SEFSC-467. 43 pp.

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#### 4.0 ENVIRONMENTAL CONSEQUENCES OF ALTERNATIVES

We are considering several alternatives relating to commercial quotas and effort controls for the Atlantic shark fisheries to rebuild overfished stocks, end overfishing, and manage these fishery resources in a manner that maximizes sustainability, while minimizing, to the greatest extent possible, the social and economic impacts on affected fisheries. As previously detailed in Chapter 1, the management measures for dusky sharks considered in the DEIS for Amendment 5 to the 2006 Consolidated HMS FMP have been split out into a separate action, termed "Amendment 5b to the 2006 Consolidated HMS FMP." The current amendment, termed "Amendment 5a to the 2006 Consolidated HMS FMP," does not further consider or address dusky shark measures. Estimates of recreational mortality for hammerhead shark will continue to occur via existing surveys (LPS/MRIP), which NMFS has determined is sufficient for immediate rebuilding purposes. Recreational shark reporting measures will be addressed in Amendment 5b. The dusky shark measures were sufficiently independent of the suites of measures considered for non-dusky shark species that their consideration in a separate amendment will have no effect on the analysis of the environmental consequences of the alternative suites for non-dusky shark species. For the other shark species in the DEIS (sandbar, scalloped hammerhead, Gulf of Mexico blacktip, and blacknose sharks) the alternatives to rebuild overfished stocks and end overfishing for the Atlantic shark fisheries range from maintaining the status quo under the No Action alternative, to restructuring the species management groups by regions, to changing the LCS and SCS quotas, to modifying the recreational size limits and reporting structures, to closing all the shark fisheries.

The ecological, social, and economic impacts of each alternative are described below.

As described in Chapter 2, the alternatives considered for establishing, structuring, and distributing commercial quotas and size limitations to address the results of the stock assessments for sandbar, scalloped hammerhead, Gulf of Mexico blacktip, and blacknose sharks are:

- Alternative Suite A1 No Action. Maintain the existing species management groups and LCS and SCS quotas
- Alternative Suite A2 Establish new species management groups by regions; adjust LCS and SCS quotas; link quotas; and require non-tournament recreational reporting
- Alternative Suite A3 Establish new species management groups by regions; adjust LCS and SCS quotas; prohibit commercial retention of blacknose sharks in the Gulf of Mexico; no quota linkage; and increase the hammerhead shark minimum recreational size to 78 inches fork length
- Alternative Suite A4 Establish new species management groups by regions; adjust LCS and SCS quotas; prohibit commercial retention of blacknose sharks in the Gulf of Mexico; link quotas; and establish species-specific recreational shark quotas
- Alternative Suite A5 Close the commercial and recreational shark fisheries in the Gulf of Mexico and Atlantic Ocean

*Alternative Suite A6 Establish new species management groups by regions; adjust LCS and SCS quotas; link quotas; and increase the hammerhead shark minimum recreational size to 78 inches fork length – Preferred Alternative Suite*

## **4.1 Ecological Impacts**

### **4.1.1 Alternative Suite A1: No Action**

#### *Overall Summary*

Alternative Suite A1 (the No Action alternative) would maintain current management of the Atlantic shark fisheries. Base quotas would remain as follows:

- Gulf of Mexico non-sandbar LCS: 439.5 mt dw;
- Atlantic non-sandbar LCS: 188.3 mt dw;
- non-sandbar LCS in the research fishery: 50 mt dw;
- sandbar shark in research fishery: 116.6 mt dw;
- non-blacknose SCS: 221.6 mt dw;
- blacknose shark: 19.9 mt dw;
- blue shark: 273 mt dw;
- porbeagle shark: 1.7 mt dw; and
- pelagic sharks other than porbeagle or blue: 488 mt dw.

Under Alternative Suite A1, the No Action alternative, we would maintain the existing recreational minimum size and retention limits for all species. Currently, recreational anglers may only retain sharks that are at least 54 inches fork length. Recreational anglers are allowed to retain one authorized shark species (i.e., non-ridgeback large coastal shark, tiger shark, small coastal shark, or pelagic shark) per vessel per trip. In addition, recreational anglers are allowed one Atlantic sharpnose and one bonnethead shark with no minimum size per person per vessel per trip.

#### *Scalloped Hammerhead Sharks*

Under Alternative Suite A1, the No Action alternative, we would not implement a scalloped hammerhead rebuilding plan or address the current overfished/overfishing status of the species. Consequently, scalloped hammerhead sharks would be subject to continued overfishing, and this alternative suite would likely result in direct short and long-term significant adverse ecological impacts since scalloped hammerhead shark mortality would exceed the TAC identified in the stock assessment in the absence of new management measures. Since this alternative would not change fishing pressure, the short- and long-term impacts on essential fish habitat (EFH), predator/prey relationships, and protected resources would be neutral.

#### *Large Coastal Sharks*

Alternative Suite A1, the No Action alternative, would not change which species are managed within the non-sandbar LCS management group or the quota for non-sandbar LCS. Moving

forward with this alternative would only cause direct adverse impacts to the species otherwise being considered for removal from the LCS quota in this Amendment: scalloped hammerhead sharks and Gulf of Mexico blacktip sharks. Sharks species that remain in the LCS management group would not be affected by adoption of this alternative. Alternative Suite A1 would cause neutral direct and indirect impacts on EFH, predator/prey relationships, and protected resources in the short- and long-term because the fishery would not change

#### *Gulf of Mexico Blacktip Sharks*

Under Alternative Suite A1, the No Action alternative, we would not remove Gulf of Mexico blacktip sharks from the non-sandbar LCS management group. Based on the SEDAR 29 stock assessment, we determined that the Gulf of Mexico blacktip shark stock is not overfished and is not experiencing overfishing. The stock assessment noted that current removal rates are sustainable, and the subsequent projections, which were completed outside the SEDAR process, indicate that current removals are unlikely to lead to an overfished fish stock by 2040. This would cause direct neutral short- and long-term ecological impacts since the fishing pressure would not change and blacktip sharks would be managed in the non-sandbar LCS management group. Based on the stock assessment, this alternative would cause neutral direct and indirect impacts on EFH, predator/prey relationships, and protected resources in the short- and long-term because fishing pressure would be similar to current levels and is not anticipated to change.

#### *Blacknose Sharks*

Under Alternative Suite A1, the No Action alternative, we would maintain one overall quota for blacknose sharks of 19.9 mt dw (43,872 lb dw). This alternative would have negative ecological impacts on blacknose sharks in the Atlantic region, which have been determined to be overfished with overfishing occurring, as current blacknose mortality would not be reduced. Under this alternative, we would not reduce Atlantic blacknose mortality to the TAC of 7,300 Atlantic blacknose sharks per year recommended by the 2011 blacknose shark stock assessment. To achieve the recommended TAC, we would need to reduce overall Atlantic blacknose mortality from current levels by at least 61 percent. The average annual landings of Atlantic blacknose sharks in all the commercial fisheries from 2008-2011 were 17,088 blacknose sharks, and the average annual discards were 992 blacknose sharks over that same time period. A 61-percent reduction in Atlantic blacknose landings (6,664 blacknose sharks/year) and discards (387 blacknose sharks/year) in the shark commercial fishery would be a total of 7,051 Atlantic blacknose sharks per year ( $6,664 + 387 = 7,051$ ), which is equivalent to 37,300 lb dw (16.9 mt dw), assuming the average commercial blacknose weight across all commercial gears (i.e., bottom longline, gillnet, and shrimp trawl gear) is 5.29 lb dw ( $7,051 \text{ blacknose sharks} \times 5.29 \text{ lb dw} = 37,300 \text{ lb dw}$ ). Without achieving a 61 percent reduction in the Atlantic shark commercial fishery, blacknose sharks would not be able to rebuild within their specified rebuilding timeframe (see Chapter 1). Thus, adoption of this alternative would negatively affect blacknose sharks. The impacts on EFH, predator/prey relationships, and protected resources would be neutral under the No Action alternative.

### *Non-Blacknose Small Coastal Shark*

Under Alternative Suite A1, the No Action alternative, we would maintain the current non-blacknose SCS management group (comprised of finetooth, Atlantic sharpnose, and bonnethead sharks) and the quota of 221.6 mt dw (488,539 lb dw). We would also maintain the current regulations regarding adjustments for under- and overharvests of the quota for this management group. This alternative would have neutral ecological impacts for finetooth, Atlantic sharpnose, and bonnethead sharks, which have all been determined not to be overfished with no overfishing occurring. Since fishing would be status quo, the impacts on EFH, predator/prey relationships, and protected resources would be neutral.

### *Quota Linkages*

Since Alternative Suite A1, the No Action alternative, does not create any new species quotas or species management group quotas and would maintain the status quo, new quota linkages would not be undertaken. Under this alternative suite, the existing quota linkage between blacknose and the SCS management group would remain the only quota linkage. Failing to link quotas would have moderate adverse impacts for scalloped hammerhead sharks since the current management measures would not assist with rebuilding this stock. Alternative Suite A1 would cause neutral direct and indirect impacts on EFH, predator/prey relationships, and protected resources in the short- and long-term because the quota linkages would stay the same.

### *Recreational Measures*

Under Alternative Suite A1, the No Action alternative, we would maintain the existing recreational retention limits for all species. Currently, recreational anglers may only retain one authorized shark species (i.e., non-ridgeback large coastal shark, tiger shark, small coastal shark, or pelagic shark) per vessel per trip that is at least 54 inches fork length. This minimum size was originally based on the size of maturity for sandbar sharks. In addition, recreational anglers are also allowed one Atlantic sharpnose and one bonnethead shark with no minimum size per person per vessel per trip. Atlantic sharpnose and bonnethead sharks are not overfished or experiencing overfishing. Therefore, maintaining the current retention limits for these two species under existing conditions would be expected to have no impacts because the recreational fishing effort would remain at current levels.

However, Alternative Suite A1 would have adverse ecological impacts on scalloped hammerhead sharks because they are overfished (see Chapter 1), and this alternative would not reduce recreational fishing pressure. Blacknose sharks rarely reach the current federal minimum size; therefore, the 54 inch fork length recreational size limit creates a *de facto* retention prohibition of blacknose sharks in federal waters. Nevertheless, overfishing is continuing to occur on the Atlantic blacknose shark stock based on the recent assessment, and recreational mortality of blacknose sharks needs to be reduced to meet the rebuilding target for the established TAC. By failing to reduce mortality, this alternative would have short- and long-term minor adverse ecological impacts for blacknose sharks. Alternative Suite A1 would maintain the status quo, and recreational anglers would continue to land sharks at the current rates that are contributing to the overfishing and overfished status of scalloped hammerhead, and Atlantic blacknose sharks. Based on recent stock assessments, the no action alternative suite

would prevent the rebuilding of these stocks and have short and long-term adverse ecological impacts. However, the impacts on EFH, predator/prey relationships, and protected resources would be neutral since the recreational fishery would not change.

### *Conclusion*

When taken as a whole, Alternative Suite A1 would have direct moderate, adverse ecological impacts in the short-term since there would be no change to the Atlantic shark fisheries and overfishing of scalloped hammerhead and blacknose sharks would continue. This alternative could result in direct significant, adverse long-term ecological impacts for certain LCS and SCS, since this alternative would result in continued overfishing of scalloped hammerhead and Atlantic blacknose sharks, which would lead to further stock decline of these species, and could increase fishing pressure on the other LCS and SCS species as fishermen shift their efforts to other species to make up for the reduced catches. This alternative would have indirect neutral ecological impacts in the short-term since the fishery would not change, but may result in moderate, adverse indirect impacts over time due to the increasing decline of the scalloped hammerhead and Atlantic blacknose shark populations. Alternative Suite A1 would cause neutral direct and indirect impacts on EFH, predator/prey relationships, and protected resources in the short- and long-term because the fishery would not change. Based on this and the descriptions below, we do not prefer this alternative suite at this time.

#### **4.1.2 Alternative Suite A2**

##### *Overall Summary*

Alternative Suite A2 was the preferred suite at the draft EIS stage but is not the preferred alternative in this FEIS. Alternative Suite A2 would establish new species management groups by regions, adjust LCS and SCS quotas, link appropriate quotas, and require non-tournament recreational reporting of hammerhead sharks. We would remove all three hammerhead shark species from the non-sandbar LCS management group, form separate regional quotas for the hammerhead and LCS management groups, and create regional quotas for blacknose and non-blacknose SCS. Also, blacktip sharks would be removed from the Gulf of Mexico non-sandbar LCS management group. Since separate quotas for hammerhead sharks and Gulf of Mexico blacktip sharks would be established, thereby necessitating removal of these species from the non-sandbar LCS management group, the remaining LCS species in the LCS management group would be renamed “aggregated LCS” in both the Atlantic and Gulf of Mexico.

The new Gulf of Mexico LCS management group would consist of bull, lemon, nurse, spinner, silky, and tiger sharks. The Gulf of Mexico regional base quotas would be as follows:

- Hammerhead sharks: 25.3 mt dw;
- Blacktip sharks: 256.6 mt dw;
- Aggregated LCS: 157.5 mt dw;
- Blacknose sharks: 2.0 mt dw; and
- Non-blacknose SCS: 45.5 mt dw.

The Atlantic LCS management group would consist of blacktip, bull, lemon, nurse, spinner, silky, and tiger sharks. The Atlantic regional base quotas would be as follows:

Hammerhead sharks: 27.1 mt dw;  
Aggregated LCS: 168.9 mt dw;  
Blacknose sharks: 18.0 mt dw; and  
Non-blacknose SCS: 176.1 mt dw.

Under Alternative Suite A2, several quota linkages would be implemented to prevent exceeding the newly established quotas. Generally, two or more shark species are caught together on the same set or trip regardless of whether there is available quota. With quota linkages, once landings indicate that the quota for one of these species or management groups has been filled, both that management group and the related management group(s) would close together. This approach would ensure that species or management groups that could be caught together are closed at the same time, preventing bycatch and providing some of the conservation benefit of closures due to quotas that are filled.

#### *Scalloped Hammerhead Sharks*

Under Alternative Suite A2, we would establish an Atlantic and a Gulf of Mexico hammerhead shark quota using the methodology outlined in Chapter 2. This action would have short and long-term direct moderate beneficial ecological impacts for the following reasons. A separate hammerhead shark quota in each region would allow us to effectively monitor commercial landings of the species to keep mortality within the recommended TAC in the stock assessment and to rebuild within the parameters set by the rebuilding plan. Additionally, including all three of the large hammerhead species (scalloped, great, and smooth hammerhead sharks) under the same quota would prevent fishing in excess of the quota that could occur as a result of species identification problems. The three large hammerhead species can be difficult to differentiate, particularly when dressed with the head removed. Including all three species under one quota would be beneficial because scalloped hammerhead sharks that are mistakenly identified as one of the other large hammerhead species would improperly be reported under the aggregated LCS quota. Including all three species in one quota will, therefore, enable us to more effectively monitor commercial landings of hammerhead sharks and will provide additional ecological benefits for the species by better tracking the populations and more carefully enforcing the quota limits. Alternative Suite A2 would result in neutral direct and indirect impacts on EFH, predator/prey relationships, and protected resources in the short- and long-term because the changed hammerhead shark management group and quota should not increase fishing pressure.

#### *Large Coastal Sharks*

Alternative Suite A2 would establish new, separate regional quotas hammerhead sharks and Gulf of Mexico blacktip sharks, remove all four of these species from the non-sandbar LCS management group, and form aggregated LCS management groups in both the Atlantic and Gulf of Mexico regions. The aggregated LCS quota would be based on average annual landings from 2008 through 2011 of the species remaining in the management group. Therefore, those species comprising the regional aggregated LCS management groups would not experience short- and long-term direct, neutral ecological impacts since fishing pressure would not change, and

landings would be capped at recent levels. We do not expect any additional ecological impacts to occur as the result of these measures in this alternative suite.

#### *Gulf of Mexico Blacktip Sharks*

Based on SEDAR 29, we have determined that the Gulf of Mexico blacktip shark stock is not overfished and is not experiencing overfishing. Because the stock assessment showed that current removal rates are sustainable, under this alternative, we would establish a Gulf of Mexico blacktip shark quota equivalent to the current blacktip shark landings percentage applied to the 2013 Gulf of Mexico non-sandbar LCS quota (256.6 mt dw) as described in the Alternative Suite A2 section of Chapter 2. Therefore, neutral short- and long-term direct impacts would be expected, as overfishing is not occurring and commercial landings would be capped at current fishing levels. Based on the stock assessment, this alternative would cause neutral direct and indirect impacts on EFH, predator/prey relationships, and protected resources in the short- and long-term because fishing pressure would be similar to current levels and is not anticipated to change.

#### *Blacknose Sharks*

Alternative Suite A2 would separate blacknose sharks into two separate regions (Atlantic Ocean and Gulf of Mexico) as recommended in the SEDAR 21 stock assessment and reduce fishing mortality based on the TAC (NMFS 2011). The Atlantic blacknose shark stock is overfished with overfishing occurring, while the Gulf of Mexico stock status is unknown. Projections of the base model indicated that the Atlantic stock could rebuild by 2043 with a TAC of 7,300 blacknose sharks. For the Gulf of Mexico blacknose shark stock, we would use a TAC of 17,802 blacknose sharks, which was determined by using the average mortality of blacknose sharks since Amendment 3 was implemented in 2010 as well as commercial landings from 2011. Therefore, this alternative suite is anticipated to have short- and long-term minor, beneficial ecological impacts for blacknose sharks. Alternative Suite A2 would result in neutral direct and indirect impacts on EFH, predator/prey relationships, and protected resources in the short- and long-term because how the fishery is executed would not change.

#### *Non-Blacknose Small Coastal Sharks*

Alternative Suite A2 would separate the non-blacknose SCS quota into two separate regions (Atlantic Ocean and Gulf of Mexico) based on the percentage of regional landings since Amendment 3 to the 2006 Consolidated HMS FMP was implemented in 2010. This alternative is anticipated to have direct, neutral ecological impacts for Atlantic sharpnose, bonnethead, and finetooth sharks in the short and long-term as it would create regional quotas and restrict fishing mortality below the TAC established for SCS in SEDAR 13 (SEDAR 2007). Currently, there is one quota for non-blacknose SCS in both the Atlantic and Gulf of Mexico, and, according to landings from 2008-2011, fishing pressure for non-blacknose SCS is higher in the Atlantic region. Splitting the quota between the two regions, in concert with the ability to transfer quota between the two regions, as outlined in the Quota Linkages section, would not change the total level of commercial landings that occur. Thus, mortality from commercial landings would remain unchanged. Since fishing pressure would be similar to current levels, the impacts on EFH, predator/prey relationships, and protected resources would be neutral.

### *Quota Linkages*

Under Alternative Suite A2, the blacknose and non-blacknose quotas would continue to be linked, only now these quotas would be linked regionally. Additionally, the hammerhead and aggregated LCS quotas in the Atlantic region and the hammerhead, Gulf of Mexico blacktip, and aggregated LCS quotas in the Gulf of Mexico region would be linked. As discussed in Chapter 2, linking quotas of species that are often caught together on the same set or trip can prevent incidental catch of sharks caught in other directed shark fisheries as bycatch, possibly resulting in mortality and negating some of the conservation benefit of quota closures. For quotas that are linked, the management groups would open and close together. If, for example, the Atlantic hammerhead management group closes based on landings information, the Atlantic aggregated LCS management group would close as well, preventing additional incidental hammerhead mortality from occurring by fishermen fishing for aggregated LCS. Similarly, if the aggregated LCS management group closes, a hammerhead shark management group closure would prevent incidental aggregated LCS landings by the fishermen fishing for hammerhead sharks. In addition, we would allow inseason regional quota transfers between regions for species or management groups where the quota is split between regions for management purposes and not as a result of a stock assessment. Under this alternative, only the non-blacknose SCS quota could be transferred on an inseason basis between regions. Before making any inseason quota transfer, we would consider certain criteria and other relevant factors as described in Chapter 2. Considering these criteria and providing for inseason quota transfers would help ensure that fishermen fishing for non-blacknose SCS are not limited by the smaller regional quotas, and would give them the best opportunity to fully harvest the overall non-blacknose SCS quota, which is split regionally to prevent bycatch of blacknose sharks leading to overfishing of the blacknose shark stocks. All quota transfers would be announced in a Federal Register notice. These measures would have short- and long-term direct, minor beneficial ecological impacts because they provide additional protection against exceeding the scientifically-determined TAC for each species and management group. Since fishing pressure would be similar to current levels, the impacts on EFH, predator/prey relationships, and protected resources would be neutral.

### *Recreational Measures*

Under Alternative Suite A2, we plan to conduct outreach to the recreational community to better inform anglers of identifying shark species, including prohibited species. We are currently working on an identification guide for all of the prohibited shark species to help with this outreach. This identification guide would complement the existing guide of shark species that can be landed by focusing on the species that cannot be landed.

In addition, we would require mandatory reporting of all hammerhead sharks landed recreationally through the non-tournament reporting system. The non-tournament reporting system was established to track the trips that released (alive or dead) or retained bluefin tuna, blue marlin, white marlin, roundscale spearfish, longbill spearfish, sailfish, and swordfish. Fishermen can report online or over the phone. Recreational fishermen who land hammerhead sharks would need to submit similar information, thus, providing us with more timely and accurate estimates of recreational hammerhead landings.

This alternative would have short- and long-term minor beneficial ecological impacts on scalloped hammerhead sharks. Providing outreach material and establishing mandatory reporting for hammerhead sharks should reduce recreational catches and allow us to better and timelier estimates of recreational landings of hammerhead sharks. Overall, the reductions in recreational mortality along with the commercial management measures are expected to help rebuild the overfished stocks. The increased recreational size limit would cause neutral direct and indirect impacts on EFH, predator/prey relationships, and protected resources in the short- and long-term.

Note that in the DEIS, this alternative suite included a 96 inch FL minimum size in the recreational shark fishery to provide protection for dusky sharks. However, as noted throughout this document, including Chapter 1, dusky shark measures will not be addressed in this amendment and will instead be addressed in Amendment 5b to the 2006 Consolidated HMS FMP.

### *Conclusion*

Alternative suite A2 as a whole would have direct, minor, beneficial ecological impacts in the short- and long-term as these measures in the Atlantic shark fisheries would end overfishing and rebuild the stocks. These impacts would mostly affect scalloped hammerhead and blacknose sharks, because rebuilding plans would be implemented and the commercial landing mortality, in the case of hammerhead sharks, would be more closely monitored. The quotas under this alternative suite are very close to historical landings from 2008 to 2011, so commercial landing mortality is unlikely to change. Quota linkage would ensure that overfishing ends because rebuilding shark species would not be caught as bycatch in other shark fisheries. These management measures would have neutral indirect impacts in the short- and long-term since fishermen would not redirect fishing pressure on other species. The cumulative direct and indirect impacts on EFH, predator/prey relationships, and protected resources would be neutral for the short- and long-term because commercial quotas would be similar to current levels and fishing pressure is not expected to change. We preferred this alternative in the DEIS and proposed rule. However, after considering public comments and performing additional analyses, we no longer prefer all the measures under this alternative suite. Instead, we prefer Alternative Suite A6, which is similar to this alternative suite for many of the quotas, but with recreational measures from Alternative Suite A3 and quota linkage measures that are a combination of this alternative suite and Alternative Suite A3. Details on the rationale for changing the preferred quota linkage and recreational measures can be found in the Alternative Suite A6 sections of Chapters 2 and 4.

#### **4.1.3 Alternative Suite A3**

##### *Overall Summary*

Alternative Suite A3 would establish new species management groups by regions, adjust LCS and SCS quotas, have no quota available for commercial and recreational retention of blacknose sharks in the Gulf of Mexico, and increase the hammerhead shark minimum recreational size

from 54 inches fork length to 78 inches fork length. We would remove hammerhead sharks from the non-sandbar LCS management group to form separate a non-regional quota, while non-blacknose SCS regulations and quota would remain the same. The non-regional base quotas would be as follows:

Hammerhead sharks: 52.4 mt dw; and  
Non-blacknose SCS: 221.6 mt dw

We would create regional quotas for blacknose sharks as well as remove blacktip sharks from the Gulf of Mexico non-sandbar LCS management group. We would rename the species remaining in the non-sandbar LCS management group as the “aggregated LCS” in both the Atlantic and Gulf of Mexico regions. The new aggregated LCS in the Gulf of Mexico region would consist of bull, lemon, nurse, spinner, silky, and tiger sharks. The new regional Gulf of Mexico base quotas would be as follows:

Blacktip sharks: 380.6 mt dw;  
Aggregated LCS: 157.5 mt dw; and  
Blacknose sharks: 0.0 mt dw.

The new aggregated LCS in the Atlantic region would consist of blacktip, bull, lemon, nurse, spinner, silky, and tiger sharks. The regional Atlantic base quotas would be as follows:

Aggregated LCS: 168.9 mt dw; and  
Blacknose sharks: 18.0 mt dw.

Because of other sources of blacktip shark mortality, there would no quota available for commercial or recreational retention of blacknose sharks in the Gulf of Mexico. This alternative suite is similar to Alternative Suite A2 except we would not create regional hammerhead shark and non-blacknose SCS quotas, would not link quotas for any of the shark fisheries, and would increase the recreational minimum size limit for only hammerhead sharks.

### *Scalloped Hammerhead Sharks*

Under Alternative Suite A3, we would remove hammerhead sharks from the non-sandbar LCS quota and establish a separate hammerhead shark quota for the three species of large hammerhead sharks (scalloped, smooth, and great hammerhead sharks), similar to the action under Alternative Suite A2. In contrast to Alternative Suite A2, however, the hammerhead shark quota under Alternative Suite A3 would not be split between the Atlantic and Gulf of Mexico regions leaving one hammerhead shark quota across both regions. However, under this alternative suite, there are no quota linkages between the hammerhead shark quota and both aggregated LCS quotas. Thus, under this alternative suite, once the hammerhead shark quota is filled, hammerhead sharks could potentially be discarded dead while one or both of the LCS aggregate fisheries are open. If this practice continues over time, it is possible that overfishing could continue to occur.

This alternative suite would establish the TAC stated in Hayes et al. 2009 (79.6 mt) and would not change the overall commercial quota level compared to Alternative Suite A2. Except as

noted under quota linkages, this alternative suite would allow for rebuilding of scalloped hammerhead sharks and was calculated to apply across both the Atlantic and Gulf of Mexico regions. Since the TAC sets a maximum level of mortality across both regions, maintaining a commercial hammerhead shark quota applicable to both regions would provide for the same stock rebuilding benefits as Alternative Suite A2. Therefore, this quota under Alternative Suite A3 would likely have short- and long-term direct moderate beneficial ecological impacts for scalloped hammerhead sharks.

### *Large Coastal Sharks*

Non-sandbar LCS management measures under Alternative Suite A3 are identical to those under Alternative Suite A2. New and separate quotas for scalloped hammerhead sharks and Gulf of Mexico blacktip sharks would be established and these species would be removed from the non-sandbar LCS management group. The non-sandbar LCS management group would be renamed the aggregated LCS in both the Atlantic and Gulf of Mexico regions. Ecological impacts would also be identical: short and long-term direct ecological impacts resulting from this portion of the Alternative Suite are expected to be neutral. See the non-sandbar LCS management group section of Alternative Suite A2 in this chapter for more details on impacts.

### *Gulf of Mexico Blacktip Sharks*

Alternative Suite A3 would create a separate Gulf of Mexico blacktip shark TAC and commercial quota by increasing the TAC calculated in Alternative Suite A2 by 30 percent (Table 2.5 and Table 2.6). Under this alternative, the commercial quota would be 380.6 mt dw (839,090 lb dw). Current landings of Gulf of Mexico blacktip sharks are believed to be sustainable, according to the SEDAR 29 stock assessment, and the stock is not overfished and not experiencing overfishing. Increasing that TAC by 30 percent would result in a quota that is 48 percent greater than current landings or the Gulf of Mexico blacktip shark quota calculated in Alternative Suite 2 (256.6 mt dw; 565,700 lb dw). This quota increase would allow increased opportunities for fishermen to land blacktip sharks and could increase shark fishing effort. This increase in shark fishing effort could lead to short- and long-term, direct and indirect, minor, adverse ecological impacts. We expect that the increase in quota, and resulting increase in fishing effort, would result in increased shark and non-shark bycatch, and short- and long-term, minor, adverse impacts to protected resources. Increases in the bycatch of sharks, other fish, and protected resources would be expected if shark fishermen are not successful in only targeting blacktip sharks. Also, because there are no quota linkages in Alternative Suite A3, additional mortality could occur on sharks whose commercial quotas have been reached and fishery has closed (e.g., hammerhead, aggregated LCS). This additional bycatch mortality resulting from fishermen targeting blacktip sharks could result in overfishing on other shark stocks.

### *Blacknose Sharks*

Alternative Suite A3 would establish an Atlantic blacknose shark quota, while blacknose shark retention in the Gulf of Mexico region would be prohibited. For the Atlantic blacknose shark stock, we would use the recommended TAC from SEDAR 21 of 7,300 blacknose sharks. All of the ecological impacts for the Atlantic region are identical to those analyzed in Alternative Suite A2.

For the Gulf of Mexico region, the stock assessment model for the Gulf of Mexico stock was not accepted, and a TAC recommendation was not provided. As such, we explored alternatives on how to calculate a Gulf of Mexico blacknose shark TAC. Alternative Suite A3 would subtract the 7,300 Atlantic blacknose sharks TAC from the overall blacknose shark TAC of 19,200 blacknose sharks established in Amendment 3. This would result in a TAC of 11,900 blacknose sharks for the Gulf of Mexico ( $19,200 - 7,300 = 11,900$ ).

The average annual commercial discards of blacknose sharks from 2008-2011 were 14,951 (Table 4.1), the average annual recreational landings were 3,215, and the average research set-aside were 12 Gulf of Mexico blacknose sharks over that time period. This would result in 18,178 Gulf of Mexico blacknose sharks ( $14,951 + 3,215 + 12 = 18,178$ ) being discarded and landed by recreational fishermen and researchers. Given the TAC under Alternative Suite A3 would be 11,900 sharks, which are fewer sharks in total than the average annual commercial discards alone; therefore, there would be no quota available for commercial and recreational retention of Gulf of Mexico blacktip sharks. Rather, we would continue to work with the Gulf of Mexico Fishery Management Council to establish bycatch reduction methods, as appropriate, to reduce mortality in the shrimp trawl and reef fish fisheries in order to bring commercial discards below the TAC. In the SEDAR 21 stock assessment, the blacknose shark bycatch in the shrimp trawl fishery were estimated for 2008-2009. It is important to note that these estimates do not take into account the fact that fishing effort was reduced due to closures as a result of the Deepwater Horizon/BP oil spill. On May 11, 2010, we closed portions of the Gulf of Mexico EEZ to all fishing. Thus, a large portion of the fishing grounds for the shrimp fishery in the Gulf of Mexico were closed for at least a portion of the commercial fishing season in 2010 and 2011. Therefore, the average bycatch of blacknose sharks could be overestimated and the reduction could result in fewer discards so we would meet the TAC of 11,900 sharks. In addition, this situation is only applicable for 2010.

**Table 4.1 Sources of yearly Gulf of Mexico blacknose shark mortality, 2008-2011.**  
 Source: NMFS 2011. Commercial discard estimates from data reported from Southeast bottom longline and gillnet observer programs and bycatch shrimp landings. Longline and gillnet discards are derived from multiplying the longline landings and fishing trips by the ratio of dead discards observed in the commercial shark bottom longline fishery. NMFS used the average bycatch shrimp landings from 2008-2009 to calculate 2010 and 2011 estimates. Estimates for the 2011 recreational landings were based on the 2010 landings. Table does not include mortality from commercial landings.

<b>Gear</b>	<b>Commercial Discards</b>	<b>Recreational Landings</b>	<b>Research Set-Aside</b>	<b>Total</b>
<b>Number of fish</b>	14,951	3,215	12	18,178
<b>Percentage</b>	82%	18%	< 1%	100%

Alternative Suite A3 would have short- and long-term, moderate beneficial ecological impacts in the Gulf of Mexico region as it prohibits the retention of blacknose sharks in the commercial and recreational fisheries to assist with the rebuilding plan. Even with these reductions, we would need to consider other options to reduce the mortality of blacknose sharks to meet the TAC established under this alternative suite.

### *Non-Blacknose Small Coastal Sharks*

Under Alternative Suite A3, we would maintain the current non-blacknose SCS management group with one Atlantic/Gulf of Mexico combined region and the quota of 221.6 mt dw (488,539 lb dw). We would also maintain the current regulations regarding underharvests of the non-blacknose SCS management group. This measure would have direct and indirect neutral ecological impacts in the short- and long-term for finetooth, Atlantic sharpnose, and bonnethead sharks, since the current management measures and overall mortality would not change. The current management measures cause neutral direct and indirect impacts on EFH, predator/prey relationships, and protected resources in the short- and long-term.

### *Quota Linkages*

Under Alternative Suite A3, no quota linkages would be implemented. All shark management groups would open and close independently of each other. This could lead to direct short- and long-term moderate, adverse ecological impacts for scalloped hammerhead and blacknose sharks. Quota linkages provide some protection for species that have management group closures and prevent their capture by fishermen fishing for other management groups that remain open. For example, hammerhead sharks are often incidentally caught by fishermen fishing for other LCS. If the hammerhead management group is closed, but the aggregate LCS management group is not, hammerhead sharks could still be caught by fishermen fishing for LCS, diminishing the protections provided by the quota closure to minimize commercial hammerhead mortality. This scenario could occur in the Atlantic region between the hammerhead shark and aggregated LCS management groups and in the Gulf of Mexico region among the blacktip shark, hammerhead shark, and aggregated LCS management groups.

### *Recreational Measures*

Under Alternative Suite A3, we would increase the minimum recreational size for all hammerhead sharks (great, smooth, and scalloped) to 78 inches fork length based on data from Hazin et al. (2001). This study states that female scalloped hammerhead sharks reach maturity at 240 cm total length, or approximately 93 inches total length. Since the data in Hazin et al. (2001) is in total length, we converted the measurement to fork length since management regulations are in fork length. Based on research reports, 240 cm total length equals roughly 200 cm fork length, or 78 inches fork length. This larger recreational size limit would limit the retention of scalloped hammerhead sharks to mature individuals. Also, we would include all hammerhead species together for this alternative due to identification issues. Hammerhead sharks are difficult to identify for even for experienced fishermen. We would provide outreach material to anglers to help identify the difference between the hammerhead species.

We would not change the current minimum size limit for the other authorized shark species. Currently, recreational anglers may only retain sharks that are at least 54 inches fork length. Recreational anglers are allowed to retain one authorized shark species (i.e., LCS, SCS, or pelagic shark) per vessel per trip. In addition, recreational anglers are allowed one Atlantic sharpnose and one bonnethead shark per person per vessel per trip.

Increasing the size limit for hammerhead sharks would reduce mortality and assist the rebuilding scalloped hammerhead sharks. As such, this alternative suite would have short- and long-term, direct and indirect, minor beneficial ecological impacts on scalloped hammerhead. The status quo for this species will not help achieve the rebuilding plan target and cause neutral impacts on EFH, predator/prey relationships, or protected resources.

### *Conclusion*

When taken as a whole, Alternative Suite A3 would have direct moderate, beneficial ecological impacts in the short-term since changes to the Atlantic shark fisheries would help rebuild scalloped hammerhead and blacknose shark stocks, but long-term impacts would be minor adverse because no quota linkages could cause dead discards and overfishing to continue. The indirect ecological impacts would be neutral to EFH, predator/prey relationships, or protected resources because fishing pressure is expected to remain near current levels. Establishing a Gulf of Mexico blacktip shark TAC at a level 30 percent greater than the TAC calculated in Alternative Suite 2 could increase shark fishing effort and, as described above, might have adverse ecological impacts on other shark stocks and other species. It is also uncertain what impact the increase would have on the Gulf of Mexico shark stock because there is high degree of uncertainty associated with the projections, particularly since these projections were not peer reviewed as part of the SEDAR process. Because of this uncertainty and because this alternative suite does not have quota linkages that would prevent overfishing from occurring, we do not prefer Alternative Suite A3 at this time.

#### **4.1.4 Alternative Suite A4**

##### *Overall Summary*

Alternative Suite A4 would establish new species management groups by regions, adjust LCS and SCS quotas, have no quota available for commercial and recreational retention of blacknose sharks in the Gulf of Mexico, link appropriate quotas, and establish species-specific recreational shark quotas. We would remove scalloped hammerhead sharks from the non-sandbar LCS management group to form separate regional quotas, and create regional quotas for blacknose sharks and non-blacknose SCS. Also, blacktip sharks would be removed from the Gulf of Mexico non-sandbar LCS management group and the non-sandbar LCS management group would be renamed “aggregated LCS” in both the Atlantic and Gulf of Mexico regions.

The new aggregated LCS in the Gulf of Mexico region would consist of bull, lemon, nurse, spinner, silky, and tiger sharks. The regional Gulf of Mexico base quotas would be as follows:

- Scalloped hammerhead sharks: 25.8 mt dw;
- Aggregated LCS: 185.8 mt dw;
- Blacktip sharks: 1,992.6 mt dw;
- Blacknose: 0.0 mt dw; and
- Non-blacknose SCS: 110.8 mt dw.

The new aggregated LCS in the Atlantic region would consist of blacktip, bull, lemon, nurse, spinner, silky, and tiger sharks. The regional Atlantic base quotas would be as follows:

Scalloped hammerhead sharks: 26.6 mt dw;  
Aggregated LCS: 180.0 mt dw;  
Blacknose sharks: 18.0 mt dw; and  
Non-blacknose SCS: 110.8 mt dw.

This alternative suite would have the same quota linkages as Alternative Suite A2. Specifically, the quotas for blacknose sharks and non-blacknose SCS would be linked in both regions, the aggregated LCS and hammerhead shark quotas in the Atlantic would be linked, and the blacktip shark, aggregated LCS, and hammerhead shark quotas in the Gulf of Mexico would be linked. This alternative suite is different than Alternative Suite A2 because it would establish regional scalloped hammerhead shark quotas, establish regional aggregated LCS quotas based on the largest landings, divide the non-blacknose SCS quota in half for each region, and establish species-specific recreational shark quotas.

#### *Scalloped Hammerhead Sharks*

Alternative Suite A4 would use the scalloped hammerhead shark TAC established by Hayes et al. (2009) to create separate Atlantic and Gulf of Mexico regional quotas applicable to only scalloped hammerheads sharks, rather than all three large hammerhead sharks as described under Alternative Suite A2. A separate scalloped hammerhead shark quota in each region would allow us to effectively monitor commercial landings of the species and close the quota, as necessary, to keep mortality within the bounds set by the rebuilding plan. The ecological impacts expected under this alternative suite are slightly less beneficial to hammerhead sharks overall than those expected under Alternative Suite A2. Alternative Suite A2 would include all three of the large hammerhead sharks under one quota to account for identification problems among the hammerhead species. Alternative Suite A4, on the other hand, would only establish a scalloped hammerhead quota. Scalloped hammerhead sharks misidentified as either smooth or great hammerhead sharks might not be properly accounted for under the TAC, undermining the rebuilding plan. However, despite the small reduction in ecological benefits, on whole, this alternative suite would still be expected to have short and long-term direct moderate beneficial ecological impacts since it limits scalloped hammerhead mortality close to that necessary under the rebuilding plan.

#### *Large Coastal Sharks*

Alternative Suite A4 would establish new aggregated LCS quotas in the Atlantic and Gulf of Mexico regions using a similar methodology to that outlined in Alternative Suite A2, except that we would calculate each species' contribution to total non-sandbar LCS landings using average annual landings between 2008 and 2011. Alternative Suite A4 would instead calculate each species' contribution to total non-sandbar LCS landings using the year with the highest annual landings for the management group between 2008 and 2011 for each species. The year with the highest non-sandbar LCS landings in the Atlantic was 2008 and the highest in the Gulf of Mexico was 2011. This deviation in methodology does not substantially change the quotas; therefore, ecological impacts are unchanged from Alternative Suite A2 with short and long-term

direct ecological impacts resulting from this portion of Alternative Suite A4 expected to be neutral.

### *Gulf of Mexico Blacktip Sharks*

Alternative Suite A4 would establish a separate Gulf of Mexico blacktip shark quota of 1,992.6 mt dw based upon projections produced by SEFSC stock assessment scientists. This portion of Alternative Suite A4 would likely result in short-term direct neutral ecological impacts. The projections indicate that this level of mortality is sustainable and is unlikely to result in an overfished stock as of 2040. However, the stock assessment scientists have indicated that the projections have a high degree of uncertainty in the base model used to create the projections and because the projections were not peer reviewed through the SEDAR process (E. Cortes 2012, pers. comm.). Due to this uncertainty, there is the potential that this quota could lead to overfishing. Therefore, in the long-term, this portion of Alternative Suite A4 could lead to direct moderate adverse ecological impacts if the projections are, in fact, overly optimistic. Indirect impacts would likely be more substantial. In the short and long-term, this portion of Alternative Suite A4 would likely lead to moderate adverse ecological impacts, particularly if fishermen are unable to successfully target blacktip sharks and avoid catching or interacting with other species such as other sharks, other fish species, or protected species. A quota of 1,992.6 mt dw is more than five times the current Gulf of Mexico non-sandbar LCS quota. The substantial increase in quota would likely result in a large increase in fishing effort, some of which may come from fishermen moving from the Atlantic region to take advantage of the large quota, which would result in increased shark and non-shark bycatch, unless fishermen can target and catch only blacktip sharks. Similarly, the large increase in fishing effort would likely result in short- and long-term moderate adverse impacts to protected resources, because increased fishing effort would likely result in increased interactions with protected resources. It is likely, however, that this increased fishing effort on Gulf of Mexico blacktip sharks, and associated bycatch, would be minimized due to linkages with the scalloped hammerhead and aggregated LCS quotas. Because these quotas are linked, all three management groups would close when landings of one reached at least 80 percent of its quota. Therefore, even though there would be a large increase in Gulf of Mexico blacktip shark quota in comparison to current landings, it is likely that Gulf of Mexico effort and associated bycatch would be limited by landings of aggregated LCS and scalloped hammerhead sharks.

### *Blacknose Sharks*

Under Alternative Suite A4, we would establish the recommended TAC of 7,300 blacknose sharks in the Atlantic region. This would have the same minor, beneficial ecological impacts that were analyzed in Alternative Suite A2. We would use the average ratio of catches (51 percent in the Gulf of Mexico) and apply the appropriate proportion to the current 19,200 TAC to establish a TAC for the Gulf of Mexico stock. We would use this percentage approach to develop a TAC of 9,792 sharks ( $19,200 * 0.51 = 9,792$ ) for the Gulf of Mexico.

However, the annual average of Gulf of Mexico blacknose sharks killed each year from 2008-2011 in different fisheries (18,178 sharks) either as targeted catch or as bycatch (Table 4.1) exceeded the TAC of 9,792. The majority of the Gulf of Mexico blacknose shark mortality occurs as bycatch in the shrimp trawl fishery with additional discards in different reef fish

(snapper, grouper, and tilefish) fisheries in the Gulf of Mexico. We would continue to work with the Gulf of Mexico Fishery Management Council to establish bycatch reduction methods to reduce blacknose shark mortality in non-HMS fisheries.

To achieve the TAC of 9,792 sharks in the Gulf of Mexico region, there would be no quota available for commercial and recreational retention of blacknose sharks. We used the average 2008-2009 blacknose shark bycatch in the shrimp trawl fishery to calculate the bycatch for 2010 and 2011; however, these estimates for 2010 and 2011 do not take in affect the Deepwater Horizon/BP oil spill. We closed portions of the Gulf of Mexico EEZ to all fishing so portions of the fishing grounds for the shrimp fishery in the Gulf of Mexico were closed for parts of 2010 and 2011. Therefore, the average bycatch of blacknose sharks could be overestimated and the reduction could result in fewer discard that may reach the TAC of 9,792 sharks. In the Gulf of Mexico, Alternative Suite A4 would have short- and long-term, moderate beneficial ecological impacts on blacknose sharks as it would prohibit commercial and recreational retention.

#### *Non-Blacknose Small Coastal Sharks*

Alternative Suite A4 would split the non-blacknose SCS management group into regions and divide the quota in half for each region. The Atlantic and Gulf of Mexico non-blacknose SCS quota would each be 244,269.5 lb dw ( $488,539/2 = 244,269.5$  lb dw) (110.8 mt dw). This is different from the method used in Alternative Suite A2 where the quota was split between regions based on the percent landings from each region.

Alternative Suite A4 would have short- and long-term neutral, direct ecological impacts on finetooth, Atlantic sharpnose, and bonnethead sharks as it would likely maintain landings of these species since the overall SCS quota would be divided by region. However, because the majority of the landings of these species currently come from fishermen in the Atlantic region, this alternative could reduce landings of non-blacknose SCS in the Atlantic region if we do not allow inseason quota transfer between the regions. The average landings of non-blacknose SCS in the Atlantic region are 87.4 percent of the total non-blacknose SCS landings.

#### *Quota Linkages*

Quota linkages under Alternative Suite A4 are nearly identical to those under Alternative Suite A2 except that instead of linking the hammerhead quotas to the aggregated LCS quota in the Atlantic and Gulf of Mexico regions, the scalloped hammerhead quota would be linked to the aggregated LCS quota. This difference could have some ecological impacts for the other hammerhead shark species because more great and smooth hammerhead sharks could be retained in the larger aggregated LCS quota. Also, because the Gulf of Mexico blacktip shark quota is over seven times greater in Alternative Suite A4 than in Alternative Suite A2, effort is expected to increase on the stock. The linkage of the Gulf of Mexico quota to the scalloped hammerhead and aggregated LCS quotas is anticipated to minimize the adverse ecological impacts on sharks, other fish, and protected resources that would be associated with this increase in effort. The quota linkages under Alternative Suite A4 would be expected to have short and long-term direct moderate beneficial ecological impacts due to the effects on hammerhead sharks.

### *Recreational Measures*

Under Alternative Suite A4, we would establish species-specific or management group-specific recreational shark quotas based on Annual Catch Limits. For sharks, quotas have typically been used in the commercial fishery, not the recreational fishery, due to the difficulty in estimating recreational landings in real time. In Amendment 3 to the 2006 Consolidated HMS FMP, we established the method by which stock assessment-derived TACs, which are estimated using all mortality including recreational mortality, could be broken down into sector annual catch limits (see Section 1.2). In summary, we consider the TAC from the stock assessment to be equivalent to the annual catch limit in HMS shark fisheries. The annual catch limit is then divided into three sector annual catch limits: discards in other fisheries, recreational shark fishery landings and discards, and the commercial shark fishery. Currently, historical information for discards in other fisheries and the recreational shark fishery are deducted from the overall annual catch limit to derive the commercial shark sector annual catch limit, otherwise known as the commercial shark quota. Under Alternative Suite A4, we would establish that for species or management groups that have a stock assessment, the recreational quota would be equal to the recreational sector annual catch limit. For species or management groups that do not have a stock assessment, we would establish the recreational quota based on the average recreational harvest in recent years.

Initially, we would establish recreational quotas for all shark species and management groups. We would establish recreational quotas for Atlantic and Gulf of Mexico aggregated LCS, hammerhead sharks, Gulf of Mexico blacktip sharks, and Atlantic and Gulf of Mexico non-blacknose SCS. These recreational quotas would initially be set based on assessments for some species and the quotas would be based on the annual catch limits.

We would not change the minimum size limit for the authorized shark species. Currently, recreational anglers may only retain sharks that have a fork length of at least 54 inches. Recreational anglers are allowed to retain one authorized shark species (*i.e.*, large coastal shark, small coastal shark, or pelagic shark) per vessel per trip. In addition, recreational anglers are allowed one Atlantic sharpnose and one bonnethead shark per person per vessel per trip.

Under Alternative Suite A4, we anticipate minor, beneficial ecological impacts to all species in the short- and long-term as annual catch limits could restrict recreational mortality of all shark species. This alternative suite would have beneficial ecological impacts on sandbar sharks, which are both overfished. Although recreational anglers are prohibited from retaining sandbar sharks, fishermen sometimes land these species due to misidentification. We plan to provide outreach material to the recreational community to help identify all shark species including prohibited shark species. These identification guides would assist recreational fishermen identify the prohibited species and would complement existing identification guides that focus on the species anglers can retain.

### *Conclusion*

Considering all the ecological impacts for each species, management group, or issue as discussed above, when taken as a whole, Alternative Suite A4 would likely have direct short- and long-term minor beneficial ecological impacts. Overfishing on scalloped hammerhead and Atlantic

blacknose sharks would be addressed, setting in a place rebuilding plans for these stocks. However, only scalloped hammerhead sharks would be included under the scalloped hammerhead TAC, rather than all three large hammerhead species as in Alternative Suites A2 and A3, possibly leading to excessive scalloped hammerhead mortality due to misidentification. Additionally, the Atlantic non-blacknose SCS commercial quota would be reduced. Indirect short and long-term ecological impacts resulting from any of the Alternative Suite A4 actions would likely be neutral. Similarly, all impacts on protected resources would be neutral as well because the measures in Alternative Suite A4 would be unlikely to significantly alter effort in the Atlantic or Gulf of Mexico shark fisheries. Therefore, additional impacts to EFH, predator/prey relationships, or protected resources are unlikely. Although this alternative suite would allow for the highest Gulf of Mexico blacktip shark commercial quota, it is based on model projections, which the NMFS scientists who participated in the stock assessment felt had a high degree of uncertainty, and, because these projections were developed outside of the standard SEDAR process and were not peer reviewed, they could not conclude with certainty that such a high level of catch would not result in overfishing. Therefore, given the uncertainty in the results of the projections at this level of catch, this alternative suite could lead to long-term adverse ecological impacts due to overfishing if the projections were overly optimistic. Additionally, because this alternative suite is less likely to end overfishing on scalloped hammerhead sharks due to misidentification with other hammerhead sharks and because of the administrative difficulties in establishing and monitoring numerous species-specific recreational quotas, we do not prefer this alternative suite.

#### **4.1.5 Alternative Suite A5**

##### *Overall Summary*

Alternative Suite A5 would close all commercial and recreational shark fisheries in the Gulf of Mexico and Atlantic Ocean.

##### *Scalloped Hammerhead Sharks*

Alternative Suite A5 would close all recreational and commercial shark fisheries. The reduced mortality in shark fisheries would have short and long-term direct significant ecological beneficial impacts.

##### *Large Coastal Sharks*

Alternative Suite A5 would close all recreational and commercial shark fisheries. The reduced mortality in shark fisheries would have short and long-term direct significant ecological beneficial impacts.

##### *Gulf of Mexico Blacktip Sharks*

Alternative Suite A5 would close all recreational and commercial shark fisheries. The reduced mortality in shark fisheries would have short and long-term direct significant ecological beneficial impacts.

### *Blacknose Sharks*

Alternative Suite A5 would close the entire blacknose commercial shark fishery, prohibiting the landing of any blacknose sharks. This alternative would have positive ecological impacts for blacknose sharks as it would reduce landings and help rebuild the stock faster.

### *Non-Blacknose Small Coastal Sharks*

Alternative Suite A5 would close the entire non-blacknose SCS commercial shark fishery, prohibiting the landing of any finetooth, Atlantic sharpnose, and bonnethead sharks. This alternative would have positive ecological impacts for all SCS species as it would reduce landings of finetooth, Atlantic sharpnose, bonnethead, and blacknose sharks.

### *Quota Linkages*

Alternative Suite A5 would close all recreational and commercial shark fisheries, obviating the need for quota linkages.

### *Recreational Measures*

Alternative Suite A5 would close the entire recreational shark fishery, prohibiting the landing of any sharks by recreational fishermen. This alternative would have positive ecological impacts for all overfished sharks as it would reduce landings and help rebuild the stock faster.

### *Conclusion*

As a whole, Alternative Suite A5 would have significant beneficial ecological impacts in the short- and long-term. Overfishing on scalloped hammerhead and Atlantic blacknose sharks would be reduced, if not eliminated, and rebuilding plan targets would be achieved. By preventing the landing of any sharks, we would affect not only the species that are overfished, but all other shark species. This alternative suite would cause an increase in the number of dead discards of sharks that are caught as bycatch in other fisheries. Also, closing the recreational shark fishery would create a catch-and-release fishery and for all shark fishing tournaments. Indirect short- and long-term ecological impacts resulting from any of the Alternative Suite A5 actions would likely be significantly beneficial. These measures could eliminate effort in the Atlantic and Gulf of Mexico shark fisheries, therefore additional impacts to EFH, predator/prey relationships, or protected resources are unlikely. Since this alternative suite would curtail data collection for future stock assessments, we do not prefer this alternative suite at this time.

#### **4.1.6 Alternative Suite A6 – Preferred Alternative Suite**

##### *Overall Summary*

This alternative suite was not presented in the DEIS, but was developed as a new preferred alternative suite based on public comment and additional analyses. Alternative Suite A6 does not include any management measures that are outside the range of those presented in the DEIS and, as discussed below, all of the effects are within the range of those considered at the DEIS

stage. Rather, it incorporates measures from the other alternative suites (*i.e.*, A2 and A3) and considers public comments to provide the most effective way to address recent stock assessments for scalloped hammerhead, sandbar, blacknose, and blacktip sharks. For the most part, this alternative suite is based on Alternative Suite A2, the preferred alternative suite in the DEIS. The primary differences are in the approach to quota linkages and recreational measures. For these measures, we incorporated some of the measures we considered under Alternative Suite A3. Alternative Suite A6 adopts Alternative Suite A2's Atlantic and Gulf of Mexico blacknose shark and non-blacknose SCS quota linkages and the Atlantic and Gulf of Mexico hammerhead shark and aggregated LCS management group quota linkage. For Gulf of Mexico blacktip sharks, we incorporate the measures described in Alternative Suite A3 so that this management group would open and close independently of the hammerhead shark and aggregated LCS management groups. This would provide fishermen better opportunities to harvest the blacktip shark quota and would have minimal bycatch impacts on aggregated LCS and hammerhead sharks.

The new Gulf of Mexico LCS management group would consist of bull, lemon, nurse, spinner, silky, and tiger sharks. The Gulf of Mexico regional base quotas would be as follows:

Hammerhead sharks: 25.3 mt dw;  
Blacktip sharks: 256.6 mt dw;  
Aggregated LCS: 157.5 mt dw;  
Blacknose sharks: 2.0 mt dw; and  
Non-blacknose SCS: 45.5 mt dw.

The Atlantic LCS management group would consist of blacktip, bull, lemon, nurse, spinner, silky, and tiger sharks. The Atlantic regional base quotas would be as follows:

Hammerhead sharks: 27.1 mt dw;  
Aggregated LCS: 168.9 mt dw;  
Blacknose sharks: 18.0 mt dw; and  
Non-blacknose SCS: 176.1 mt dw.

Recreational measures would be identical to those presented under Alternative Suite A3, which includes a new 78 inches fork length minimum size for all hammerhead sharks. Additionally, outreach materials would be developed to improve hammerhead shark identification among the three species (great, scalloped, and smooth hammerhead sharks), which are often hard to differentiate.

### *Scalloped Hammerhead Sharks*

Hammerhead shark management measures under Alternative Suite A6 are identical to those under Alternative Suite A2. Hammerhead sharks (smooth, great, and scalloped hammerhead sharks) would be removed from the non-sandbar LCS management group and separate quotas would be established in the Atlantic and Gulf of Mexico. Ecological impacts would also be identical: short and long-term direct moderate beneficial ecological impacts since overfishing on scalloped hammerhead sharks would be ended. A separate hammerhead shark quota in each

region would allow us to effectively monitor commercial landings of the species to keep mortality within the recommended TAC in the stock assessment and to rebuild within the parameters set by the rebuilding plan. Additionally, including all three of the large hammerhead species under the same quota would prevent fishing in excess of the quota that could occur as a result of species identification problems. The three large hammerhead species can be difficult to differentiate, particularly when dressed with the head removed. Including all three species under one quota is beneficial because scalloped hammerhead sharks that are mistakenly identified as one of the other large hammerhead species would improperly be reported under the aggregated LCS quota. Including all three species in one quota will, therefore, enable us to more effectively monitor commercial landings of hammerhead sharks and will provide additional ecological benefits for the species by better tracking the populations and more carefully enforcing the quota limits. See the Scalloped Hammerhead Sharks section of Alternative Suite A2 in this chapter for more details on impacts.

### *Large Coastal Sharks*

LCS management measures under Alternative Suite A6 are identical to those under Alternative Suite A2. In the Atlantic region, hammerhead sharks would be removed from the non-sandbar LCS management group quota, which would be renamed the Atlantic aggregated LCS management group. In the Gulf of Mexico region, blacktip and hammerhead sharks would be removed from the non-sandbar LCS management group quota, which would be renamed the Gulf of Mexico aggregated LCS management group. The aggregated LCS quotas in each region would be based on historical landings of the species remaining in each management group. Ecological impacts would also be identical to those described in Alternative Suite A2: short- and long-term direct, neutral ecological impacts since fishing pressure would not change, and landings would be capped at recent levels. See the Non-Sandbar Large Coastal Sharks section of Alternative Suite A2 in this chapter for more details on impacts.

### *Gulf of Mexico Blacktip Sharks*

Gulf of Mexico blacktip shark management measures under Alternative Suite A6 are identical to those under Alternative Suite A2. Gulf of Mexico blacktip sharks would be removed from the non-sandbar LCS management group and a separate quota would be established in the Gulf of Mexico. Ecological impacts would also be identical: neutral short- and long-term direct impacts would be expected, as overfishing is not occurring and commercial landings would be capped at current fishing levels. See the Gulf of Mexico Blacktip Sharks section of Alternative Suite A2 in this chapter for more details on impacts.

### *Blacknose Sharks*

Blacknose shark management measures under Alternative Suite A6 are identical to those under Alternative Suite A2. Blacknose sharks would maintain a separate quota from non-blacknose SCS and the separate Atlantic and Gulf of Mexico regional quotas would be established. The Atlantic quota would be based on the TAC from the SEDAR 21 stock assessment after deducting all other sources of mortality including recreational landings and commercial dead discards. The Gulf of Mexico blacknose shark stock does not have an accepted stock assessment, so the quota would be based on historical landings. Ecological impacts would also be identical to those

described in Alternative Suite A2: short- and long-term minor, beneficial ecological impacts since the Atlantic quota is consistent with the rebuilding plan identified in the SEDAR 21 stock assessment. Gulf of Mexico landings would be capped at a level already reduced since the implementation of Amendment 3 to the 2006 Consolidated HMS FMP. See the Blacknose Sharks section of Alternative Suite A2 in this chapter for more details on impacts.

#### *Non-Blacknose Small Coastal Sharks*

Non-blacknose SCS management measures under Alternative Suite A6 are identical to those under Alternative Suite A2. The current non-blacknose SCS quota, which is applicable across all regions, would be split into separate Atlantic and Gulf of Mexico regional quotas. This split would be based on the percentage of regional landings since 2010. Splitting the quota between the two regions, in concert with the ability to transfer quota between the two regions, as outlined in the Quota Linkages section, would not change the total level of commercial landings that occur. Thus, mortality from commercial landings would remain unchanged. Ecological impacts would also be identical to those described in Alternative Suite A2: direct, minor beneficial ecological impacts for Atlantic sharpnose, bonnethead, and finetooth sharks in the short and long-term as it would create regional quotas and restrict fishing mortality below the TAC established for SCS in SEDAR 13 (SEDAR 2007). See the Non-Blacknose Small Coastal Sharks section of Alternative Suite A2 in this chapter for more details on impacts.

#### *Quota Linkages*

Under Alternative Suite A6, some quota linkages would be the same as Alternative Suite A2 and some would be a combination of the quota linkage measures in Alternative Suites A2 and A3. Atlantic and Gulf of Mexico blacknose shark and non-blacknose SCS quota linkages and the Atlantic hammerhead shark and aggregated LCS management group quota linkage would be identical to those under Alternative Suite A2. Ecological impacts would also be identical: short- and long-term direct moderate beneficial ecological impacts since the simultaneous closure of quotas for species and management groups that are caught together prevents incidental catch from pushing mortality above the TAC.

In the Gulf of Mexico region, the aggregated LCS and hammerhead shark quotas would be linked as in Alternative Suite A2, but the blacktip shark quota would not be linked and would open and close independent of the aggregated LCS and hammerhead quotas. Closing the aggregated LCS management group when the hammerhead shark quota reaches, or is expected to reach 80 percent, would prevent hammerhead sharks from being incidentally caught in the aggregated LCS fishery and the associated continued overfishing. Since the blacktip shark management group would not necessarily close when the hammerhead quota is reached, there is the potential for incidental hammerhead shark mortality in the blacktip shark fishery after the hammerhead shark quota has been closed. However, we expect the blacktip shark, aggregated LCS, and hammerhead shark Gulf of Mexico quotas to be harvested at about the same rate. The quotas for these three management groups are either based on recent landings history in this region (blacktip shark and aggregated LCS) or were calculated to be at a level slightly above recent landings (hammerhead sharks). Consequently, if fishing continues as it did in 2008-2011, these three quotas should be filled at approximately the same rate and each management group would likely close near the same time, diminishing the possibility of excessive incidental

mortality. To further provide protection for scalloped hammerhead sharks in case the blacktip shark management group stays open significantly longer than the hammerhead shark management group, we would have authority to close the blacktip shark management group before it reaches, or is expected to reach, 80 percent. After considering criteria (below), we could close the blacktip management group early to ensure that bycatch of hammerhead sharks and aggregated LCS does not result in mortality that would exceed the TAC of either management group. Because of the linked aggregated LCS and hammerhead quotas and the authority to close the blacktip shark management group early, this portion of this alternative suite's quota linkage measures would be expected to have short- and long-term direct moderate beneficial ecological impacts, similar to the other quota linkage measures considered under this alternative.

In addition, we would allow inseason regional quota transfers between regions for species or management groups where the species are the same between regions and the quota is split between regions for management purposes and not as a result of a stock assessment. At this time, only the hammerhead shark and non-blacknose SCS regional management groups meet this description; and therefore, we prefer that only the hammerhead shark and non-blacknose SCS regional quotas can be transferred on an inseason basis between regions since the separate regional quotas are not biological in nature. Before making any inseason quota transfer, we would consider the following criteria and other relevant factors:

- (A) The usefulness of information obtained from catches in the particular management group for biological sampling and monitoring of the status of the respective shark species and/or management group.
- (B) The catches of the particular species and/or management group quota to date and the likelihood of closure of that segment of the fishery if no adjustment is made.
- (C) The projected ability of the vessels fishing under the particular species and/or management group quota to harvest the additional amount of corresponding quota before the end of the fishing year.
- (D) Effects of the adjustment on the status of all shark species.
- (E) Effects of the adjustment on accomplishing the objectives of the fishery management plan.
- (F) Variations in seasonal distribution, abundance, or migration patterns of the appropriate shark species and/or management group.
- (G) Effects of catch rates in one area precluding vessels in another area from having a reasonable opportunity to harvest a portion of the quota.
- (H) Review of dealer reports, daily landing trends, and the availability of the respective shark species and/or management group on the fishing grounds.

Inseason regional quota transfers would help ensure that the hammerhead shark and non-blacknose SCS fisheries are not limited by the smaller regional quotas. If the smaller hammerhead shark or non-blacknose SCS quota in either region is predicted to be filled at a higher rate than the linked quota (aggregated LCs in the case of hammerhead sharks and blacknose sharks in the case of non-blacknose SCS), transferring some quota from the other region could help the management group with the smaller quota stay open longer, allowing for additional opportunity to harvest the larger quota. All inseason quota transfers would be

announced in a Federal Register notice. These measures would have direct, minor beneficial ecological impacts because they provide additional protection against exceeding the scientifically-determined TAC for each species and management group by reducing the possibility of excessive incidental mortality of one management group from occurring while fishing for another management group.

### *Recreational Measures*

The recreational management measures in Alternative Suite A6 are identical to those in Alternative Suite A3. The minimum size for hammerhead sharks would be increased to 78 inches fork length while the minimum size for all other authorized sharks would remain the same. Additionally, outreach materials would be developed to improve hammerhead shark identification between the three species (great, scalloped, and smooth), which are often hard to differentiate. Ecological impacts would also be identical to those described in Alternative Suite A3: short- and long-term, direct and indirect, minor beneficial ecological impacts since mortality on hammerhead sharks would be reduced. See the Recreational Measures section of Alternative Suite A3 in this chapter for more details on impacts.

### *Conclusion*

Alternative Suite A6 as a whole would have direct, moderate, beneficial ecological impacts in the short- and long-term as these measures would end overfishing, rebuild overfished shark stocks, and achieve optimum yield, consistent with the need and objectives of this amendment. Quota linkages would ensure that overfishing of blacknose sharks and Atlantic scalloped hammerhead sharks ends because rebuilding shark species would not be caught as bycatch in other shark fisheries. Although the Gulf of Mexico blacktip shark quota would not be linked to any other quota, excessive discards of scalloped hammerhead sharks would not be likely since the two quotas would likely fill at about the same rate and the geographic extent of the management groups do not greatly overlap, as described in Chapter 2. The Gulf of Mexico blacktip shark quota is larger than either the aggregated LCS or hammerhead shark quotas and would likely be filled last, diminishing the possibility of excessive incidental blacktip shark mortality from occurring while fishing for aggregated LCS or hammerhead sharks. These management measures would cause neutral indirect impacts in the short- and long-term since fishermen would not redirect fishing pressure on other species. The cumulative direct and indirect impacts on EFH, predator/prey relationships, and protected resources would be neutral for the short- and long-term because commercial quotas would be similar to current levels and fishing pressure is not expected to change. Therefore, we prefer Alternative Suite A6 at this time.

## **4.2 Social and Economic Impacts**

Chapter 6 of this document details the social and economic impacts of each measure in each alternative suite and provides an impact analysis of each alternative suite when taken as a whole. The in-depth analyses of each management measure are not repeated in this section. Rather, we have provided an overview of each alternative suite's expected social and economic impacts when each alternative suite is taken as a whole.

#### 4.2.1 **Alternative Suite A1: No Action**

Alternative Suite A1 (status quo) would not change current management of the Atlantic shark fisheries. Base quotas would be as follows: Gulf of Mexico non-sandbar LCS 439.5 mt dw; Atlantic non-sandbar LCS 188.3 mt dw; non-sandbar LCS in the research fishery 50 mt dw; sandbar shark in research fishery 116.6 mt dw; non-blacknose SCS 221.6 mt dw; blacknose shark 19.9 mt dw; blue shark 273 mt dw; porbeagle shark 1.7 mt dw; and pelagic sharks other than porbeagle or blue 488 mt dw. Also, this alternative suite would maintain the possession limit of one shark greater than 54 inches fork length per vessel per trip, and 1 Atlantic sharpnose and 1 bonnethead shark per person per trip with no minimum size requirements for recreational fishermen.

When taken as a whole, Alternative Suite A1 would likely have direct neutral social and economic impacts in the short-term because the shark fishery would continue to operate as it currently does. In the long-term, it could cause direct moderate adverse social and economic impacts because, in maintaining the status quo, we would not be making needed changes to the fishery to address overfishing and overfished stocks and the stocks would not rebuild within the rebuilding timeframes. Since Alternative Suite A1 does not address the overfished and/or overfishing determination based on recent stock assessments, we do not prefer this alternative at this time. The decline in catches would lead to a moderate reduction in sales and revenue.

Indirect short- and long-term socioeconomic impacts resulting from any of this Alternative Suite's actions would likely be neutral. The measures in this Alternative Suite would maintain the status quo with respect to shark landings and fishing effort. Consequently, dealers and supporting businesses, such as bait and tackle suppliers, would be unlikely to experience any impacts in the short term. In the long-term, as catches of overfished stocks decline, minor negative socioeconomic impacts would occur as dealers and supporting businesses would have to offset reduced revenues from shark landings.

#### 4.2.2 **Alternative Suite A2**

Alternative Suite A2 would establish new species management groups by regions, adjust LCS and SCS quotas, link appropriate quotas, and increase recreational reporting and outreach. We would remove three species of hammerhead sharks (great, scalloped, and smooth) from the non-sandbar LCS management group to form separate regional quotas, and create regional quotas for blacknose sharks and non-blacknose SCS. Also, blacktip sharks would be removed from the Gulf of Mexico non-sandbar LCS management group. Since separate quotas for hammerhead sharks and Gulf of Mexico blacktip sharks would be established, necessitating removal of these species from the non-sandbar LCS management group, the non-sandbar LCS management group would be renamed "aggregated LCS" in both the Atlantic and Gulf of Mexico regions. The new Gulf of Mexico regional base quotas would be as follows: hammerhead sharks 25.3 mt dw; blacktip sharks 256.6 mt dw; aggregated LCS 157.5 mt dw; blacknose sharks 2.0 mt dw; and non-blacknose SCS 45.5 mt dw. The new aggregated LCS management group in the Gulf of Mexico would consist of bull, lemon, nurse, spinner, silky, and tiger sharks. Gulf of Mexico hammerhead shark, Gulf of Mexico blacktip shark, and Gulf of Mexico aggregated LCS quotas would be linked as well as Gulf of Mexico blacknose and Gulf of Mexico non-blacknose SCS quotas to prevent overfishing of one species while fishing for another species or management

group. In the Atlantic region, base quotas would be as follows: hammerhead sharks 27.1 mt dw; aggregated LCS 168.9 mt dw; blacknose sharks 18.0 mt dw; and non-blacknose SCS 176.1 mt dw. The new aggregated LCS management group in the Atlantic region would consist of blacktip, bull, lemon, nurse, spinner, silky, and tiger sharks. Atlantic hammerhead and Atlantic aggregated LCS quotas would be linked as well as Atlantic blacknose and Atlantic non-blacknose SCS quotas to prevent overfishing of one species while fishing for another species or management group. In addition, this alternative would require mandatory reporting of recreational landings of hammerhead sharks, and provide identification guides for all prohibited shark species. This alternative suite differs from the preferred Alternative Suite A6 in that Alternative Suite A6 would not link the Gulf of Mexico blacktip shark quota with the Gulf of Mexico hammerhead shark and non-sandbar LCS quotas, and that Alternative Suite A2 does not include a new 78 inch fork length minimum size limit for recreational landings of hammerhead sharks.

When taken as a whole, Alternative Suite A2 would likely have direct short- and long-term minor adverse socioeconomic impacts. These impacts would mostly affect fishermen targeting hammerhead sharks and blacknose sharks since the quotas would be established or reduced. These fishermen are likely to adapt to the new regulations by fishing in other fisheries, or changing their fishing habitats. Recreational management measures would maintain current size and bag limits leading to minor long-term adverse impacts if stocks continue to be overfished; however, implementing mandatory reporting of hammerhead shark landings would provide us with better data on recreational exploitation of the fishery while putting a greater burden on recreational anglers. Neutral socioeconomic impacts are expected for fishermen targeting the aggregated LCS and non-blacknose SCS management groups since the quotas considered are based on the average landings for each species.

Quota linkages could affect the socioeconomic impacts based on the fishing rate of each linked shark quota. Under this alternative suite, management groups with linked quotas would open and close together. If fishermen fill both quotas at about the same rate, there will be little or no unutilized quota. If, however, one of the linked quotas is filled at a much faster rate than others and close management groups with linked quotas, there could be left over quota available that could have been harvested and sold by fishermen. When we compare the socioeconomic impacts of Alternative Suite A2 to the preferred Alternative Suite A6, which does not link hammerhead shark and aggregated LCS quotas to the Gulf of Mexico blacktip shark quota (see section 6.4.6), this alternative suite would cause more socioeconomic impacts overall to fishermen. For this reason and the ecological reasons stated above, we do not prefer this alternative suite at this time.

Indirect short-term minor adverse socioeconomic impacts would likely result from this alternative suite's actions. The measures in this alternative suite adjust quotas based on new scientific information and would impact shark landings. Consequently, it is possible that dealers and supporting businesses such as bait and tackle suppliers may experience minor adverse impacts in the short-term, but since they do not rely solely on the shark fishery and buy from and sell to a variety of fisheries, the impacts are expected to be neutral in the long-term. The changes to quotas would impact fishermen retaining certain shark species, but the changes are small enough that dealers and supporting businesses are unlikely to experience impacts from this alternative suite and its effects are therefore expected to be neutral.

### 4.2.3 Alternative Suite A3

Alternative Suite A3 would establish new species management groups, adjust LCS and SCS quotas, prohibit retention of commercial blacknose sharks in the Gulf of Mexico region, and increase the hammerhead shark minimum recreational size to 78 inches fork length. We would remove hammerhead sharks from the non-sandbar LCS management group to form a separate non-regional quota of 52.4 mt dw, while non-blacknose SCS quota would remain the same at 221.6 mt dw. We would create regional quotas for blacknose sharks as well as remove blacktip sharks from the Gulf of Mexico non-sandbar LCS management group. The non-sandbar LCS management group would be renamed “aggregated LCS” in both the Atlantic and Gulf of Mexico regions. The new Gulf of Mexico regional base quotas would be as follows: blacktip sharks 380.6 mt dw; and aggregated LCS 157.5 mt dw. The new aggregated LCS management group in the Gulf of Mexico region would consist of bull, lemon, nurse, spinner, silky, and tiger sharks. In the Atlantic region, base quotas would be as follows: aggregated LCS 168.9 mt dw; and blacknose sharks 18.0 mt dw. The new aggregated LCS management group in the Atlantic region would consist of blacktip, bull, lemon, nurse, spinner, silky, and tiger sharks. TAC used for Gulf of Mexico blacknose sharks in this alternative would result in a commercial quota of 0 mt dw. For the recreational fishery, this alternative suite would establish a minimum size for all hammerhead sharks (great, scalloped, and smooth) and increase outreach. This alternative suite differs from the preferred Alternative Suite A6 in that the hammerhead shark quota would not be subdivided between the Atlantic and Gulf of Mexico regions, the non-blacknose SCS quota is not subdivided between regions, and no quota linkages would be established.

When taken as a whole, Alternative Suite A3 would likely have direct short- and long-term moderate beneficial socioeconomic impacts, mainly resulting from the increase in Gulf of Mexico blacktip shark quota. Any adverse impacts would mostly affect fishermen catching hammerhead and blacknose sharks. The hammerhead shark quota would be based on the scalloped hammerhead shark TAC and could potentially reduce all hammerhead shark landings. The blacknose shark quota in the Atlantic would be reduced from its current level, while in the Gulf of Mexico there would not be enough TAC available to allow for commercial or recreational harvest of blacknose sharks due to discards in other non-HMS fisheries. Recreational management measures would affect fishermen who catch hammerhead sharks since the increased size limit would result in more hammerhead sharks having to be released. Neutral socioeconomic impacts are expected for fishermen targeting the aggregated LCS and non-blacknose SCS management groups since these management measures would maintain status quo in these management groups. In addition, the lack of quota linkages in Alternative Suite A3 would allow fishermen to fully harvest all of the quotas. While this alternative suite might have more beneficial direct socioeconomic impacts than preferred Alternative Suite A6, the ecological impacts would be adverse and would not achieve the rebuilding plan targets for these stocks.

Indirect short-term moderate beneficial socioeconomic impacts would likely result from this Alternative Suite’s actions. The measures in this Alternative Suite adjust quotas based on new scientific information and would impact shark landings. Consequently, the increase in the commercial Gulf of Mexico blacktip shark quota could result in short- and long-term beneficial economic impacts for dealers and supporting businesses such as bait and tackle suppliers. The other changes to quotas (e.g., hammerhead, blacknose) would impact fishermen retaining sharks,

but the changes are small enough that dealers and supporting businesses are unlikely to experience impacts from this alternative suite. This increase in the Gulf of Mexico blacktip quota could lead to increased revenues of \$339,467 when compared to the quota considered under preferred Alternative Suite A6, but because there is high degree of uncertainty associated with establishing this quota, and the lack of quota linkage to prevent overfishing on other shark stocks, this alternative is not preferred at this time.

#### 4.2.4 **Alternative Suite A4**

Alternative Suite A4 would establish new species management groups by regions, adjust LCS and SCS quotas, prohibit retention of commercial blacknose sharks in the Gulf of Mexico region, link appropriate quotas, and establish a species and management group-specific recreational shark quota. We would remove scalloped hammerhead sharks from the non-sandbar LCS management group to form separate regional quotas, and create regional quotas for blacknose and non-blacknose SCS. Also, blacktip sharks would be removed from the Gulf of Mexico non-sandbar LCS management group. The non-sandbar LCS management group would be renamed “aggregated LCS” in both the Atlantic and Gulf of Mexico regions. The new Gulf of Mexico regional base quotas would be as follows: scalloped hammerhead sharks 25.8 mt dw; blacktip sharks 1,992.6 mt dw; non-sandbar LCS 185.8 mt dw; and non-blacknose SCS 110.8 mt dw. The new aggregated LCS management group in the Gulf of Mexico region would consist of great and smooth hammerhead, bull, lemon, nurse, spinner, silky, and tiger sharks. In the Atlantic region, base quotas would be as follows: scalloped hammerhead sharks 26.6 mt dw; non-sandbar LCS 180 mt dw; blacknose sharks 18.0 mt dw; and non-blacknose SCS 110.8 mt dw. The new aggregated LCS management group in the Atlantic region would consist of great and smooth hammerhead, blacktip, bull, lemon, nurse, spinner, silky, and tiger sharks. We would link some quotas to prevent overfishing of one species while fishing for another species or management group. This alternative suite differs from the preferred Alternative Suite A6 because it establishes a scalloped hammerhead shark quota rather than a hammerhead shark (great, scalloped, and smooth) quota, it would calculate each species’ contribution to total non-sandbar LCS landings using the highest annual landings rather than average annual landings between 2008 and 2011, it would divide the non-blacknose shark SCS quota evenly between the Atlantic and Gulf of Mexico regions rather than apportion based on historical landings, and would establish species and management group-specific recreational shark quotas.

Alternative Suite A4 would likely have direct short and long-term minor, adverse socioeconomic impacts. These impacts would mostly affect fishermen catching blacknose sharks. The blacknose shark quota in the Atlantic region would be reduced, while there would be no TAC available for commercial and recreational harvest of blacknose sharks in the Gulf of Mexico region given the blacknose shark mortality in non-HMS fisheries in the Gulf of Mexico. Recreational management measures would affect fishermen who retain sharks because we would implement species- and management group-specific quotas for the recreational fishery. Neutral socioeconomic impacts are expected for recreational and commercial fishermen targeting scalloped hammerhead sharks, aggregated LCS, and non-blacknose SCS as detailed in those sections of this alternative suite. While this alternative suite might have minor adverse socioeconomic impacts, there is the potential for more adverse socioeconomic impacts if quotas are exceeded in the future. Although this alternative suite would allow for the highest Gulf of

Mexico blacktip shark commercial quota, the quota is based on base model projections that the NMFS scientists who participated in the stock assessment felt had a high degree of uncertainty, and, because these projections were developed outside of the standard SEDAR process and were not peer reviewed, they could not conclude with certainty that such a high level of catch would not result in overfishing. In addition to the uncertainty in the model, the blacktip shark quota considered under this alternative suite could lead to increased bycatch of other species due to increased fishing effort. For all these reasons and because of the potential for additional adverse socioeconomic impacts if quotas are exceeded, this alternative suite is not preferred at this time.

Indirect short-term minor, adverse socioeconomic impacts would likely result from Alternative Suite A4 actions. The measures in this alternative suite adjust quotas based on new scientific information and would impact shark landings. Consequently, dealers and supporting businesses such as bait and tackle suppliers may experience minor adverse impacts in the short-term, but since they do not rely solely on the shark fishery and buy from and sell to a variety of fisheries, the impacts are expected to be neutral in the long-term. The changes to quotas would impact fishermen retaining sharks, but the changes are small enough that dealers and supporting businesses are unlikely to experience impacts from this alternative suite.

#### **4.2.5 Alternative Suite A5**

Alternative Suite A5 would close all commercial and recreational shark fisheries. This alternative suite differs from all the other alternatives, including the preferred Alternative Suite A6, because while the other alternatives provide some fishing opportunities for commercial and recreational fishermen, this alternative suite would not.

This alternative suite would have the largest social and economic impacts of any of the alternative suites considered, and would likely have direct short- and long-term significant adverse socioeconomic impacts because all recreational and commercial shark fishing would be prohibited. Because other alternatives would meet the objectives of this Amendment with less significant adverse socioeconomic impacts, we do not prefer this alternative suite at this time.

Indirect short- and long-term socioeconomic impacts resulting from this Alternative Suite's actions would likely be moderately adverse. The measures in this Alternative Suite would shut down the commercial and recreational shark fisheries, and dealers and supporting businesses such as bait and tackle suppliers would be likely be adversely impacted due to decreased shark catches and sales.

#### **4.2.6 Alternative Suite A6 – Preferred Alternative Suite**

As described in Chapter 2, this alternative suite was not presented in the draft Amendment, but was developed as a new preferred alternative suite based on public comment and additional analyses. This alternative suite is a new alternative composed of TAC and quota measures from Alternative Suite A2, a combination of quota linkage measures from Alternative Suites A2 and A3, and recreational measures from Alternative Suite A3. Alternative Suite A6 would establish new species management groups by regions, adjust LCS and SCS quotas, link appropriate quotas, and increase the hammerhead shark minimum recreational size to 78 inches fork length. We would remove three species of hammerhead sharks from the non-sandbar LCS management

group to form separate regional quotas, and create regional quotas for blacknose sharks and non-blacknose SCS. Also, blacktip sharks would be removed from the Gulf of Mexico non-sandbar LCS management group. Because separate quotas for hammerhead sharks and Gulf of Mexico blacktip sharks would be established, necessitating removal of these species from the non-sandbar LCS management group, the non-sandbar LCS management group would be renamed “aggregated LCS” in both the Atlantic and Gulf of Mexico regions. The new Gulf of Mexico base quotas would be as follows: hammerhead sharks 25.3 mt dw; blacktip sharks 256.6 mt dw; aggregated LCS 157.5 mt dw; blacknose sharks 2.0 mt dw; and non-blacknose SCS 45.5 mt dw. The new aggregated LCS management group in the Gulf of Mexico region would consist of bull, lemon, nurse, spinner, silky, and tiger sharks. In the Atlantic region, base quotas would be as follows: hammerhead sharks 27.1 mt dw; aggregated LCS 168.9 mt dw; blacknose sharks 18.0 mt dw; and non-blacknose SCS 176.1 mt dw. The new aggregated LCS management group in the Atlantic region would consist of blacktip, bull, lemon, nurse, spinner, silky, and tiger sharks. We would link selected quotas to prevent overfishing of one species while fishing for another species or management group. In addition, the recreational minimum size limit for hammerhead shark species (great, scalloped, and smooth) would be increased to 78 inches fork length.

When taken as a whole, Alternative Suite A6 would likely have direct short- and long-term minor adverse socioeconomic impacts. These impacts would mostly affect fishermen targeting scalloped hammerhead and blacknose sharks, because the quotas would be reduced. These fishermen are likely to adapt to the new regulations by fishing in other fisheries, or changing their fishing habitats. Recreational management measures would increase the size limit on hammerhead sharks and cause fishermen to catch and release more hammerhead sharks, although tournament participants should not be impacted. Neutral socioeconomic impacts are expected for fishermen targeting the aggregated LCS and non-blacknose SCS management groups since the quotas are based on the average landings for each species.

Quota linkages could affect the socioeconomic impacts based on the fishing rate of each linked shark quota. For example, this alternative suite would link regional hammerhead shark and aggregated LCS quotas so that the two management groups will open and close together. If fishermen fill both quotas at about the same rate, there will be little or no unutilized quota. If, however, one or the other is filled at a much faster rate than the other and both management groups close, there could be left over quota available that could have been harvested and sold by fishermen. We would not link the Gulf of Mexico blacktip shark quota to the Gulf of Mexico hammerhead shark and aggregated LCS quotas, which would allow increased opportunities for fishermen than quota linkage scenarios in other alternative suites (i.e., A2 and A4). When we compare the socioeconomic impacts of Alternative Suite A6 to the other alternative suites, this alternative suite would cause fewer socioeconomic impacts overall to fishermen. For this reason and the ecological reasons described in other chapters, we prefer this alternative suite at this time.

Indirect short-term minor adverse socioeconomic impacts would likely result from this alternative suite’s actions. The measures in this alternative suite adjust quotas based on new scientific information and would impact shark landings. Consequently, it is possible that dealers and supporting businesses such as bait and tackle suppliers may experience minor adverse impacts in the short-term, but since they do not rely solely on the shark fishery and buy from and sell to a variety of fisheries, the impacts are expected to neutral in the long-term. The changes to

quotas would impact fishermen retaining certain shark species, but the changes are small enough that dealers and supporting businesses are unlikely to experience impacts from this alternative suite and its effects are therefore expected to be neutral.

### **4.3 Impacts on Essential Fish Habitat**

Pursuant to 16 U.S.C. 1855(b)(1), and as implemented by 50 C.F.R. § 800. 815, the Magnuson-Stevens Act requires NMFS to identify and describe EFH for each life stage of managed species and to evaluate the potential adverse effects of fishing activities on EFH including the cumulative effects of multiple fisheries activities. If we determine that fishing gears are having an adverse effect on HMS EFH, or other species' EFH, then we must include management measures that minimize adverse effects to the extent practicable. Ecological impacts to EFH due to actions in this amendment would likely be neutral and have no adverse effects as the preferred alternatives would establish regional hammerhead, blacknose, and non-blacknose SCS quotas, and the new quotas would cause minor changes to the current landings and fishing effort. There would be no adverse effects due to the changed aggregated LCS quota since it would maintain status quo fishing effort on the species remaining in the management group. The Gulf of Mexico blacktip quota would not affect EFH. In the 2006 Consolidated HMS FMP and Amendment 1 to the 2006 Consolidated HMS FMP, we reviewed the various gear types with the potential to affect EFH and, based on the best information available at that time, we determined that fishing for sharks is not likely to adversely affect EFH. Gears commonly used in the Atlantic shark fisheries or impacted by this action include bottom longline, pelagic longline, gillnet, and rod and reel gear. Amendment 1 to the 2006 Consolidated HMS FMP analyzed EFH impacts resulting from these gear types. Amendment 1 found that bottom longline and gillnet interact with the sea floor in areas deemed EFH by the regional councils or NMFS, but that the majority of directed shark fishing with these gears occurs over areas with mud or sand bottoms; thus, impacts to EFH are minimal. Some sensitive bottom habitats, including coral, exist in the Caribbean and are closed to bottom longline fishing. We backstopped these Caribbean Fishery Management Council bottom longline closures to include shark fishing. Amendment 1 also found that pelagic longline and rod and reel gear do not typically interact with the sea floor; therefore, these gear types are unlikely to impact EFH. There is no new information on the effects shark fishing gear would have on EFH. Certain fishing gears can have negative effects on essential fish habitat and the measures in this amendment are not expected to change the fishing gears authorized relative to the status quo. Thus, there is no evidence to suggest that implementing any of the preferred alternatives in this amendment would adversely affect EFH.

### **4.4 Impacts on Protected Resources**

Since publication of the DEIS, NOAA Fisheries, in response to a petition submitted by the WildEarth Guardians and Friends of Animals, has published a proposal to list four populations of scalloped hammerhead sharks under the ESA, two as threatened and two as endangered. The announcement also includes a final negative finding for two other populations, one that spans the U.S. northwest Atlantic to the Gulf of Mexico and another in the Central Pacific (spanning the Hawaiian archipelago). Since the population in the geographical range of this amendment, the U.S. northwest Atlantic to the Gulf of Mexico, received a negative finding, scalloped hammerhead sharks ESA listing is unlikely to impact this action.

#### **4.4.1 Alternative Suite A1**

Alternative Suite A1, the no action alternative, would retain the status quo in the Atlantic and Gulf of Mexico shark fisheries in terms of quotas for non-sandbar LCS, non-blacknose SCS, and blacknose sharks. We would also not change recreational fishery regulations. Therefore, the direct and indirect impacts on protected resources would be neutral in the short- and long-term, as there would be no increase or decrease in fishing effort, and, therefore, no changes in bycatch or bycatch rates of protected resources are expected.

#### **4.4.2 Alternative Suite A2**

Under Alternative Suite A2, we would create regional quotas for hammerhead, blacknose, and non-blacknose SCS, remove species from the new aggregated LCS management group, establish a Gulf of Mexico blacktip shark quota, and improve recreational outreach. This alternative suite would reduce fishing effort, prevent overfishing, and rebuild overfished shark stocks. As such, Alternative Suite A2 would have neutral direct and indirect ecological impacts on protected resources, since we would be reducing fishing effort, but it is not likely to significantly alter effort in the Atlantic and Gulf of Mexico shark fisheries. Thus, bycatch and bycatch rates of protected resources would not change.

#### **4.4.3 Alternative Suite A3**

Alternative Suite A3 would address overfishing of scalloped hammerhead and Atlantic blacknose sharks. This alternative suite would use average landings to calculate the regional aggregated LCS quotas, which could restrict fishing opportunities, but a large number of sharks could be available to harvest in the Gulf of Mexico region with the addition of a blacktip shark quota. One concern with Alternative Suite A3 is that there would be no quota linkage. The absence of quota linkages may lead to bycatch of certain shark species after their quota is already closed and could lead to an increase in dead discards, which could allow overfishing to continue. This alternative suite would cause a neutral direct and indirect impact on protected resources since catches and catch rates of protected resources would not change.

#### **4.4.4 Alternative Suite A4**

Alternative Suite A4 would implement regional scalloped hammerhead shark quotas, regional aggregated LCS quotas based on the largest landings, dividing the non-blacknose SCS quota in half for each region, and establish species-specific recreational shark quotas. These alternative suites would have neutral direct and indirect impacts on protected resources since we would potentially reduce fishing effort in shark fisheries that interact with protected resources; however, these reductions in fishing effort would be minimal so beneficial impacts to protected resources are not expected.

#### **4.4.5 Alternative Suite A5**

Alternative Suite A5 would close all shark fisheries. Most of the fishermen that currently fish in the shark fishery would switch to other fisheries, while others may stop fishing altogether. There

would likely be direct beneficial impacts since the interaction rates between protected resources and the shark fisheries would decline. Closing all shark fisheries would have significant direct impacts on protected resources as there would no longer be any interactions with protected resources in shark fisheries.

#### **4.4.6 Alternative Suite A6 – Preferred Alternative**

Under Alternative Suite A6, the preferred alternative suite, we would create regional quotas for hammerhead, blacknose, and non-blacknose SCS, remove species from the new aggregated LCS management group, establish a Gulf of Mexico blacktip shark quota, and increase the recreational minimum size for all hammerhead shark species. This alternative suite would prevent overfishing and rebuild overfished shark stocks. The quotas under this alternative suite are near recent landings, and so total effort is unlikely to be greatly impacted. As such, Alternative Suite A6 would have neutral direct and indirect ecological impacts on protected resources, since effort in the Atlantic and Gulf of Mexico shark fisheries would not be significantly altered. Thus, bycatch and bycatch rates of protected resources would not change.

### **4.5 Environmental Justice**

Executive Order 12898 requires agencies to identify and address disproportionately high and adverse environmental effects of its regulations on minority and low-income populations. To determine whether environmental justice concerns exist, the demographics of the affected area should be examined to ascertain whether minority populations and low-income populations are present. If so, a determination must be made as to whether implementation of the alternatives may cause disproportionately high and adverse human health or environmental effects on these populations.

The community profile information found in the 2011 SAFE Report includes updated community profiles and new social impacts assessments for HMS fishing communities along the Atlantic and Gulf of Mexico coasts (NMFS 2011). Tables that were not updated in the 2011 SAFE Report were updated in the 2012 SAFE Report (NMFS 2012). The communities of Dulac, Louisiana and Fort Pierce, Florida have significant populations of Native Americans and African-Americans, respectively. Data from the 2010 Census indicates that Native Americans made up 42 percent of the Dulac population, and that African-Americans made up approximately 41 percent of the population in Fort Pierce. These two communities also have significant populations of low-income residents according to the 2010 Census. About 37 percent of the Dulac population was living below poverty level and about 31 percent of the entire Fort Pierce population was living below the poverty line. In addition to Dulac and Fort Pierce, there is a dispersed low-income, minority Vietnamese-American population in Louisiana that actively participates in the pelagic longline fishery, and commutes to fishing ports, but does not live in “fishing communities” as defined by the Magnuson-Stevens Act and identified in Chapter 9 of this document. Each of the management alternatives in this chapter includes an assessment of the potential social and economic impacts associated with the alternatives. The preferred alternative suite was selected to minimize economic impacts and provide for the sustained participation of fishing communities, while taking the necessary actions to rebuild overfished fisheries as required by the Magnuson-Stevens Act. Information about potential social impacts of each preferred alternative is described below. Demographic data indicate that coastal counties

with fishing communities are variable in terms of social indicators like income, employment, and race and ethnic composition.

Considering all the above socioeconomic impacts discussions for each species, management group, or issue, when taken as a whole, preferred Alternative Suite A6 would likely have minor adverse socioeconomic impacts. These impacts would mostly affect fishermen targeting scalloped hammerhead and blacknose sharks since the quotas would be reduced slightly from current fishing levels. We do not anticipate that these effects would fall disproportionately on minority or low-income populations in the affected communities discussed above. Alternative Suite A6 was designed to reduce quotas necessary to rebuild and end overfishing of scalloped hammerhead and blacknose sharks. We believe this alternative would provide an appropriate balance between positive ecological impacts that must be achieved in order to rebuild and end overfishing on overfished stocks, while minimizing the severity of negative economic impacts that would occur as a result of these measures.

#### **4.6 Coastal Zone Management Act**

The Coastal Zone Management Act (CZMA) requires that federal agency activities that have reasonably foreseeable coastal effects be consistent to the maximum extent practicable with the enforceable policies of affected federally-approved state coastal management programs (CMPs). Alternative Suite A6 is a new alternative that largely represents a hybrid of measures previously proposed in the DEIS under Alternative Suites A2 and A3, as well as minor adjustments resulting from the application of final 2011 data. We have determined that the preferred Alternative Suite A6 would be implemented in a manner consistent to the maximum extent practicable with the enforceable policies of the coastal states in the Atlantic, Gulf of Mexico, and Caribbean that have federally approved CMPs. In December 2012, we provided all coastal states along the eastern seaboard and the Gulf of Mexico (21 states), including Puerto Rico and the U.S. Virgin Islands, with a copy of the proposed rule and DEIS for Amendment 5 to the 2006 Consolidated HMS FMP. Under 15 C.F.R. § 930.41, states and/or U.S. territories have 60 days to respond after the receipt of the consistency determination and supporting materials. States can request an extension of up to 15 days. If a response is not received within those time limits, NMFS can presume concurrence (15 C.F.R. § 930.41(a)). Nine states replied within the response time period that the proposed regulations were consistent with the enforceable policies of their CMPs (Alabama, Delaware, Florida, Louisiana, Mississippi, New Hampshire, New Jersey, Rhode Island, and South Carolina). Another nine states (Connecticut, Maine, Maryland, Massachusetts, New York, South Carolina, Texas, U.S. Virgin Islands, and Puerto Rico) did not respond within the response time period, nor did they request an extension in the comment period; therefore, we presume their concurrence. The State of Georgia replied that they concur with our consistency determination with the condition that changes are made to the rule or incorporate other state agency comments. The State of North Carolina concurred with our consistency determination but also stated that the proposed action would have negative impacts on North Carolina fishermen and we should incorporate the North Carolina Division of Marine Fisheries' (NCDMF's) suggestions and concerns to the greatest extent practicable. The Commonwealth of Virginia indicated that Alternative Suites A2, A3, and A4 were consistent with its CMP, noted that Alternative Suites A2 and A3 would severely restrict recreational fishermen access to other species of LCS, and that Alternative Suite A3 would have the greatest potential to allow Virginia commercial and recreational fishermen access to a portion of the

annual quota of the managed shark management groups while still adequately protecting those species of shark identified as overfished.

### *State of Georgia*

The State of Georgia, in its February 12, 2013, CZMA consistency letter to NMFS, stated that “portions of the preferred Alternative Suite A2 would place undue burdens on Georgia’s recreational shark fishery when there are other alternatives that would meet NMFS’s objectives and reduce coastal use impacts.” The State of Georgia also noted that rather than linking quotas, “bycatch and post-release mortality should be considered when catch levels are determined” and that “whenever possible single species management should be considered until appropriate multispecies assessments can be developed.” The State of Georgia concurred with NMFS’ consistency determination on the proposed rule with the condition that the following changes be made to the rule. Georgia would prefer Alternative Suite A3 for TAC and commercial quota measures since no quota linkage would fulfill the intended goal of this amendment and reduce impacts to Georgia’s fishermen. The State of Georgia also stated that it did not support the increase to the shark minimum recreational size limit to 96 inches fork length. This increased size would eliminate recreational shark fishing in Georgia. Georgia suggests NMFS prohibit the take of all ridgeback sharks and implement a fine for landings of any prohibited species. In the Alternative Suite A2, the State of Georgia would like NMFS to postpone mandatory reporting of hammerhead sharks until a process has been fully developed, and postpone education and outreach for prohibited shark identification unless Federal funds are used to support this program.

While we acknowledge the potential impacts to Georgia fishermen, under the Magnuson-Stevens Act’s (16 U.S.C. § 1801 et seq.) National Standards, NMFS is required under the statute to, among other things, implement conservation and management measures to prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery; base actions upon the best scientific information available; manage stocks throughout their range to the extent practicable; minimize adverse economic impacts on fishing communities to the extent practicable; and minimize bycatch and bycatch mortality to the extent practicable (16 U.S.C. § 1851(a)(1), (2), (3), (8), and (9)). In the preparation of this document, we performed an extensive analysis on quota linkages for shark species that are caught together to determine which quotas would likely trigger management group closures. This analysis concluded that the aggregated LCS quota would likely be reached before the hammerhead shark quota in the Atlantic region based on species landings per trip from the logbook data. Opening and closing these two management groups concurrently would strengthen the conservation benefits of either group’s quota closure. Furthermore, SCS fishermen have been able to avoid blacknose sharks to fully retain the non-blacknose SCS quota since Amendment 3 to the 2006 Consolidated HMS FMP in 2008. Regarding bycatch and post-release mortality, we already account for fishing mortality of sharks across multiple fisheries in the TACs and commercial quotes estimates for sharks.

During the comment period for Amendment 5 to the 2006 Consolidated HMS FMP, we received numerous comments on the proposed dusky shark measures, some requesting consideration of approaches to dusky shark fishery management that were significantly different from those we analyzed in the proposed rule and DEIS. After reviewing all of the comments received, we are

not proceeding at this time with the dusky shark measures as proposed and will address the dusky shark overfishing and rebuilding plan in an upcoming proposed separate action. Therefore, we will not be implementing the 96 inch fork length minimum size since it was designed for dusky shark rebuilding. In the FEIS, the preferred Alternative Suite A6 would assist with the rebuilding plan for scalloped hammerhead sharks, which would increase the minimum size limit of all recreationally landed hammerhead sharks to 78 inches fork length. In addition, we would increase outreach to the recreational community regarding the identification of prohibited shark species in recreational fisheries. This outreach could be in the form of updated shark identification placards for authorized and prohibited species, and outreach to state agencies and fishing tournaments on the current recreational shark regulations.

The minor adverse economic and social impacts resulting from the quota linkage and recreational measures do not outweigh the ecological benefits for these shark species. Therefore, NMFS would implement these quota linkage and recreational measures in the shark fishery. Since the recent stock assessments were determined to be the best scientific data available, this finding is consistent with National Standard 2, which requires that management measures be based on the best scientific information available. Based on the information in this amendment and combined with the Magnuson-Stevens Act legal requirements noted in this paragraph, under the CZMA and NOAA regulations, NMFS is consistent to the maximum extent practicable with Georgia's CMP enforceable policies.

#### *State of North Carolina*

The State of North Carolina, in its January 17, 2013, CZMA consistency letter to NMFS, stated that the proposed actions are consistent, to the maximum extent practicable, with the relevant enforceable policies of North Carolina's CMP. Though the State of North Carolina concurred with the proposed action, they encouraged us to incorporate the suggestions and concerns of the NCDMF to the greatest extent possible. During the comment period for the DEIS, we received comments from the NCDMF. NCDMF did not support quota linkage for the LCS and SCS fisheries since having one species as a trigger for closure can result in reduced fishing opportunity and have significant economic consequences. In Alternative Suite A6, we linked the quotas of shark species and management groups that are caught together to prevent incidental catch mortality from exceeding the TAC. The aggregated LCS and hammerhead shark quotas and the blacknose and non-blacknose SCS quotas would be linked in each region. The Gulf of Mexico blacktip shark quota would not be linked and would open and close independent of the aggregated LCS and hammerhead management groups. In addition, NMFS would allow inseason quota transfers between regions for hammerhead shark and non-blacknose SCS management groups. NCDMF was also concerned that the increase in the minimum size would almost eliminate all recreational shark harvest, but recommended a slot limit for recreational harvested shark species. Alternative Suite A6 would only increase the recreational size limit for all landed hammerhead sharks and would provide additional protection for scalloped hammerhead shark stock, which is overfished and is experiencing overfishing. As described above, all of the dusky shark measures will be addressed in a separate rulemaking. Therefore, we find the preferred Alternative Suite A6 to be consistent to the maximum extent practicable with the enforceable policies of the State of North Carolina's CMP.

## *Commonwealth of Virginia*

The Commonwealth of Virginia, in its January 17, 2013, CZMA consistency letter to NMFS, stated that, while the Alternative Suites A2 and A3 have measures severely restricting recreational fishermen access to other species of LCS, these alternative suites are consistent with the fisheries management enforceable policy of the Virginia CMP. The State of Virginia finds that Alternative Suite A3 would have the greatest potential to allow Virginia commercial and recreational fishermen access to a portion of the annual quota of the managed shark management groups, while still adequately protecting those species of shark identified as being over fished. Additionally, they support additional outreach to all fishermen to improve the identification of sharks. Based on public comment, we have changed the preferred alternative suite. In the FEIS, preferred Alternative Suite A6 would be a combination of management measures from Alternative Suites A2 and A3. The State of Virginia's CZMA consistency letter noted that Alternative Suite A2 and A3 would be consistent with the state's CMP. Therefore, we consider the actions in the FEIS to be consistent with the State of Virginia's CMP enforceable policies, to the maximum extent practicable.

### **4.7 Cumulative Impacts**

Cumulative impacts are the impacts on the environment, which result from the incremental impacts of the action when added to other past, present, and reasonably foreseeable future actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 C.F.R. § 1508.7). A cumulative impact includes the total effect on a natural resource, ecosystem, or human community due to past, present, and reasonably foreseeable future activities or actions of federal, non-federal, public, and private entities. Cumulative impacts may also include the effects of natural processes and events, depending on the specific resource in question. Cumulative impacts include the total of all impacts to a particular resource that have occurred, are occurring, and would likely occur as a result of any action or influence, including the direct and reasonably foreseeable indirect impacts of a federal activity. The goal of this section is to describe the cumulative ecological, economic and social impacts of past, present and reasonably foreseeable future actions with regard to the management measures presented in this document. Table 4.42 provides a qualitative comparison of the impacts associated with the various alternative suites considered in this document. This table summarizes the impacts that were discussed in detail in Sections 4.1 and 4.2.

**Table 4.2 Comparison of the impacts of analyzed alternatives.**

**Symbol Key:**

○ Neutral Impacts

⊙<sub>-</sub> Minor Adverse Impacts

⊙<sub>+</sub> Minor Beneficial Impacts

∅<sub>-</sub> Moderate Adverse Impacts

∅<sub>+</sub> Moderate Beneficial Impacts

●<sub>-</sub> Significant Adverse Impacts

●<sub>+</sub> Significant Beneficial Impacts

Alternative	Quality	Timeframe	Ecological	Protected Resources	Socio-economic
Alternative Suites for Total Allowable Catch, Commercial Quotas and Recreational Measures					
Alternative Suite A1	Direct	Short-term	∅ <sub>-</sub>	○	○
		Long-term	● <sub>-</sub>	○	∅ <sub>-</sub>
	Indirect	Short-term	○	○	○
		Long-term	∅ <sub>-</sub>	○	⊙ <sub>-</sub>
	Cumulative		⊙ <sub>-</sub>	○	○
Alternative Suite A2	Direct	Short-term	⊙ <sub>+</sub>	○	⊙ <sub>-</sub>
		Long-term	⊙ <sub>+</sub>	○	⊙ <sub>-</sub>
	Indirect	Short-term	○	○	⊙ <sub>-</sub>
		Long-term	○	○	○
	Cumulative		∅ <sub>+</sub>	○	⊙ <sub>-</sub>
Alternative Suite A3	Direct	Short-term	∅ <sub>+</sub>	○	∅ <sub>+</sub>
		Long-term	⊙ <sub>-</sub>	○	∅ <sub>+</sub>
	Indirect	Short-term	○	○	∅ <sub>+</sub>
		Long-term	○	○	∅ <sub>+</sub>

Alternative	Quality	Timeframe	Ecological	Protected Resources	Socio-economic
	Cumulative		⊙ <sub>+</sub>	○	⊙ <sub>+</sub>
Alternative Suite A4	Direct	Short-term	⊙ <sub>+</sub>	○	⊙ <sub>-</sub>
		Long-term	⊙ <sub>+</sub>	○	⊙ <sub>-</sub>
	Indirect	Short-term	○	○	⊙ <sub>-</sub>
		Long-term	○	○	○
	Cumulative		⊙ <sub>+</sub>	○	⊙ <sub>-</sub>
Alternative Suite A5	Direct	Short-term	● <sub>+</sub>	● <sub>+</sub>	● <sub>-</sub>
		Long-term	● <sub>+</sub>	● <sub>+</sub>	● <sub>-</sub>
	Indirect	Short-term	● <sub>+</sub>	● <sub>+</sub>	● <sub>-</sub>
		Long-term	● <sub>+</sub>	● <sub>+</sub>	● <sub>-</sub>
	Cumulative		● <sub>+</sub>	● <sub>+</sub>	● <sub>-</sub>
<i>Alternative Suite A6 – Preferred Alternative</i>	Direct	Short-term	∅ <sub>+</sub>	○	⊙ <sub>-</sub>
		Long-term	∅ <sub>+</sub>	○	⊙ <sub>-</sub>
	Indirect	Short-term	○	○	⊙ <sub>-</sub>
		Long-term	○	○	○
	Cumulative		∅ <sub>+</sub>	○	⊙ <sub>-</sub>

#### 4.8 Past, Present, and Reasonably Foreseeable Actions

As discussed in Section 3.1, we have taken a number of actions in the past in order to, among other things, rebuild overfished fisheries and prevent overfishing of Atlantic sharks. These actions have included FMPs, FMP amendments, and framework actions. The goals and objectives of these past management actions are summarized in Section 3.1. We are required to take similar actions in this document, and can reasonably expect to implement regulations in the

future to address the management and conservation of Atlantic sharks in directed shark fisheries and in fisheries that caught sharks. The need and objectives of this document are described in earlier sections, particularly Chapter 1, and are not repeated here.

Listed below are other recent actions within HMS fisheries that may affect bottom longline, pelagic longline, and gillnet shark fishermen both directly and indirectly.

**Table 4.3 Chronological list of the Federal Register publications relating to Atlantic sharks.**

<b>Federal Register Cite</b>	<b>Date</b>	<b>Rule or Notice</b>
<i>2008</i>		
73 FR 11621	3/4/2008	Notice of Atlantic shark identification workshops and protected species safe handling, release, and identification workshops
73 FR 25665	5/7/2008	Stock Status Determinations; Notice of Intent (NOI) to prepare an Environmental Impact Statement (EIS) for Amendment 3 to the 2006 Consolidated HMS FMP
73 FR 30381	5/27/2008	Notice of Intent for Amendment 4 to the 2006 Consolidated Atlantic Highly Migratory Species (HMS) Fishery Management Plan (FMP)
73 FR 32309	6/6/2008	Notice of Atlantic shark identification workshops and protected species safe handling, release, and identification workshops
73 FR 35778	6/24/2008	Final rule for Amendment 2 to the 2006 Consolidated HMS FMP and fishing season notification
73 FR 35834	6/24/2008	2008 Shark research fishery; Notice of intent; request for applications
73 FR 37932	7/2/2008	Notice of availability; notice of public scoping meetings; Extension of comment period for Amendment 3 to the 2006 Consolidated HMS FMP
73 FR 40301	7/14/2008	Notice of public scoping meetings for Amendment 4 to the 2006 Consolidated HMS FMP
73 FR 40658	7/15/2008	Final rule for Amendment 2 to the 2006 Consolidated HMS FMP and fishing season notification; correction/republication
73 FR 47851	8/15/2008	Effectiveness of collection-of-information requirements to implement fins-on check box on Southeast dealer form
73 FR 51448	9/3/2008	Notice of Atlantic shark identification workshops and protected species safe handling, release, and identification workshops
73 FR 53408	9/16/2008	Notice of public meeting, public hearing, and scoping meetings regarding the AP meeting and various other hearings/meetings
73 FR 53851	9/17/2008	Atlantic Shark Management Measures; Changing the time and location of a scoping meeting
73 FR 54384	9/19/2008	Draft Essential Fish Habitat (EFH) for Amendment 1 to the 2006 Consolidated HMS FMP
73 FR 63668	10/27/2008	Proposed rule for 2009 shark fishing season
73 FR 64307	10/29/2008	Extension of scoping comment period for Amendment 3 to the 2006 Consolidated HMS FMP
73 FR 65294	11/3/2008	2009 Shark research fishery; Notice of intent; request for applications
73 FR 66844	11/12/2008	Extension of the comment period for Draft EFH for Amendment 1 to the 2006 Consolidated HMS FMP
73 FR 68361	11/18/2008	Inseason action to close the commercial porbeagle shark fishery
73 FR 79005	12/24/2008	NMFS establishes the annual quotas for the 2009 shark fishing season
<i>2009</i>		
74 FR 8913	2/27/2009	Notice of Atlantic shark identification workshops and protected species safe handling, release, and identification workshops
74 FR 26803	6/4/2009	Inseason action to close the commercial Gulf of Mexico non-sandbar

<b>Federal Register Cite</b>	<b>Date</b>	<b>Rule or Notice</b>
		large coastal shark fishery
74 FR 27506	6/10/2009	Notice of Atlantic shark identification workshops and protected species safe handling, release, and identification workshops
74 FR 28018	6/12/2009	Final EFH for Amendment 1 to the 2006 Consolidated HMS FMP
74 FR 29185	6/19/2009	Stack status determination for HMS shortfin mako shark
74 FR 30479	6/26/2009	Inseason action to close the commercial non-sandbar large coastal shark fisheries in the shark research fishery and Atlantic region
74 FR 36892	7/24/2009	Proposed rule for Amendment 3 to the 2006 Consolidated HMS FMP
74 FR 39914	8/10/2009	Extension of Comment Period for Amendment 3 to the 2006 Consolidated HMS FMP
74 FR 46572	9/10/2009	Notice of Atlantic shark identification workshops and protected species safe handling, release, and identification workshops
74 FR 51241	10/6/2009	Inseason action to close the commercial sandbar shark research fishery
74 FR 55526	10/28/2009	Proposed rule for 2010 shark fishing season
74 FR 56177	10/30/2009	Notice of intent for 2010 shark research fishery; request for applications
<i>2010</i>		
75 FR 250	1/5/2010	Final rule for the 2010 Commercial Quotas and Opening Dates for the Atlantic Shark Fisheries
75 FR 12700	3/17/2010	Closure of the Gulf of Mexico Large Coastal Shark Fishery
75 FR 22103	4/27/2010	Atlantic Coastal Fisheries Cooperative Management Act Provisions; Atlantic Coastal Shark Fishery
75 FR 44938	7/30/2010	Atlantic Coastal Fisheries Cooperative Management Act Provisions; Atlantic Coastal Shark Fishery
75 FR 30484	6/1/2010	Final Rule for Amendment 3 to the Consolidated HMS FMP
75 FR 50715	8/17/2010	Correction to the final rule for Amendment 3 to the Consolidated HMS FMP
75 FR 53871	8/31/2010	Closure of the Commercial Porbeagle Shark Fishery
75 FR 57235	9/20/2010	Notice of Availability of the Advanced Notice of Proposed Rulemaking for the Future of the Atlantic Shark Fishery
75 FR 57240	9/20/2010	Proposed Rule for the Atlantic Shark Fishery
75 FR 57259	9/20/2010	Request for Applications for Participation in the Atlantic Highly Migratory Species 2011 Shark Research Fishery
75 FR 62690	10/13/2010	Closure of the Commercial Non-Sandbar Large Coastal Shark Research Fishery
75 FR 67251	11/2/2010	Closure of the Commercial Blacknose and Non-Blacknose Small Coastal Shark Fisheries
75 FR 75416	12/3/2010	Closure of the Commercial Non-Sandbar Large Coastal Shark Fishery in the Atlantic Region
75 FR 76302	12/8/2010	Final rule for the 2011 Commercial Quotas and Opening Dates for the Atlantic Shark Fisheries
<i>2011</i>		
76 FR 14884	3/18/2011	Proposed rule for Atlantic Highly Migratory Species; Modification of the Retention of Incidentally-Caught Highly Migratory Species in Atlantic Trawl Fisheries
76 FR 23794	4/28/2011	Notice of Stock Status Determination for Atlantic highly Migratory scalloped Hammerhead Shark
76 FR 23935	4/29/2011	Proposed Rule to Implement the 2010 International Commission for the Conservation of Atlantic Tunas (ICCAT) Recommendations on Sharks
76 FR 36071	6/21/2011	Proposed rule for Vessel Monitoring System (VMS)

<b>Federal Register Cite</b>	<b>Date</b>	<b>Rule or Notice</b>
76 FR 37750	6/28/2011	Proposed rule for the HMS electronic dealer reporting system
76 FR 38107	6/29/2011	Correction to the proposed rule for VMS
76 FR 41216	7/13/2011	Notice of intent for Amendment 4 to the 2006 Consolidated HMS FMP
76 FR 41723	7/15/2011	Inseason Action to Close the Commercial Gulf of Mexico Non-Sandbar Large Coastal Shark Fishery
76 FR 44501	7/26/2011	Inseason Action to Close the Commercial Non-Sandbar Large Coastal Shark Research Fishery
76 FR 49368	8/10/2011	Final rule for Atlantic Highly Migratory Species; Modification of the Retention of Incidentally-Caught Highly Migratory Species in Atlantic Trawl Fisheries
76 FR 53343	8/26/2011	Inseason Action to Close the Commercial Porbeagle Shark Fishery
76 FR 53652	8/29/2011	Final Rule to Implement the 2010 ICCAT Recommendations on Sharks
76 FR 57709	9/16/2011	Notice of intent for HMS to consider shark catch share program and control date for landings
76 FR 61092	10/3/2011	Notice of Availability of the Stock Assessments for Sandbar, Dusky, and Blacknose Sharks
76 FR 62331	10/7/2011	Notice NMFS Makes Stock Determinations and Requests Comments on Future Options to Manage Atlantic Shark Fisheries
76 FR 65673	10/24/2011	Correction to stock status determination for Amendment 5 to the 2006 Consolidated HMS FMP
76 FR 67121	10/31/2011	Proposed Rule to Establish the Quotas and opening Dates for the 2012 Atlantic Shark Commercial Fishing Season
76 FR 67149	10/31/2011	Request for Applications for Participation in the Atlantic Highly Migratory Species 2012 Shark Research Fishery
76 FR 69139	11/8/2011	Inseason Action to Close the Commercial Atlantic Non-Sandbar Large Coastal Shark Fishery
76 FR 70064	11/10/2011	Notice of Delay in the Effective Date of Federal Atlantic Smoothhound Shark Management Measures
76 FR 72382	11/23/2011	Notice on Workshops for the Electronic Dealer Reporting System
76 FR 72383	11/23/2011	Extension of Comment Period and Workshops Schedule for Shark Catch Shares Amendment
76 FR 72891	11/30/2011	90-Day Finding on a Petition To List the Scalloped Hammerhead Shark as Threatened or Endangered Under the Endangered Species Act
76 FR 75492	12/2/2011	Final rule for VMS
<i>2012</i>		
77 FR 3393	1/24/2012	Final Rule to Establish the Quotas and Opening Dates for the 2012 Atlantic Shark Commercial Fishing Season
77 FR 8218	2/14/2012	NMFS Announces a Public Meeting for Selected Participants of the 2012 Shark Research Fishery
77 FR 15701	3/16/2012	Proposed rule for Amendment 4 to the 2006 Consolidated HMS FMP
77 FR 19164	3/30/2012	Public hearings for Amendment 4 to the 2006 Consolidated HMS FMP
77 FR 24161	4/23/2012	Notice of intent for Amendment 7 to the 2006 Consolidated HMS FMP
77 FR 32036	5/25/2012	Inseason Action to Close the Commercial Porbeagle Shark Fishery
77 FR 31562	5/29/2012	NMFS Considers Adding Gulf of Mexico Sharks to Amendment 5 to the 2006 Consolidated HMS FMP
77 FR 32036	5/31/2012	Inseason Action to Close the Commercial Porbeagle shark fishery

<b>Federal Register Cite</b>	<b>Date</b>	<b>Rule or Notice</b>
77 FR 34025	6/8/2012	Public scoping meeting for Amendment 7 to the 2006 Consolidated HMS FMP
77 FR 35357	6/13/2012	NMFS Announces the Opening Date of the Commercial Atlantic Region Non-Sandbar Large Coastal Fishery
77 FR 37647	6/21/2012	Proposed Rule to Prohibit Retention of Silky Sharks Caught in ICCAT Fisheries
77 FR 38772	6/29/2012	Public workshops for the electronic dealer reporting system
77 FR 39648	7/5//2012	Inseason Action to Close the Commercial Non-Sandbar Large Coastal Shark Fishery in the Gulf of Mexico Region
77 FR 44592	7/30/2012	Notice of Public Workshops for the Electronic Dealer Reporting System
77 FR 47303	8/8/2012	Final Rule to Require Electronic Dealer Reporting for Atlantic HMS Dealers
77 FR 52259	8/29/2012	Final Rule Regarding the Trade of HMS
77 FR 52314	8/29/2012	Notice of a Public Meeting for the Atlantic HMS Advisory Panel
77 FR 55464	9/10/2012	Notice for Atlantic Shark Identification Workshops, and Protected Species, Release, Disentanglement, and Identification Workshops
77 FR 59842	10/1/2012	Final Rule for Amendment 4 to the 2006 Consolidated HMS FMP
77 FR 60108	10/2/2012	Notice of Additional Public Workshops for the Electronic Dealer Reporting System
77 FR 60632	10/4/2012	Final Rule to Prohibit Retention of Silky Sharks Caught in ICCAT Fisheries
77 FR 61562	10/10/2012	Proposed Rule to Establish the Quotas and Opening Dates for the 2013 Atlantic Shark Commercial Fishing Season
77 FR 61727	10/11/2012	Notice to Announce the New Effective Date for the VMS Requirement for HMS
77 FR 67631	10/13/2012	Notice of Intent for Applications to the 2013 Shark Research Fishery
77 FR 64318	10/19/2012	Notice to Solicit Nominations for the Atlantic HMS Advisory Panel
77 FR 69593	10/20/2012	Notice of Intent to Issue Exempted Fishing Permits (EFPs), Scientific Research Permits (SRPs), Display Permits, Letter of Acknowledgement (LOAs), and Chartering Permits
77 FR 69596	11/20/2012	Notice to Solicit Nominations for the AP for Atlantic HMS Southeast Data, Assessment, and Review (SEDAR Workshops)
77 FR 70552	11/26/2012	Proposed Rule for Amendment 5 to the 2006 Consolidated HMS FMP
77 FR 72891	11/28/2012	Positive 90-Day Finding on a Petition To List the Scalloped Hammerhead Shark as Threatened or Endangered Under the Endangered Species Act
77 FR 75896	12/21/2012	Final Rule Regarding the 2013 Atlantic Shark Fishery Season
78 FR 12273	2/22/2013	Proposed Rule for Amendment 8 to the 2006 Consolidated HMS FMP

The following past and ongoing actions had or would have varying degrees of synergistic impacts on the human environment when considered in conjunction with Amendment 5a to the 2006 Consolidated HMS FMP:

- Amendment 3 to the 2006 Consolidated HMS FMP (NMFS 2010) changed SCS management group and quotas, recommended catch and release of shortfin mako sharks, and added smoothhound sharks to federal management. Changes in this amendment were determined to likely result in beneficial, cumulative, ecological impacts for SCS by decreasing fishing mortality, but reductions in SCS quotas were

determined to likely lead to adverse, cumulative socioeconomic impacts when considered in conjunction with Amendment 5a to the 2006 Consolidated HMS FMP.

- Amendment 2 to the 2006 Consolidated HMS FMP (NMFS 2008a) changed quotas, retention limits, and authorized species for the commercial shark fishery. Changes in this amendment were determined to likely result in beneficial, cumulative, ecological impacts for SCS and LCS by decreasing fishing mortality, but reductions in LCS quotas were determined to likely lead to adverse, cumulative socioeconomic impacts when considered in conjunction with Amendment 5a to the 2006 Consolidated HMS FMP.
- The rules that implement ICCAT recommendations adopted in 2010 and 2011 which prohibit possession and harvest of oceanic whitetip, smooth hammerhead, scalloped hammerhead, great hammerhead (76 FR 53652), and silky sharks (77 FR 60632) would result in beneficial cumulative ecological impacts because fishing mortality in ICCAT fisheries would be reduced. These rules would have adverse socioeconomic impacts on fishermen because they would no longer be able to harvest and sell these species commercially.
- The rule that established the 2013 shark fishing season specifications adjusted quotas and opening dates for the 2013 fishing season for sandbar sharks in the research fishery, non-sandbar LCS, SCS, and pelagic sharks based on any over- and/or under-harvests experienced during the 2011 and 2012 Atlantic commercial shark fishing seasons. This rule may have cumulative, adverse, socioeconomic impacts for some SCS and LCS fishermen as the fishing seasons would open before the implementation of Amendment 5a. The cumulative socioeconomic impacts could vary from beneficial to adverse depending on SCS and LCS availability when Amendment 5a is implemented.
- The rule modifying the reporting requirements for the HMS dealer electronic reporting system was implemented in January 2013. This rule is administrative in nature and requires electronic reporting by HMS dealers. Because this rule does not affect fishing regulations, it is not expected to have any additional impacts with the implementation of Amendment 5a.
- Amendment 6 to the 2006 Consolidated HMS FMP could potentially implement catch shares for the shark fishery. At this time, any additional impacts with the implementation of Amendment 5a are unknown as the draft amendment is still in development.
- On September 25, 2012, porbeagle and scalloped hammerhead sharks were added to CITES Appendix III as a result of actions by the European Union and Costa Rica, respectively. Listings under Appendix III require certain trade documentation for the listed species. On March 14, 2013, CITES adopted an Appendix II listing for oceanic whitetip, porbeagle, scalloped hammerhead, smooth hammerhead, and great hammerhead sharks. This listing supersedes the Appendix III listings of porbeagle and scalloped hammerhead sharks, and does not prohibit the trade of these species. The listing requires strict trade monitoring and could impact the ability of dealers to sell these species to international costumers.

In addition, reasonably foreseeable future actions that may result in additional incremental cumulative impacts include Amendment 5b to the 2006 Consolidated HMS FMP which will

address overfishing of dusky sharks and Amendment 7 to the 2006 Consolidated HMS FMP which will examine existing management measures for dusky sharks and Atlantic bluefin tuna and the best means of achieving current management objectives while providing additional flexibility to adapt in the future. These are measures that could affect participants in shark and/or pelagic longline fisheries in conjunction with the preferred alternatives suites in this amendment. Such actions would have varied effects on shark fishermen. Any later actions that reduce fishing opportunities could be expected to have cumulative, adverse, socioeconomic impacts on shark fishermen in conjunction with Amendment 5a to the 2006 Consolidated HMS FMP. Amendments 5b and 7 to the 2006 Consolidated HMS FMP will primarily impact pelagic longline fishermen and could, in combination with Amendment 5a, result in increased adverse socioeconomic impacts.

In general, the preferred alternative suite would implement quotas necessary to rebuild and stop overfishing of blacknose and scalloped hammerhead sharks, and mitigate some of the socioeconomic impacts that are necessary and expected to reduce fishing mortality as prescribed by recent stock assessments. Cumulative impacts of this alternative suite could have moderate beneficial or neutral ecological impacts, and moderate adverse or neutral socioeconomic impacts. While we have evaluated the cumulative ecological and socioeconomic impacts of these preferred alternative suite, we also evaluated how other non-HMS fisheries may be impacted by the preferred alternative suite. In particular, we evaluated other fisheries for which shark fishermen currently have permits, shark fishermen's ability to enter other fisheries, and the subsequent impacts those fisheries might experience as a result of redirected shark fishing effort.

As part of this analysis, we investigated the different types of commercial permits that directed and incidental shark permit holders currently have in addition to their HMS permits (Table 3.14) found that many directed and incidental shark permit holders also have Gulf of Mexico reef fish, dolphin/wahoo, mackerel (including king and Spanish mackerel), South Atlantic snapper/grouper commercial permits, and non-HMS Charter/Headboat permits. A few fishermen also have lobster permits. We also evaluated the ability of shark fishermen to move into these other fisheries (i.e., Gulf of Mexico reef fish, dolphin/wahoo, mackerel, and South Atlantic snapper/grouper fisheries) as a result of quota reductions in the Atlantic shark fishery under the preferred alternative suite. Shark fishermen may also participate in shark fisheries in state waters or may participate in other HMS fisheries for which they may already possess permits (i.e., swordfish). An overview of each fishery is listed below, and the cumulative ecological and socioeconomic impacts of the preferred alternative suite, including impacts of any redistributed effort to other fisheries, are discussed below.

### Gulf of Mexico Reef Fish Fishery

The Gulf of Mexico Fishery Management Council originally established the Gulf of Mexico Reef Fish FMP in 1984 (GMFMC 1984). Thirty amendments have been made to this plan, and currently Amendment 31 is under development.

A Gulf of Mexico commercial reef fish vessel permit allows the harvest and sale of all reef fish listed in the Reef Fish FMP under quota (where applicable) and in excess of the bag limits (where applicable), except goliath grouper (all harvest prohibited), Nassau grouper (all harvest prohibited), and red snapper. Fishermen wanting to harvest and sell red snapper must also

possess individual fishing quota (IFQ) shares. Issuance of new reef fish permits is under a moratorium. Access to this fishery is limited to existing permits holders. However, existing permits are transferable. As of December 31, 2011, shark directed and incidental permit holders possessed 116 Gulf of Mexico reef fish permits (Table 3.14). There are 93 Gulf of Mexico reef fish permits held by shark permitted vessels, which are concentrated in Florida and which represent approximately 80 percent of the total number of Gulf of Mexico reef fish permits held by commercial shark permit holders.

Portions of reef fish permit holders also possess IFQ shares, which allow them to land red snapper in addition to other reef fish. Anyone commercially fishing for red snapper now must possess an IFQ allocation and follow the established reporting protocol. Quota shares are freely transferable to any other reef fish permit holders during the first five years following implementation of the IFQ program and then to anyone thereafter. Shark permit holders that also possess a reef fish permit, but did not receive an IFQ allocation, will likely find that it would be costly to attain such an allocation.

The Gulf of Mexico Reef Fish FMP authorizes the use of longline, hook and line, handline, bandit gear, rod and reel, buoy gear, spear, powerhead, cast net, and trawl. There is a 6,000 lb gutted weight trip limit for all groupers, deep-water and shallow-water, combined. In January 2008, NMFS published a final rule implementing the Joint Reef Fish Amendment 27/Shrimp Amendment 14. This amendment reduced the commercial red snapper quota to 2.55 million pounds (mp) and a recreational quota of 2.45 mp between 2008 and 2010. The amendment also reduced the commercial minimum size limit to 13 inches total length, requires the use of non-stainless steel circle hooks, venting tools, and dehooking devices when fishing for reef fish, establish a red snapper bycatch mortality reduction goal for the shrimp trawl fishery, and, if necessary, shrimp fishery seasonal closures if the reduction target is not met.

Gulf of Mexico commercial grouper and tilefish fishermen in December 2008 approved a referendum that allowed the Council to approve Amendment 29 to the Reef Fish FMP in January 2009. The final rule was published on August 31, 2009 (74 FR 44732), and established a commercial IFQ management program for grouper and tilefish, which will become effective on January 1, 2010. Initial allocation of quota is based on a permit's landings history from 1999 and 2004.

Recently, the Gulf of Mexico Fishery Management Council published a final rule to amend the Reef Fish FMP to adjust the quotas for the red snapper fishery (77 FR 31734; May 30, 2012). This regulatory amendment sets the 2012 and 2013 quotas for commercial and recreational red snapper harvest. The quotas can be increased because recent population assessments show that overfishing has ended. The red snapper allowable catch would be increased from 7.185 million pounds whole weight in 2011 to 8.080 million pounds whole weight in 2012 and 8.690 million pounds whole weight in 2013. If the 2012 overall quota is exceeded, the 2013 quota increase would require modification by the Gulf of Mexico Fishery Management Council. The regulatory amendment also eliminates the fixed recreational red snapper closed season of October 1 through December 31. By eliminating the closure date, NMFS can re-open the recreational harvest for red snapper if any remaining quota is available, without the delay of additional rulemaking.

Approximately 19 percent of all shark permit holders (directed and incidental combined) already possess the limited access permits necessary to participate in the Gulf of Mexico reef fish fishery. Since the fishery is limited access and has extensive measures in place to control effort and harvest levels, it is not likely that HMS fishermen would be able to compensate all potential losses from reductions in quota and retention limits for sharks solely by transferring effort to the Gulf of Mexico reef fish fishery.

### Dolphin/Wahoo Fishery

In the Gulf of Mexico, dolphin/wahoo is included in the management unit under the Coastal Migratory Pelagic Resources FMP, and a charter/headboat vessel permit is required to fish for or possess dolphin/wahoo in the Gulf of Mexico. Otherwise, there are no regulations controlling the harvest of these species in the Gulf of Mexico.

In the South Atlantic, historically, the dolphin/wahoo fishery has been a recreational fishery (SAFMC 2003). However, during the 1990s, commercial landings in the Atlantic Ocean increased, due in part to an increasing number of pelagic longline vessels targeting dolphin (SAFMC 2003). As a result, the South Atlantic Fishery Management Council in cooperation with the Mid-Atlantic Fishery Management Council and New England Fishery Management Council developed a comprehensive FMP for both dolphin and wahoo in the Atlantic Ocean (SAFMC 2003). This FMP was approved in December of 2003. The final rule implementing the regulations in this FMP was published on May 27, 2004 (69 FR 30235). Owing to the significant importance of the dolphin/wahoo fishery to the recreational fishing community in the Atlantic, the overall goal of the FMP was to adopt a precautionary and risk-averse approach to management that set harvest limits based on the status quo at that time, which was average catch and effort levels from 1993 to 1997 (SAFMC 2003). These limits were implemented to deter shifts in the historical pelagic longline fisheries for sharks, tunas, and swordfish or expansions into nearshore coastal waters to target dolphin/wahoo, which could create user conflicts and possible localized depletion in abundance (SAFMC 2003).

As such, the dolphin/wahoo fishery is an open access fishery where people can purchase a vessel, dealer, or operator permit in the South Atlantic. Operators of commercial vessels, charter vessels, and headboats in the South Atlantic that fish south of 39° N. Latitude are required to have a federal vessel permit for dolphin/wahoo and must have and display operator permits. There is no trip limit for dolphin for a vessel with a commercial federal vessel permit. However, there is a 500 lb commercial trip limit for wahoo for vessels with such a permit. For commercially permitted vessels fishing north of 39° N. Latitude that do not have a federal commercial vessel permit for dolphin/wahoo, there is a trip limit of 200 pounds combined of dolphin and wahoo. In addition, there is a 20 inches fork length minimum size limit for dolphin off the coasts of Georgia and Florida with no size restrictions elsewhere, and pelagic longline fishing for dolphin and wahoo is prohibited in areas closed to the use of such gear for HMS. Dolphin/wahoo longline vessels must also comply with sea turtle protection measures. Finally, there is also a non-binding 1.5 million lb (or 13 percent of the total harvest) cap on commercial landings for dolphin. Should the catch exceed this level, the South Atlantic Fishery Management Council would review the data and evaluate the need for additional regulations, which may be established through a framework action.

The recreational dolphin fishery has the same minimum size restrictions as the commercial fishery. In addition, there is a recreational bag limit of two wahoo per person per day and ten dolphin per person per day or 60 dolphin per vessel per day, whichever is less (headboats are excluded from the vessel limit). There is a prohibition on recreational sale of dolphin and wahoo caught under the bag limit unless the seller holds the necessary commercial permits.

The authorized gears for dolphin and wahoo fishery are hook-and-line gear including manual, electric, and hydraulic rods and reels; bandit gear; handlines; longlines; and spearfishing (including powerheads) gear. Pelagic longline vessels permitted in the shark and swordfish fisheries are subject to the hook size regulations regarding the HMS fishery, which has impacted their ability to simultaneously fish for dolphin by attaching smaller-hooked gangions directly to their pelagic longline gear.

The total 2009 recreational harvest of dolphin and wahoo accounted for 88 percent (8,309,538 pounds total recreational harvest and 1,178,656 lb commercial harvest) of the total U.S. harvest (SAFMC 2011). The commercial fishery for dolphin and wahoo appears to be incidental to fishing for these species. Like dolphin, the recreational landings of wahoo account for a larger proportion of the total harvest in the Gulf of Mexico and Atlantic Ocean. In 2009, the total commercial harvest amounted to 43,126 pounds, compared to 792,687 lb harvested by recreational anglers (SAFMC 2011).

NMFS published a final rule (77 FR 15916; March 12, 2012) to implement the Comprehensive ACL Amendment to the Fishery Management Plans for the Snapper-Grouper Fishery, the Golden Crab Fishery, the Dolphin and Wahoo Fishery, and the Pelagic Sargassum Habitat. This rule implements many new measures, but we will only discuss the affects to the dolphin and wahoo fishery. This final rule specifies ACLs and AMs for dolphin and wahoo and prohibits recreational bag limit sales of dolphin harvested from for-hire vessels. This final rule also establishes a minimum size limit for dolphin of 20 inches (50.8 cm) fork length to include the Federal waters off South Carolina. Currently, the dolphin minimum size limit is 20 inches (50.8 cm) fork length, for the Federal waters off Florida and Georgia. This final rule extends the applicability of that size limit from Florida through South Carolina to ensure consistency in the regulations as well as help prevent the large-scale harvest of very small dolphin.

The dolphin/wahoo fishery is extremely seasonal in nature. This seasonality would influence the number of displaced HMS fishermen's ability to direct effort towards dolphin and wahoo. In addition, there have been no formal stock assessments for dolphin or wahoo. The status of wahoo is considered unknown and time-series data seems to indicate neither a decline in stock abundance nor a decrease in mean size of individual dolphin fish (SAFMC 1998). However, a precautionary approach to management was taken in 2003 since the dolphin and wahoo tend to aggregate, they are economically valuable before the age of maturity, and there is high interannual variability in these stocks due to environmental factors. Therefore, the 2003 FMP set harvest limits based on the status quo at that time.

As of December 31, 2011, 386 dolphin/wahoo permit holders also have directed or incidental shark permits (Table 3.14). Two hundred thirty eight of these dolphin/wahoo permit holders are from the state of Florida (Table 3.14). Because the dolphin/wahoo fishery is an open access

fishery, shark permit holders who do not currently have a dolphin/wahoo permit would be able to enter the fishery in the south Atlantic. Fishermen in the Gulf of Mexico could switch to the dolphin/wahoo fishery without trip limits or any permit requirements. However, gear modification may be difficult since dolphin and wahoo are pelagic in nature, and pelagic longline gear requires the use of 18/0 (with an offset not to exceed 10°) or 16/0 non-offset circle hooks. These larger hooks would make it difficult to catch small dolphin and wahoo, thus limiting catch to larger individuals. In addition, because of the seasonal nature of this fishery, directed fishing year-round would be difficult.

### Spanish mackerel

In the south Atlantic, fisheries for Spanish mackerel (*Scomberomorus maculatus*) are important for commercial participants who also engage in shark fisheries. Fisheries are managed by the South Atlantic Fishery Management Council and the Gulf of Mexico Fishery Management Council under the FMP for Coastal Migratory Pelagic Resources and its amendments (SAFMC 1982). A stock assessment for south Atlantic Spanish mackerel was completed in 2008 and concluded that the population is not overfished or experiencing overfishing (SEDAR 2008).

Authorized gear for Spanish mackerel in the south Atlantic include automatic reel, bandit gear, rod and reel, cast net, run-around gill nets, and stab nets; in the Gulf of Mexico, all gears are legal except drift and long gillnets and purse seines. However, there is an incidental catch allowance for vessels with purse seines onboard. A minimum size of 3.5 inches (8.9 cm) stretched mesh is required for all run-around gill nets and soak time is limited to one hour. The fishing year in the south Atlantic is from March 1 through the end of February. The fishing year in the Gulf of Mexico is April 1 through March 31. A federal vessel permit is required for commercial fisheries; however, the fishery is open to new participants who can demonstrate they meet an income requirement.

In the south Atlantic, the fishery is managed in two zones with differing regulations: a northern zone (Georgia to New York) and a southern zone (east coast of Florida to Dade-Monroe County). Catch restrictions vary by month and are dependent on the percentage of each zones allocation that is actually harvested. The majority of landings occur off Florida, where the commercial trip limit from April – November is 3,500 lb/trip. Trip limits are unlimited on weekdays beginning December 1 with a 1,500 lb trip limit on weekends until 75 percent of the quota is reached, and 1,500 lb daily trip limits are established. When 100 percent of the adjusted quota is met, trip limits are reduced to 500 pounds through the end of fishing year (SAFMC 2009).

Gillnets were the predominant gear type for Spanish mackerel prior to the net ban in Florida (NMFS 2004). As of 2003, approximately 60 percent of the overall catch came from cast nets and approximately 25 percent are caught with gillnets, the remainder being caught with other authorized gears (NMFS 2004). In Florida, the majority of the effort is still in state waters, where gillnets are not allowed (NMFS 2004). Some netting occurs in federal waters; however, the cast net is used more often (NMFS 2004). Fishing effort follows the fish migrating north to waters off North Carolina in the summer and then following the fish back to Florida during the winter months (NMFS 2004). Sinknets are the primary gear type used off of North Carolina (NMFS 2004).

Shark fishermen could transfer fishing effort to Spanish mackerel fisheries although this is unlikely since the preferred quotas in this action are very close to recent landings. Many vessels that deploy gillnets for sharks also possess Spanish mackerel permits. Of vessels that possess directed and incidental shark permits, 292 also possess Spanish mackerel permits (Table 3.14). Because the commercial fishery for Spanish mackerel is not limited access, with only an income qualifier restriction and the stocks are healthy, this could be an attractive fishery for participants to engage in, especially those who possess vessels that are already set up for fishing with gillnet or castnet gear.

NMFS published a final rule (72 FR 34632; June 25, 2007) revising regulations implementing the Atlantic Large Whale Take Reduction Plan by expanding the Southeast U.S. Restricted Area and modifying regulations pertaining to gillnetting within the Southeast U.S. Restricted Area. NMFS prohibits gillnet fishing or gillnet possession during annual restricted periods associated with the right whale calving season. Limited exemptions to the fishing prohibitions are provided for gillnet fishing for sharks and for Spanish mackerel south of 29°00' N. Latitude. An exemption to the possession prohibition is provided for transiting through the area if gear is stowed in accordance with this final rule. This action is required to meet the goals of the MMPA and the ESA. This action is necessary to protect northern right whales from serious injury or mortality from entanglement in gillnet gear in their calving area in Atlantic Ocean waters off the Southeast United States.

Amendment 18 to the FMP for the Coastal Migratory Pelagic Resources in the Gulf of Mexico and Atlantic Region implemented many new measures, but only impacts to the Spanish mackerel fishery were discussed (76 FR 82058; December 29, 2011). The final amendment established annual catch limits, allowable catch targets, and accountability measures for Spanish mackerel. In the Gulf of Mexico, the stock annual catch limit for Spanish mackerel is 5.15 million lb (4.75 million kg). In the Atlantic Ocean, this final rule established separate annual catch limits for the commercial and recreational sectors based on sector allocations and an allowable catch target for the recreational sector. The commercial sector annual catch limit is equivalent to the commercial sector quota of 3.13 million lb (1.42 million kg). The recreational sector allowable catch target is 2.32 million lb (1.05 million kg) and the recreational sector annual catch limit is 2.56 million lb (1.16 million kg). The intent of this rule was to specify annual catch limits for species not undergoing overfishing while maintaining sustainable catch levels.

### King Mackerel

Commercial fisheries for king mackerel (*Scomberomorus cavalla*) are an important source of revenue for participants in the Atlantic and Gulf of Mexico regions. Similar to Spanish mackerel, king mackerel is managed by both the South Atlantic Fishery Management Council and the Gulf of Mexico Fishery Management Council under the Coastal Migratory Pelagic Resources FMP (SAFMC 1982).

A stock assessment was conducted for king mackerel in 2009. The assessment determined that the Atlantic and Gulf of Mexico migratory groups of king mackerel are not overfished and that it was uncertain if the two stocks are experiencing overfishing (SEDAR 2009). Permits in the commercial fishery are limited access and there is currently a permit moratorium in place. The

minimum size for king mackerel is 24 inches (61 cm); however, vessels may possess up to five percent of the fish on board as undersized fish. In the south Atlantic, the fishing season is March 1 through the end of February, or until the quota of 3.71 million lb is met. In the Gulf of Mexico, the fishing year is July 1 through June 30, or until the quota of 1.01 million lb is met.

In the south Atlantic, trip limits vary by region and time of year, including:

- From New York to Flagler/Volusia County, Florida from April 1 to March 31, the trip limit is 3,500 lb;
- From Flagler/Volusia to Volusia/Brevard County lines from April to October 31, the trip limit is 75 fish; and,
- In Monroe County, Florida, from April 1 to October 31, the trip limit is 1,250 lb.

Authorized gear for king mackerel varies by region, including: rod and reel, bandit gear, handline, automatic reel, gillnets, and long gillnets (except north of Cape Lookout, North Carolina); pelagic longline, run-around gillnets (>4.75 inches (12.1 cm) stretched mesh); and purse seine (no more than 400,000 lb may be harvested by purse seine) (SAFMC 2009).

In the Gulf of Mexico, trip limits are established according to regional sub-divisions, each with their own quota.

- From the Florida/Alabama state boundary through Texas, the trip limit is 3,000 pounds.
- From The Florida/Alabama state boundary to the Lee/Collier County, Florida, boundary, the trip limit is 1,250 lb.
- From the Lee/Collier County boundary to the Monroe/Miami-Dade County boundaries, from November 1 through March 31, the trip limit is 1,250 lb.
- From the Monroe/Miami-Dade County boundary to the Broward/Volusia County boundary, from November 1 through March 31, the trip limit is 50 fish until February 1, when it increases to 75 fish if 75 percent of the quota is not taken.

Amendment 18 to the FMP for the Coastal Migratory Pelagic Resources in the Gulf of Mexico and Atlantic Region implemented many new measures (76 FR 82058; December 29, 2011), but only impacts to the king mackerel fishery are discussed here. The final amendment established annual catch limits, allowable catch targets, and accountability measures for king mackerel. In the Gulf of Mexico, this final rule established separate annual catch limits and accountability measures for the commercial and recreational sectors based on sector allocations. The commercial sector annual catch limit is equivalent to the commercial sector quota, which is set for the 2012 to 2013 fishing year at 3.808 million lb (1.728 million kg) and for the 2013 to 2014 fishing year and subsequent fishing years, at 3.456 million lb (1.568 million kg). The recreational sector annual catch limit is set at 8.092 million lb (3.670 million kg). In the Atlantic Ocean, the commercial sector annual catch limit is equivalent to the commercial quota of 3.88 million lb (1.76 million kg), while the recreational annual catch target for the commercial sector is set at 6.11 million lb (2.77 million kg) and the stock annual catch limit is 10.46 million lb (4.75 million kg).

There are 233 king mackerel permits held by shark permit holders (directed and incidental combined) as of December 31, 2011 (Table 3.14). The king mackerel fishery is limited access so entry by those who do not currently possess a permit would be more difficult. Vessels that are already set up to deploy run-around gillnets, pelagic longline, bandit gear, or other gillnets are most likely to increase fishing effort in the king mackerel fishery as they would have the least difficulty reconfiguring their vessel.

### South Atlantic Snapper-Grouper Fishery

The South Atlantic Fishery Management Council manages the 60 species that comprise the south Atlantic snapper-grouper fishery management unit (NMFS 1983). In 1998, Amendment 8 to the snapper-grouper FMP was implemented initiating a limited access program. Recent stock assessments were conducted for two deepwater snapper-grouper species, snowy grouper and golden tilefish as well as some shallower snapper-grouper species (red porgy, vermilion snapper, and black sea bass). Snowy grouper, black seabass, and red porgy were found to be overfished. Red porgy and golden tilefish were determined to not be overfished, and the overfished status of vermilion snapper was unknown. Snowy grouper, golden tilefish, black seabass, and vermilion snapper were determined to be experiencing overfishing. An assessment of south Atlantic red snapper conducted in 2008 determined that the stock is overfished and experiencing overfishing. Stock assessments for south Atlantic and Gulf of Mexico black grouper, and south Atlantic red grouper were completed in 2010.

In response to the 2006 Magnuson-Stevens Reauthorization Act and the 2008 red snapper stock assessment, the South Atlantic Fishery Management Council developed Amendment 17 to address overfishing requirements by 2010. This includes increasing catch limits and establishing new closed areas for snapper-grouper fishing. The amendment would also establish annual catch limits and accountability measures for 10 species (red snapper, golden tilefish, snowy grouper, speckled hind, warsaw grouper, black grouper, black sea bass, gag, red grouper, and vermilion snapper) within the snapper-grouper fishery. The Amendment was split into two, with Amendment 17A addressing the overfishing of red snapper (75 FR 76874; December 8, 2010), and Amendment 17B addressing annual catch limits and accountability measures for black grouper, black sea bass, gag, golden tilefish, red grouper, snowy grouper, vermilion snapper, speckled hind, and warsaw grouper (75 FR 82280; December 30, 2010).

Amendment 17A established an annual catch limit of zero for red snapper, which means all harvest and possession of red snapper in or from the South Atlantic exclusive economic zone is prohibited. This rule also implemented an area closure that extends from southern Georgia to northern Florida and hook restriction. Additionally, Amendment 17A established a rebuilding plan for red snapper and requires a monitoring program as the accountability measure for red snapper. Regulatory Amendment 10 removed the snapper-grouper area closure implemented through Amendment 17A to the FMP (76 FR 23728; April 28, 2011). The intended effect of this final rule is to minimize socioeconomic impacts to snapper-grouper fishermen, without subjecting the red snapper resource to overfishing. Amendment 17B established annual catch limits and accountability measures for eight snapper-grouper species in the FMP that are undergoing overfishing, and for black grouper, which was recently assessed and determined to not be undergoing overfishing or overfished (75 FR 82280; December 30, 2010). The intent of

this final rule was to address overfishing of eight snapper-grouper species while maintaining catch levels consistent with achieving optimum yield.

Regulatory Amendment 9 reduced the recreational bag limit for black sea bass, increased the commercial trip limit for greater amberjack, and established commercial trip limits for vermilion snapper and gag (76 FR 34892; June 15, 2011). The intended effect of this final rule was to address derby-style fisheries for black sea bass, gag, and vermilion snapper while reducing the rate of harvest to extend the fishing seasons of these three species, to achieve optimum yield for greater amberjack, and to implement technical corrections to the regulations.

A comprehensive annual catch limit Amendment to the FMPs for the Snapper-Grouper Fishery, the Golden Crab Fishery, the Dolphin and Wahoo Fishery, and the Pelagic Sargassum Habitat implemented many new measures (77 FR 15916; March 12, 2012, but only impacts to the snapper-grouper fishery are discussed below. This final rule identified snapper-grouper species that do not need Federal management and can therefore be removed from the Snapper-Grouper FMP; designated selected snapper-grouper species as ecosystem component species; established species groups for selected snapper-grouper species for more effective management; established annual catch limits and accountability measures for the commercial and recreational sectors; and establishes a daily vessel limit for the recreational possession of wreckfish and creates a closed season for the wreckfish recreational sector. Amendment 18A modified the current system of accountability measures for black sea bass, limits effort in the black sea bass segment of the snapper-grouper fishery, and improved fisheries data in the for-hire sector of the snapper-grouper fishery (77 FR 32408; June 1, 2012). This rule updated the rebuilding plan and modifies the allowable biological catch for black sea bass, which intends to reduce overcapacity in the black sea bass segment of the snapper-grouper fishery

In December 2006, the South Atlantic Fishery Management Council voted to explore the use of a limited access privilege program for the snapper-grouper fishery, which could include the use of an individual fishing quota. Shark directed and incidental permit holders that already possess limited access permits in the snapper-grouper fishery may benefit from a future an individual fishing quota program as it may mitigate the more restrictive management measures that are in place for some of the snapper-grouper species. However, entrance into the snapper-grouper fishery is difficult due to the need to find two transferable limited access permits available for purchase.

As of December 31, 2011, 128 shark directed and incidental permit holders also held permits in the south Atlantic snapper-grouper fishery (Table 3.14). New entrants into the snapper-grouper fishery must obtain two existing snapper-grouper transferable permits and exchange them for one new permit. Allowable commercial gear for the snapper-grouper fishery includes vertical hook and line including bandit gear, black seabass pots, sink nets (North Carolina only), and bottom longline. Vessels with bottom longline gear onboard may only possess snowy grouper, one warsaw grouper, yellowedge grouper, misty grouper, golden tilefish, blueline tilefish, and sand tilefish. No other snapper-grouper species may be possessed or harvested.

## **4.9 Cumulative Ecological Impacts**

### **4.9.1 Fishing Impacts**

Preferred Alternative Suite A6 would, among other things, create quotas for Gulf of Mexico and Atlantic hammerhead sharks and Gulf of Mexico blacktip sharks, refine the blacknose shark, SCS, and LCS quotas; establish quota linkages among LCS and SCS species and management groups; and reexamine the minimum size for recreationally caught hammerhead sharks, as detailed in Chapter 2. Since Alternative Suite A6 would provide protections for sharks based upon the most recent scientific information, we expect the action would likely have direct short- and long-term moderate beneficial ecological impacts. Overfishing on scalloped hammerhead and Atlantic blacknose sharks would be stopped, setting in place rebuilding plans to achieve optimum yield. Furthermore, additional protections would be put into place, such as quota linkages and the inclusion of all three large hammerhead shark species under the scalloped hammerhead TAC. These additional protections would increase the effectiveness of the rebuilding plans and help ensure a sustainable fishery overall. Indirect ecological impacts (those to EFH, bycatch species, predator/prey relationships, etc) resulting from the TAC and quota preferred alternative suite are likely neutral since shark fishing effort levels and rates are unlikely to significantly change as a result of the quota adjustments. Subsequently, this action is unlikely to contribute to additional indirect ecological cumulative impacts.

The incremental contribution of the actions in Amendment 5a to the 2006 Consolidated HMS FMP, when considered in conjunction with the activities listed above, is considered a moderate cumulative ecological benefit to the ecology of the managed shark species. The measures listed above were implemented to help reduce interactions with protected species, or increase post-release survival of non-target species and protected species, to help rebuild overfished fish stocks and end overfishing, or to protect EFH for deep water species. This action provides additional ecological benefits since it aims to end overfishing and rebuild shark stocks per the SEDAR 21 (SEDAR 2011), SEDAR 29 (SEDAR 2012), and Hayes et al. (2009) stock assessments. In conjunction with Amendment 5a to the 2006 Consolidated HMS FMP, which would help rebuild several shark stocks and end overfishing, such measures would help conserve fishery resources in the long-term, which would ultimately have positive ecological impacts. Stopping overfishing and rebuilding shark stocks can contribute to healthy shark populations and sustainable fisheries.

### **4.9.2 Non-Fishing Impacts**

Non-fishing activities that may affect EFH are described in Section 10.5 of the 2006 Consolidated HMS FMP (NMFS 2006) and Amendment 1 to the 2006 Consolidated HMS FMP (NMFS, 2008b). Broad categories of activities that may adversely affect HMS EFH include, but are not limited to: (1) actions that physically alter structural components or substrate, *e.g.*, dredging, filling, excavations, water diversions, impoundments and other hydrologic modifications; (2) actions that result in changes in habitat quality, *e.g.*, point source discharges; (3) activities that contribute to non-point source pollution and increased sedimentation; (4) introduction of potentially hazardous materials; or (5) activities that diminish or disrupt the functions of EFH. If these actions are persistent or intense enough, they can result in major changes in habitat quantity as well as quality, conversion of habitats, or in complete abandonment of habitats by some species.

### 4.9.3 Cumulative Social and Economic Impacts

Preferred Alternative Suite A6 would, among other things, create quotas for Gulf of Mexico and Atlantic hammerhead sharks, and Gulf of Mexico blacktip sharks, refine the blacknose shark, SCS, and LCS quotas; establish quota linkages among LCS and SCS species and management groups; and reexamine the minimum size for recreational caught hammerhead sharks, as detailed in Chapter 2. Alternative Suite A6 would likely have direct short- and long-term minor adverse socioeconomic impacts of shark fishermen, primarily due to decreased opportunity to retain and sell shark products. These impacts would mostly affect fishermen targeting scalloped hammerhead and blacknose sharks since those quotas would be reduced. Additionally adverse impacts could be experienced as a result of the quota linkages. If any quotas are closed before they are filled as a result of quota linkages, fishermen would not realize the full revenue available from that quota. These fishermen are likely to adapt to the new regulations by fishing in other fisheries, or changing their fishing habitats. Some of these negative impacts are mitigated by opening and closing the Gulf of Mexico blacktip shark quota independent of other quotas, ensuring greater access to this resource if the aggregated LCS and hammerhead shark management groups in this region close more quickly. Recreational management measures would increase the size limit of hammerhead sharks and cause fishermen to release more caught hammerhead sharks. This alternative would result in direct minor adverse socioeconomic impacts for recreational fishermen targeting the hammerhead sharks. The socioeconomic impacts on fishermen targeting blacktip sharks in the Gulf of Mexico would be neutral since the new quota would be based on the current blacktip shark landings percentage applied to the 2013 Gulf of Mexico non-sandbar LCS quota (Table 2.5 and Table 2.6).

Based on preferred alternative suite measures, however, it is unlikely that shark fishermen would be able to recuperate any potential economic losses by switching to other Southeast fisheries due to quota reductions and/or limited access programs in these other fisheries. The Agency presumes that since some shark fishermen also possess several permits in other fisheries, they do not receive all of their revenues from shark products. At the present time, NMFS estimates that fishermen make decisions about which fisheries to participate in based on the ex-vessel prices they can expect from a given species of fish, seasonality, quotas, trip limits, and other factors. In the past, due to higher quotas, revenues received from sharks likely comprised a larger share of fishermen's overall revenues from fishing activities than is expected in the future. However, it could be difficult for lost shark revenues to be replaced by transferring more effort to other fisheries in which they have historically participated due to restrictions in those fisheries as well.

There are limited access permit programs in place for the South Atlantic snapper-grouper fishery as well as the Gulf of Mexico reef fish fishery, where no new permits are being issued. Therefore, if shark fishermen do not currently possess a South Atlantic snapper-grouper permit or a Gulf of Mexico reef fish permit, it would be difficult and costly to enter these fisheries in the future. There are also quota reductions for many reef fish species (see above), which would affect current Gulf of Mexico reef fish permit holders. Thus, shark fishermen who have shark and reef fish permits could experience economic hardships in both fisheries.

In addition, there is an IFQ program in place for the Gulf of Mexico red snapper fishery, with limitations on transfers during the first five years, and a new IFQ program would be

implemented in the near future for the South Atlantic snapper-grouper fishery. These IFQ programs could benefit current South Atlantic snapper-grouper or Gulf of Mexico red snapper permit holders; however, it would make it difficult and expensive for shark fishermen who do not currently possess these permits to enter these fisheries in the future.

The dolphin/wahoo fishery is an open access fishery; however, redistribution of commercial shark fishing effort into this fishery may result in user conflicts between recreational and commercial fishermen. If this cap is exceeded, the South Atlantic Fishery Management Council may decide to take more stringent measures in this fishery to reduce overall catch. More importantly, due to the seasonality of the dolphin/wahoo fishery, it would be difficult for commercial fishermen to direct on dolphin/wahoo (S. Branstetter, NOAA, pers. comm.).

It is likely that shark fishermen using gillnet gear for sharks would transfer some fishing effort to the Spanish mackerel fishery. Participants currently using other gears for sharks may consider purchasing the necessary gear (e.g., gillnets, etc.) to become involved in this fishery. Since this fishery is not limited access, transferring effort into this fishery would not require paying high costs to acquire permits from other vessels. Furthermore, since the stock status of Spanish mackerel is healthy, there does not appear to be any significant restrictions on quotas or other effort controls necessary at this time or in the foreseeable future. However, this fishery is seasonal, so year-round revenues from Spanish mackerel may not be realized. Rather, participants in North Carolina would be expected to fish for Spanish mackerel in the summer while participants in Florida could target these fish in the winter.

The commercial fishery for king mackerel is managed via a limited access permit system, and shark fishermen who do not currently possess a king mackerel permit may have a difficult time entering this fishery. However, there are some participants in the shark fishery that currently possess these king mackerel permits. Therefore, effort in this fishery is expected to increase as a result of shark management measures in this amendment.

The additional management measures taken by other Regional Fishery Management Councils and Commissions, such as the eight marine protected areas implemented by the South Atlantic Fishery Management Council's Amendment 14, de-hooking requirements by the Gulf of Mexico Fishery Management Council, the Interstate Shark Plan implemented by the Atlantic States Marine Fisheries Commission, and the requirement to use non-stainless steel, circle hooks in the reef fish fishery as well as other rules that we have recently implemented for protected species and to protect EFH, would all have moderate adverse cumulative socioeconomic impacts on fishery participants. Therefore, the incremental contribution of the measures in Amendment 5a to the 2006 Consolidated HMS FMP, when considered with these other actions, is expected to have moderate adverse cumulative socioeconomic impacts on participants in the shark fisheries. However, because these measures were implemented to help reduce interactions with protected species or increase post-release survival of non-target species and protected species, to help rebuild overfished fish stocks and end overfishing or to protect EFH for deep-water species, such measures would help conserve fishery resources in the long-term, which could ultimately have beneficial cumulative economic and social impacts for fishermen in the long-term.

#### **4.10 Dusky Shark Measures**

Based on comments received on the Predraft during scoping, and the addition of Gulf of Mexico blacktip shark to this action, we determined the scope of significant issues of concern that would be addressed in the draft amendment. The Notice of Availability of the DEIS for Amendment 5 and the proposed rule published in the Federal Register on December 7, 2013 (77 FR 73029), and November 26, 2012 (77 FR 70552), respectively. The public comment period ended on February 12, 2013. During the comment period, we received numerous comments on the proposed dusky shark measures regarding the data sources used and the analyses of these data. We also received many comments requesting consideration of approaches to dusky shark fishery management that were significantly different from those we analyzed in the Amendment 5 proposed rule and DEIS. For example, commenters suggested exemptions to a recreational minimum size increase to allow landings of other sharks such as blacktip sharks or “blue” sharks such as shortfin mako or thresher sharks, and other commenters suggested implementing gear restrictions instead of additional pelagic longline closures.

After reviewing all of the comments received, we concluded that further analyses are needed for dusky shark measures. In order to ensure that other shark measures are finalized as expeditiously as possible, we decided to conduct additional dusky shark analyses in a separate proposed action, which will be referred to as Amendment 5b. Comments received on the dusky shark portions of the November 2012 proposed rule will be considered in that action. This final document — referred to as Amendment A5a to the 2006 Consolidated HMS FMP — finalizes other shark measures needed to maintain rebuilding of sandbar sharks; end overfishing and rebuild scalloped hammerhead and Atlantic blacknose sharks; and establish a TAC and commercial quota and recreational measures for Gulf of Mexico blacknose and blacktip sharks.

## Chapter 4 References

- GMFMC. 1984. Reef Fish Fishery Management Plan. Gulf of Mexico Fishery Management Council. 2203 N. Lois Avenue, Suite 1100, Tampa, FL 33607.
- Hayes, C.G., Y. Jiao, and E. Cortes. 2009. Stock assessment of scalloped hammerheads in the western North Atlantic ocean and Gulf of Mexico. *North American Journal of Fisheries Management* 29:1406-1417.
- Hazin, F., A. Fischer and M. Broadhurst. 2001. Aspects of reproductive biology of the scalloped hammerhead shark, *Sphyrna lewini*, off northeastern Brazil. *Environ. Biol. Fishes* 61: 151-159.
- NMFS. 2008a. Final Amendment 2 to the Fishery Management Plan for Atlantic Tunas, Swordfish, and Sharks, and Highly Migratory. NOAA, National Marine Fisheries Service, Highly Migratory Species Management Division, Silver Spring, MD. Public Document.
- NMFS. 2008b. Final Amendment 1 to the Consolidated Atlantic Highly Migratory Species Fishery Management Plan Essential Fish Habitat. NOAA, NMFS, Highly Migratory Species Management Division, Silver Spring, MD
- NMFS. 2010. Amendment 3 to the Final Consolidated Atlantic Highly Migratory Species Fishery Management Plan. NOAA, NMFS, Highly Migratory Species Management Division, 1315 East West Highway, Silver Spring, MD 20910.
- NMFS. 2011. Stock Assessment and Fishery Evaluation (SAFE) Report For Atlantic Highly Migratory Species. Highly Migratory Species Management Division, 1315 East West Highway, Silver Spring, MD 20910. 294 p.
- NMFS. 2012. Stock Assessment and Fishery Evaluation (SAFE) Report For Atlantic Highly Migratory Species. Highly Migratory Species Management Division, 1315 East West Highway, Silver Spring, MD 20910. 204 p.
- SAFMC 1982. Fishery Management Plan for Coastal Migratory Pelagic Resources (King and Spanish Mackerel). South Atlantic Fishery Management Council, 4055 Faber Place Drive, Suite 201 North Charleston, SC 29405.
- SAFMC. 1998. Dolphin/Wahoo Workshop Report. South Atlantic Fishery Management Council, 4055 Faber Place Drive, Suite 201 North Charleston, SC 29405.
- SAFMC. 2003. Fishery Management Plan for the Dolphin and Wahoo Fishery of the Atlantic. South Atlantic Fishery Management Council, 4055 Faber Place Drive, Suite 201 North Charleston, SC 29405.
- SAFMC. 2009. South Atlantic Fishery Management Council, Regulations by Species – King Mackerel. May 4, 2009.  
<http://www.safmc.net/FishIDandRegs/FishGallery/KingMackerel/tabid/297/Default.aspx>

- SAFMC. 2011. Comprehensive Annual Catch Limit Amendment for the South Atlantic Region (Draft Amendment 2 to the Fishery Management Plan for the Dolphin Wahoo Fishery of the South Atlantic). South Atlantic Fishery Management Council, 4055 Faber Place Drive, Suite 201, North Charleston, SC 29405.
- SEDAR, 2007. SEDAR 13 Stock Assessment Report: Small Coastal Sharks, Atlantic Sharpnose, Blacknose, Bonnethead, and Finetooth Shark. 4055 Faber Place Drive, Suite 201, North Charleston, SC 29405. 375p
- SEDAR, 2008. SEDAR 17 Stock Assessment Report: South Atlantic Spanish Mackerel. 4055 Faber Place Drive, Suite 201, North Charleston, SC 29405. 375p
- SEDAR. 2009. SEDAR 16 Stock Assessment Report: South Atlantic and Gulf of Mexico King Mackerel. SEDAR, 4055 Faber Place Drive, Suite 201, North Charleston, SC 29405. 415p.
- SEDAR, 2011. SEDAR 21 Stock Assessment Report: HMS Blacknose, Dusky, and Sandbar Sharks. SEDAR, 4055 Faber Place Drive, Suite 201, North Charleston, SC 29405. 415p.
- SEDAR, 2012. SEDAR 29 Stock Assessment Report: Gulf of Mexico Blacktip Sharks. SEDAR, 4055 Faber Place Drive, Suite 201, North Charleston, SC 29405. 415p.

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## **5.0 MITIGATION AND UNAVOIDABLE IMPACTS**

Mitigation is an important mechanism that Federal agencies can use to minimize, prevent, or eliminate damage to the human and natural environment associated with their actions. As described in the CEQ regulations, agencies can use mitigation to reduce environmental impact in several ways. Mitigation may include one or more of the following: avoiding the impact by not taking a certain action or parts of an action; minimizing impacts by limiting the degree or magnitude of the action and its implementation; rectifying the impact by repairing, rehabilitating, or restoring the affected environment; reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; and compensating for the impact by replacing or providing substitute resources or environments. The mitigation measures discussed in an EIS must cover the range of impacts of the proposal and must be considered even for impacts that by themselves would not be considered "significant." If a proposed action is considered as a whole to have significant effects, all of its specific effects on the environment must be considered, and mitigation measures must be developed where it is feasible to do so. We may consider mitigation provided that the mitigation efforts do not circumvent the goals and objectives of the rulemaking or the mandate to rebuild fisheries under the Magnuson-Stevens Act.

The alternative suites considered in this document focus on establishing TACs, quotas, recreational measures, and any links between quotas for scalloped hammerhead, blacktip, and LCS as well as between quotas for blacknose and non-blacknose SCS. We are not considering changes to the current sandbar shark rebuilding plan because results from the SEDAR stock assessment indicated that overfishing is no longer occurring and that rebuilding should occur within the previously specified timeframe at current rates of fishing mortality. Preferred Alternative Suite A6 was not included in the DEIS and combines aspects of Alternative Suites A2 and A3 from the DEIS.

More information on the ecological, social, and economic impacts of the preferred alternatives are found in Chapter 4 and not repeated here.

### **5.1 Mitigation Measures**

Preferred Alternative Suite A6 would likely have direct short- and long-term moderate beneficial ecological impacts and minor adverse socioeconomic impacts. Aspects of attempts to mitigate these effects are discussed below.

This action would not have adverse ecological impacts that need to be mitigated. The preferred measures were specifically selected to avoid potential adverse impacts on the environment and thus are structured within the alternative suite as outlined and discussed in Chapter 4. As a result, mitigation was explicitly addressed in the analyses conducted for selecting the preferred alternative suite in other sections of this document including Chapters 4, 6, 7, 8, and 9. At this time, we have not identified any additional mitigation measures to offset adverse impacts beyond those already built into the alternative suite analyzed in this document. We chose to develop the alternative suite that avoided, minimized, and mitigated adverse ecological and socioeconomic impacts from the outset, thus avoiding to the greatest extent practicable residual or unavoidable

adverse impacts. That approach is reflected in the changes to the preferred alternative suite between the DEIS and FEIS based on the comments of stakeholders and additional agency analysis that is explained in earlier chapters. While this document represents our preferred alternative suite, we retain discretion to choose any reasonable alternative evaluated in this document in the implementing rule for this action after the waiting period.

As stated above, in analyzing possible quotas and retention limits, the preferred alternative suite was selected because it more precisely addresses the species in which reductions in fishing mortality are needed to end overfishing and rebuild stocks (e.g., scalloped hammerhead and Atlantic blacknose sharks). The preferred alternative suite establishes a hammerhead shark quota for each region that includes all three large hammerhead sharks (scalloped, smooth, and great hammerhead sharks) rather than only the assessed species, scalloped hammerhead sharks. This action mitigates adverse impacts that could result from misidentification and provides beneficial ecological impacts. Particularly when dressed, the three large hammerhead shark species are difficult to differentiate, and a scalloped hammerhead shark quota alone could lead to excessive mortality of the species beyond the TAC. Misidentification can lead to detrimental ecological impacts if these species were reported separately. For example, if large numbers of scalloped hammerhead sharks were reported as smooth hammerhead or great hammerhead sharks, then the quota for scalloped hammerhead sharks might remain open beyond the level of harvest that is considered acceptable for the stock. Additionally, to mitigate any adverse socioeconomic impacts resulting from inequitable distribution of the quota and to allow each region's fishermen's continued access to the resource, the preferred alternative suite apportions the hammerhead quotas between the two regions based upon historical landings and, because the hammerhead quota was split between regions for management purposes and not for biological reasons, provides the flexibility for inseason transfers of quota between the regions.

The preferred alternative suite also removes Gulf of Mexico blacktip sharks from the non-sandbar LCS management group. The Gulf of Mexico blacktip stock assessment noted that current removal rates are sustainable, and the subsequent projections, which were completed outside the SEDAR process, indicate that current removals are unlikely to lead to an overfished fish stock by 2040 (i.e., have a 70% chance of being above anticipated MSY levels in 2040).. Preferred Alternative Suite A6 establishes a commercial quota based on average landings of Gulf of Mexico blacktip sharks from 2008-2011 using data from the GULFIN dealer database. We are establishing a TAC and quota measures for blacktip sharks in this amendment to avoid a delay in the operation of this fishery that would occur if we chose to initiate a new FMP amendment, which further altered the aggregated LCS management group fishery. The establishment of a separate quota based on an optimum yield, as opposed to retaining Gulf of Mexico blacktip sharks in the LCS complex, will provide the greatest amount of blacktip shark fishing opportunities for commercial shark fishermen.

With respect to the remaining species in the non-sandbar LCS management group, the regional quotas would be renamed (aggregated LCS), and recalculated based on average annual landings of the remaining species between 2008 and 2011. Recalculation of the aggregated LCS quotas mitigates potential adverse socioeconomic impacts that could result from the removal of key species from the complex (e.g., blacktip sharks) because it ensures that the remaining species

would continue to be harvested at a level deemed sustainable and appropriate for meeting the management and rebuilding requirements of LCS.

The preferred alternative suite would include, for blacknose sharks, the creation of two separate regional quotas (Atlantic and Gulf of Mexico). The current non-blacknose SCS quota applies to both the Atlantic and Gulf of Mexico region. However, SEDAR 21 (SEDAR 2011) determined a separation in blacknose shark stocks between the Atlantic and Gulf of Mexico. Because the non-blacknose SCS and blacknose shark quotas are linked under the preferred alternative suite, the non-blacknose SCS quota must be divided between the two regions for quota linkage purposes. To mitigate any adverse socioeconomic impacts resulting from inequitable distribution of the quota and to allow each region's fishermen's continued access to the resource, the preferred alternative suite apportions the non-blacknose SCS quota between the two regions based upon historical landings and, because the non-blacknose quota was split between regions for management purposes and not for biological reasons, provides the flexibility for inseason transfers of quota between the regions.

The preferred alternative suite would establish quota linkages between management groups that are often caught together to mitigate adverse impacts to shark species that have reached their quota. Management groups that have linked quotas would open and close at the same time to prevent excessive mortality of one species to occur due to incidental capture while targeting other shark species. For example, Atlantic hammerhead sharks are often caught while targeting Atlantic aggregated LCS. If the Atlantic hammerhead shark quota is filled, and the management group is subsequently closed, additional hammerhead sharks could be incidentally caught while targeting Atlantic aggregated LCS if that management group is not closed as well. The quota linkages in the preferred alternative suite mitigate the potential adverse impacts that could result from bycatch of sharks in other directed shark fisheries. We decided not to link the Gulf of Mexico blacktip shark quota with the other LCS regional quotas to mitigate the potential for revenue loss from Gulf of Mexico blacktip shark harvest with the closure of the aggregated LCS and hammerhead shark fisheries. Gulf of Mexico blacktip shark stocks are healthy, and we based quotas on average landings, so this action would allow full use of the Gulf of Mexico blacktip shark quota. Aggregated LCS and hammerhead sharks are caught in small amounts on trips targeting Gulf of Mexico blacktip sharks, so this should not affect the mortality rates of hammerhead sharks.

With respect to recreational measures, the preferred alternative suite will help mitigate the ecological effects of the recreational fishery on hammerhead sharks. The increased size limit for hammerhead sharks would allow the harvest of trophy-sized hammerhead sharks and would reduce fishing mortality of hammerhead sharks. Increasing outreach would mitigate ecological impacts by improving shark species identification and reducing accidental harvest of prohibited species, such as sandbar sharks, due to misidentification. Furthermore, increased outreach would also mitigate socioeconomic impacts since as hammerhead and prohibited shark stocks rebuild, increased fishing opportunities may result.

In summary, while many of the actions in this amendment would impose additional restrictions on the shark fishery to minimize ecological effects, we specifically selected the preferred

alternative suite that also minimizes economic impacts while accomplishing the mandate to end overfishing and implement rebuilding plans for overfished shark stocks.

## **5.2 Unavoidable Adverse Impacts**

In general, there are no unavoidable adverse impacts expected as a result of the preferred alternative suite and corresponding management measures for the Gulf of Mexico blacktip shark TAC and quotas, non-sandbar LCS TAC and quotas, non-blacknose SCS, protected resources, and EFH considered in the FEIS. We would continue to monitor the impact of the management measures in the preferred alternative suite and would propose additional management measures, as necessary, to avoid any unanticipated adverse impacts.

However, there are some minor adverse socioeconomic impacts as a result of the preferred alternative suite and corresponding management measures for the scalloped hammerhead shark TAC and quotas, recreational measures, and quota linkages. We must comply with the National Standards of the Magnuson-Stevens Act, which include a mandate to prevent overfishing and rebuild overfished stocks. In meeting our legal obligation to rebuild shark stocks and end overfishing, we must reduce fishing effort under the preferred alternative suite for scalloped hammerhead and Atlantic blacknose sharks, consistent with the objectives of the rulemaking as defined in Section 1.4. The preferred alternative suite was designed to achieve these purposes and objectives in a manner that maximizes the environmental benefits, and minimizes, to the greatest extent possible, the social and economic impacts on affected fisheries. However, the preferred alternative suite may still result in unavoidable adverse socioeconomic impacts that would cause directed and incidental shark permit holders and dealers to redirect to other fisheries and/or leave the fishing industry due to lowered and/or reduced access to quotas. Environmental and socioeconomic impacts of the preferred alternative suite are analyzed in Chapters 4, 7, and 8. For information on other HMS fisheries in which effort may increase or change as a result of the preferred alternative suite, see Table 3.26. However, hammerhead sharks are not a primary target of the LCS fishery, and SCS fishermen have demonstrated an ability to avoid blacknose sharks while pursuing other SCS. Participants in recreational shark fisheries (including charter/headboats) may experience minor negative socioeconomic impacts as a result of increasing the recreational minimum size for hammerhead sharks to 78 inches fork length. This minimum size would still allow the recreational fisheries to land trophy-sized hammerhead sharks. Several of the stocks addressed in this Amendment are captured using gear and methods that may be non-selective with respect to species. Although scalloped hammerhead and blacknose sharks may not be targeted, fishing for large coastal and small coastal shark species may still generate discards and continued overfishing of these stocks. Quota linkages are explicitly designed to concurrently close multiple shark management groups, regardless of whether all the linked quotas are filled. This provides protection against incidental capture for species for which the quota has been reached, but it could also preclude fishermen from harvesting all of the available linked quotas. Quota linkages encourage fishermen to maximize the efficiency of fishing practices; for example, fishermen demonstrated an ability to selectively target non-blacknose SCS through adjustments in fishing practices.

In the analyses for the preferred alternative suite, we determined that the management measures are necessary to comply with the Magnuson-Stevens Act mandate to end overfishing of Atlantic blacknose sharks and scalloped hammerhead sharks. In addition, the preferred alternative suite

has been determined to be the most feasible alternatives to rebuild shark stocks according to the most recent assessments.

As described above, the preferred alternative suite and the corresponding management measures are expected to have positive or neutral conservation benefits for shark species, bycatch species, and protected resources. This is because the preferred alternative suite was specifically selected to mitigate any potential adverse impacts. Any resulting economic or social impacts, beyond those described above, are unavoidable.

### **5.3 Irreversible and Irretrievable Commitment of Resources**

The management measures in the preferred alternative suite would not result in any irreversible and irretrievable commitment of resources. There are expected to be positive ecological impacts because of the establishment of new TACs, quotas, quota linkages, and recreational measures. Because of this, the Agency expects interactions, fishing effort, and bycatch levels of sharks, along with bycatch of non-target species and protected resources may decrease. The preferred alternative suite would not change the amount or frequency of commercial reporting. We have already codified a framework for flexible shark management that allows the Agency to open and close the fishery, make in-season adjustment transfers, and link quotas.

## **Chapter 5 References**

SEDAR. 2011. SEDAR 21 Stock Assessment Report: HMS Blacknose, Dusky, and Sandbar Sharks. SEDAR, 4055 Faber Place Drive, Suite 201, North Charleston, SC 29405. 415p.

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## 6.0 ECONOMIC EVALUATION

This chapter assesses the economic impacts of the alternatives presented in this document. The primary purpose of this chapter is to provide the baseline economic data and economic impact analysis 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, it is not a stand-alone analysis, as it refers back to, provides background data for, and builds upon the specific data and analyses provided 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 alternatives considered, we analyzed the number of permits that were issued as of October 2012 in conjunction with HMS fishing activities. This represents an update of our analyses from the proposed rule which used permit data up to October 2011. We used the more updated October 2012 permit data for all analyses, as it provides more recent information on permit holders, and thus a more up-to-date picture of who will be affected by implementation of the final rule. The actual number of permit holders changes throughout the year because the permits expire at the end of each permit holder's birth month.

As of October 2012, there were a total of 486 commercial permit holders in the Atlantic shark fishery (215 directed and 271 incidental permits). Table 6.1 provides a summary of the number of permit holders since 2008. Unless otherwise discussed, the reference period for most of the analyses begins at 2008 because a number of significant regulatory changes went into effect in that year. Specifically, Amendment 2 to the 2006 Consolidated HMS FMP established new commercial shark quotas, required all fins remain naturally attached through landing for commercial and recreational fishermen, reduced the commercial retention limit, and prohibited the retention of sandbar shark for any commercial or recreational fishermen outside of the research fishery. Including years before Amendment 2 could distort the analyses because the fishery changed dramatically as a result of the management measures in Amendment 2. Further detail regarding commercial permit holders is provided in Chapter 3.

**Table 6.1** Number of Shark Limited Access Permits holder from 2008-2012.

Year	# Directed Shark	# Incidental Shark	# Tuna Longline
2012	215	271	253
2011	217	262	242
2010	215	265	248
2009	223	285	259

Year	# Directed Shark	# Incidental Shark	# Tuna Longline
2008	214	285	241

In addition to the universe of commercial shark permit holders, all of the Alternative Suites, other than Alternative Suite A1 (no action), contain changes that would also impact any Atlantic HMS Angling or Atlantic HMS Charter/Headboat permit holders. The numbers of Charter/Headboat and Angling permit holders since 2008 are listed in Table 6.2, as are the number of HMS tournaments that have targeted sharks since 2008. The total number of Charter/Headboat permits has declined by 168 since 2008, but has varied up and down from year-to-year. Atlantic HMS Angling permit holders can land all allowable HMS, not just sharks, and their numbers have steadily declined by a total of nearly 4,000 permits since 2008. The number of HMS tournaments targeting sharks has varied since 2008 with an average of 94 tournaments per year across the 5 year period. A low of 76 shark tournaments were held in 2012, and a maximum of 128 were held in 2010.

**Table 6.2** Number of CHB Permits, Angling Permits, and HMS Tournaments by Year in 2008-2012.

Year	CHB Permits	Angling Permits	HMS Shark Tournaments
2012	4,129	23,061	76
2011	4,194	23,138	93
2010	4,174	24,479	128
2009	4,150	25,506	83
2008	4,297	26,933	91

Atlantic shark dealers could be affected by any regulations that affect commercial shark vessels. The analyses in this document only consider impacts as a result of changes to the shark regulations. As of October 2012, there were a total of 92 Atlantic shark dealer permit holders. Table 6.3 provides a summary of these dealer permit holders by year from 2008 to 2012. All dealer permit holders are required to submit reports providing data about their businesses and transactions. Before January 1, 2013, all shark dealers were required to submit bi-weekly dealer reports on all HMS they purchased. To facilitate quota monitoring, “negative reports” for sharks are also required from dealers when no purchases have been made, allowing us to determine who has not purchased fish versus who has neglected to report. Since January 1, 2013, all shark dealers have been required to report all HMS they purchased or a negative report on a weekly basis.

**Table 6.3** Number of shark dealer permits issued from 2008-2012. The actual number of permits per region may change as permit holders move or sell their businesses.

Year	Atlantic shark dealers
2012	92

Year	Atlantic shark dealers
2011	117
2010	108
2009	106
2008	128

## 6.2 Gross Revenue of the Atlantic HMS Commercial Fishery

As described in earlier chapters, for most of the analyses in this document, the data used ends at 2011. While the number of permits sold in 2012 is available at this time for inclusion in our analyses, fishing data from 2012 such as ex-vessel prices and landings are not included because the 2012 data is not currently available as it is still being entered and quality controlled at the time of writing this document. We calculated annual gross revenues for the Atlantic HMS commercial fleet by first determining the total weight of commercial landings by species category for Atlantic HMS from dealer reports. The weights of the landings were then multiplied by the average annual ex-vessel prices obtained from dealer reporting to determine annual gross revenues.

**Table 6.4** Estimates of the total ex-vessel annual revenues of Atlantic HMS fisheries. Sources: CFDBS, QMS, and NMFS 2012.

Species		2008	2009	2010	2011
All Atlantic Tunas	Fishery Revenue	\$19,502,488	\$21,599,666	\$23,140,579	\$29,116,881
Swordfish	Ex-vessel \$/lb dw	\$3.68	\$3.46	\$4.41	\$4.51
	Weight lb dw	3,414,513	3,762,280	3,676,324	4,473,140
	Fishery Revenue	\$12,565,408	\$13,017,489	\$16,212,589	20,173,861
Large coastal sharks	Ex-vessel \$/lb dw	\$0.70	\$0.54	\$0.60	\$0.53
	Weight lb dw	1,363,021	1,513,201	1,519,603	1,485,497
	Fishery Revenue	\$954,115	\$817,129	\$911,762	\$787,298
Pelagic sharks	Ex-vessel \$/lb dw	\$1.21	\$1.18	\$1.22	\$1.35
	Weight lb dw	234,546	225,575	312,195	314,314
	Fishery Revenue	\$283,801	\$266,179	\$380,878	\$424,324
Small coastal sharks	Ex-vessel \$/lb dw	\$0.69	\$0.69	\$0.69	\$0.75
	Weight lb dw	623,848	667,815	357,855	583,364
	Fishery Revenue	\$430,455	\$460,792	\$246,920	\$437,523
Shark fins (weight = 5% of all sharks landed)	Ex-vessel \$/lb dw	\$12.43	\$12.45	\$13.99	\$11.90
	Weight lb dw	111,071	120,330	110,539	110,539
	Fishery Revenue	\$1,380,609	\$1,498,103	\$1,531,662	\$1,417,971
<b>Total sharks</b>	<b>Fishery Revenue</b>	<b>\$3,048,980</b>	<b>\$3,042,202</b>	<b>\$3,071,222</b>	<b>\$3,067,116</b>
<b>Total HMS</b>	<b>Fishery Revenue</b>	<b>\$34,116,875</b>	<b>\$37,659,357</b>	<b>\$42,424,389</b>	<b>\$52,357,858</b>

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

Of all Atlantic HMS, all shark species together bring in the lowest total annual gross revenues (~\$3.1 million in 2011) according to the calculations above and as reported in the 2012 SAFE Report (NMFS 2012). Table 6.4 provides data on the prices shark fishermen received at the dock. The average values for ex-vessel prices from the SEFSC Accumulative Landings System (ALS) and dealer reports from the Northeast were used to construct the table.

Table 6.5 reports ex-vessel prices by shark species group, region, and year from 2008 through 2011. The ex-vessel price data indicates somewhat stable ex-vessel prices since 2008.

**Table 6.5 Annual Gulf of Mexico median ex-vessel prices for shark species groups from 2008-2011.**  
Source: HMS Dealer Reports

Species Group	2008	2009	2010	2011
Blacknose shark	\$0.50	\$0.55	\$0.50	\$0.50
Blacktip shark	\$0.40	\$0.40	\$0.50	\$0.40
Hammerhead sharks (scalloped, great, smooth)	\$0.40	\$0.05	\$0.25	\$0.25
Non-Blacknose SCS	\$0.51	\$0.85	\$0.48	\$0.70
Non-Sandbar LCS	\$0.40	\$0.25	\$0.50	\$0.40
Sandbar shark	\$0.40	\$0.25	\$0.50	\$0.40
Shark fins	\$15.00	\$15.00	\$15.00	\$15.00

**Table 6.6 Annual South Atlantic median ex-vessel prices for shark species groups from 2008-2011.** Source: HMS Dealer Reports

Species Group	2008	2009	2010	2011
Blacknose shark	\$0.84	\$0.75	\$0.81	\$0.75
Hammerhead sharks (scalloped, great, smooth)	\$0.25	\$0.28	\$0.15	\$0.09
Non-Blacknose SCS	\$0.75	\$0.70	\$0.73	\$0.75
Non-Sandbar LCS	\$0.54	\$0.55	\$0.70	\$0.60
Sandbar shark	\$0.45	\$0.55	\$0.85	\$0.70
Shark fins	\$12.00	\$11.00	\$12.00	\$12.00

**Table 6.7 Median ex-vessel prices for shark species groups from 2008-2011.**

Species Group	Median Price
Blacknose shark	\$0.75
Blacktip shark	\$0.40
Hammerhead sharks (scalloped, great, smooth)	\$0.20
Non-Blacknose SCS	\$0.70
Non-Sandbar LCS	\$0.50
Sandbar shark	\$0.50
Shark fins	\$12.00

### 6.3 Variable Costs and Net Revenues of Atlantic HMS Commercial Fishing Vessels

We have collected operating cost information from commercial permit holders via logbook reporting since 2004. Each year, 20 percent of active Atlantic HMS commercial permit holders are selected to report economic information along with their Atlantic HMS logbook or coastal fisheries logbook submissions. In addition, we also receive voluntary submissions of the trip expense and payment section of the logbook form from non-selected vessels. The costs reported below in this section are input costs and are not generally impacted by regulations such as those implemented in 2008 with Amendment 2 to the 2006 Consolidated HMS FMP. Therefore, for this section, we use the cost data from 2004, which is when reporting cost-earnings data became mandatory, through 2011.

It should be noted that most of the vessels reporting in the Atlantic HMS logbook, the source used for the data in the following tables, are pelagic longliners which typically target BAYS tuna or swordfish. Most shark fishermen use bottom longline gear, and report in the coastal fisheries logbook. However, the costs associated with pelagic and bottom longline fisheries are comparable.

The primary expenses associated with operating an Atlantic HMS permitted commercial vessel include labor, fuel, bait, ice, groceries, and other gear. Unit costs are collected on some of the primary variable inputs associated with trips. The unit costs for fuel and bait are reported in Table 6.8. Fuel costs increased over 270 percent from 2004 to 2011 while the cost per pound for bait remained fairly constant through 2010 before increasing by 80 percent in 2011.

**Table 6.8 Median Unit Costs for Fuel and Bait 2004 - 2011.** Source: Atlantic HMS logbooks.

Input Unit Costs	2004	2005	2006	2007	2008	2009	2010	2011
Fuel	\$1.25	\$1.85	\$2.15	\$2.25	\$3.55	\$1.73	\$2.50	\$3.38
Bait	\$0.80	\$0.84	\$0.85	\$0.85	\$0.81	\$0.81	\$0.85	\$1.53

Table 6.9 provides the median total cost per trip for the major variable inputs associated with Atlantic HMS trips. Fuel costs are one of the largest variable expenses and the total costs of fuel decreased substantially per trip in 2009 and 2010 before rising again in 2011 in line with changes in the unit cost of fuel.

**Table 6.9 Median Input Costs for HMS Trips 2004 - 2011.** Source: Atlantic HMS logbooks.

Input Costs	2004	2005	2006	2007	2008	2009	2010	2011
Fuel	\$2,029	\$2,786	\$1,728	\$3,012	\$3,600	\$3,000	\$2,480	\$3,455
Bait	\$1,110	\$1,200	\$1,115	\$1,200	\$1,500	\$1,875	\$1,731	\$3,671
Ice Costs	\$480	\$495	\$498	\$540	\$540	\$625	\$225	\$726
Grocery Expenses	\$790	\$793	\$696	\$786	\$800	\$1,000	\$752	\$900
Other Trip Costs	\$1,000	\$1,500	\$1,200	\$1,500	\$1,651	\$1,670	\$1,500	\$2,000

Labor costs are also an important component of operating costs for HMS commercial vessels. Table 6.10 lists the amount of crew on a typical trip. The median number of crew members has been consistently three from 2004 to 2011. Most crew and captains are paid based on a lay system. According to Atlantic HMS logbook reports, owners are typically paid 50 percent of revenues. Captains receive a 20 percent share and crew in 2011 received 29 percent on average. These shares are typically paid out after costs are netted from gross revenues. Median total shared costs per trip have ranged from \$4,903 to \$11,306 from 2004 to 2011.

**Table 6.10 Median Labor Inputs and Costs for HMS Trips 2004 - 2011.** Source: Atlantic HMS logbooks.

Labor	2004	2005	2006	2007	2008	2009	2010	2011
Number of Crew	3	3	3	3	3	4	3	3
Owner Share	50%	50%	50%	47%	45%	45%	50%	50%
Captain Share	20%	20%	20%	20%	20%	20%	23%	20%
Crew Share	13%	12%	13%	15%	15%	30%	29%	29%
Total Shared Costs	\$4,903	\$5,000	\$5,657	\$5,566	\$6,037	\$7,000	\$6,500	\$11,306

In 2011, median reported total trip sales were \$26,650. In 2010, median reported total trip sales were \$17,768. In 2009, the median reported total trip sales were \$17,584. After adjusting for operating costs, median net earnings per trip in 2010 were \$7,525. Median net earnings per trip increased to \$11,255 in 2011.

It should be noted that operating costs for the Atlantic HMS commercial fleet vary considerably from vessel to vessel. The factors that impact operating costs include unit input costs, vessel size, target species, and geographic location, among other things.

#### **6.4 Expected Economic Impacts of the Alternatives**

In this FEIS we designed a range of alternative suites for meeting the objectives of the action. The six alternative suites address a range of potential shark TACs, quotas, as well as recreational measures. Each of the six alternative suites would impact both commercial and recreational shark fisheries. The expected economic impacts of the different alternatives considered and analyzed are discussed below.

##### **6.4.1 Alternative Suite A1**

Alternative Suite A1 (status quo) would not change current management of the Atlantic shark fisheries. Base quotas would be as follows: Gulf of Mexico non-sandbar LCS 439.5 mt dw; Atlantic non-sandbar LCS 188.3 mt dw; non-sandbar LCS in the research fishery 50 mt dw; sandbar shark in research fishery 116.6 mt dw; non-blacknose SCS 221.6 mt dw; blacknose shark 19.9 mt dw; blue shark 273 mt dw; porbeagle shark 1.7 mt dw; and pelagic sharks other than porbeagle of blue 488 mt dw. Also, this alternative suite would maintain the possession limit of one shark > 54" fork length per vessel per trip, and 1 Atlantic sharpnose and 1 bonnethead shark per person per trip with no minimum size requirements for recreational fishermen.

##### *Scalloped Hammerhead Sharks*

As of October 2012, there were 215 directed shark permit holders, 271 incidental permit holders, and 92 shark dealers. From 2008 through 2011, an average of approximately 22 vessels with directed shark permits landed hammerhead sharks, while on average approximately 2 vessels with incidental shark permits landed hammerhead sharks in the Atlantic region. In the Gulf of Mexico region, an average of approximately 12 vessels with directed shark permits landed hammerhead sharks, while on average approximately 1 vessel with an incidental shark permit landed hammerhead sharks. In the HMS logbook and coastal fisheries logbook (CFL), fishermen typically report "unidentified hammerhead sharks" and do not list the individual hammerhead shark species. Therefore, in order to estimate the proportion of scalloped hammerhead sharks being landed, we applied the proportion of hammerhead landings from the SEFSC observer data, which has hammerhead sharks reported to the species level, to the logbook data. This process allowed us to estimate that scalloped hammerhead sharks represent 72 percent of all hammerhead shark landings.

The average annual gross revenues from 2008 through 2011 from scalloped hammerhead shark meat and fins vary based on the region. In the Atlantic region, annual gross revenues for the entire fleet from scalloped hammerhead shark meat were \$8,181, while the shark fins were \$24,542. Thus, total average annual gross revenues for the fleet for scalloped hammerhead shark landings in the Atlantic region were \$32,723 (\$8,181 + \$24,542) (Table 6.11). Directed shark permit holders landed approximately 97 percent of the hammerhead sharks, whereas incidental shark permit holders landed approximately 3 percent of the scalloped hammerhead sharks. In total, directed shark permit holders earned approximately \$31,741 in average annual gross revenues from scalloped hammerhead shark landings, whereas incidental shark permit holders earned approximately \$982 (Table 6.11). Divided evenly amongst the directed and incidental shark permit holders that landed scalloped hammerhead, the average directed shark permit holder earned \$1,443 in average annual gross revenues ( $\$31,741 / 22$  directed vessels = \$1,443 per vessel), and the average incidental shark permit holder earned \$491 in average annual gross revenues from scalloped hammerhead shark landings ( $\$982 / 2$  incidental vessels = \$491 per vessel).

In the Gulf of Mexico region, annual gross revenues for the fleet from scalloped hammerhead shark meat were \$9,921, while the shark fins were \$29,760. Thus, total average annual gross revenues for the fleet for scalloped hammerhead shark landings in the Gulf of Mexico region were \$39,681 (Table 6.11). Directed shark permit holders landed approximately 99.9 percent of the scalloped hammerhead sharks, whereas incidental shark permit holders landed approximately 0.1 percent of the scalloped hammerhead sharks the permit types reported in the coastal fisheries and HMS logbooks. In total, directed shark permit holders collectively earned approximately \$39,641 in average annual gross revenues from scalloped hammerhead shark landings, whereas the one incidental shark permit holder earned approximately \$40 (Table 6.11). Divided evenly amongst the directed shark permit holders that landed scalloped hammerhead, the average directed shark permit holder earned \$3,303 in average annual gross revenues ( $\$39,641 / 12$  directed vessels = \$3,303 per vessel).

**Table 6.11 Median hammerhead ex-vessel prices and average annual gross revenues for the fleet by region from 2008-2011. Shark fins are assumed to be 5 percent of the carcass weight.**

Species	Average Landings (lb dw)	Median Ex-Vessel Price	Average Annual Gross Revenues
<i>Atlantic Region</i>			
Scalloped HH shark	40,904	\$0.20	\$8,181
Fins	2,045	\$12	\$24,542
Total			\$32,723
<i>Gulf of Mexico Region</i>			
Scalloped HH shark	39,685	\$0.25	\$9,921
Fins	1,984	\$15	\$29,760
Total			\$39,681

Under Alternative Suite A1, by maintaining the status quo, we would not implement a rebuilding plan for scalloped hammerhead sharks, allowing for a greater number of

scalloped hammerhead sharks to be harvested then under the other alternative suites, which reduce allowable landings consistent with the scientific advice. Currently, an average of 40,904 lb dw of scalloped hammerhead sharks are annually harvested and sold in the Atlantic region and an average of 39,685 lb dw are annually harvested and sold in the Gulf of Mexico region. In the Atlantic region, median ex-vessel values from 2008-2011 are \$0.20 for meat and \$12.00 for fins. In the Gulf of Mexico region, median ex-vessel values from 2008-2011 are \$0.25 for meat and \$15 for fins. Assuming a fin-to-carcass ratio of 5 percent, the scalloped hammerhead fishery has an average annual ex-vessel value of \$32,723 in the Atlantic region (40,904 lb dw of meat, 2,045 lb dw of fins) and \$39,681 in the Gulf of Mexico region (39,85 lb dw of meat, 1,984 lb of fins). Scalloped hammerhead sharks comprise a small portion of total non-sandbar LCS landings; an annual average of 7.3 percent of non-sandbar LCS landings are scalloped hammerhead sharks in the Atlantic region and 4.3 percent on the Gulf of Mexico region.

In the short-term, this portion of the alternative suite would likely have direct minor beneficial socioeconomic impacts. By not limiting scalloped hammerhead shark harvest and sale beyond the existing non-sandbar LCS quota, fishermen would experience higher revenues in the short-term, but because scalloped hammerhead sharks comprise a small portion of total non-sandbar LCS catch, the benefit would be minor. In the long-term, some of these benefits would decline. Scalloped hammerhead sharks are overfished with overfishing occurring and, under current management measures, the stock would become increasingly unproductive. Consequently, in the long-term, direct minor adverse socioeconomic impacts would be likely due to decreased stock size and decreased availability.

### *Large Coastal Sharks*

From 2008 through 2011, on average 43 vessels with directed shark permits landed non-sandbar LCS, while on average 14 vessels with incidental shark permits landed non-sandbar LCS in the Atlantic. In the Gulf of Mexico region, on average 18 vessels with directed shark permits landed non-sandbar LCS, while on average 6 vessels with incidental shark permits landed non-sandbar LCS.

The average annual gross revenues from 2008 through 2011 from non-sandbar LCS meat and fins would vary based on the region and species included in the management group. In the Atlantic region, annual gross revenues for the entire fleet from non-sandbar LCS meat were \$336,901, while the shark fins were \$336,900. Thus, total average annual gross revenues for non-sandbar LCS shark landings in the Atlantic region were \$673,801 (\$336,901 + \$336,900) (Table 6.12). Directed shark permit holders landed approximately 97 percent of the non-sandbar LCS, whereas incidental shark permit holders landed approximately 3 percent of the non-sandbar LCS. In total, directed shark permit holders collectively earned approximately \$653,587 in average annual gross revenues from non-sandbar LCS landings, whereas incidental shark permit holders earned approximately \$20,214 (Table 6.12). Divided evenly amongst the directed and incidental shark permit holders that landed non-sandbar LCS, the average directed shark permit holder earned \$15,200 in average annual gross revenues (\$653,587 / 43 directed

vessels = \$15,200 per vessel), and the average incidental shark permit holder earned \$1,444 in average annual gross revenues from non-sandbar LCS landings (\$20,214 / 14 incidental vessels = \$1,444 per vessel).

**Table 6.12 Median non-sandbar LCS ex-vessel prices and average annual gross revenues for the fleet by region from 2008-2011. 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>Atlantic Region</i>			
Non-sandbar LCS	561,501*	\$0.60	\$336,901
Fins	28,075	\$12	\$336,900
Total			\$673,801
<i>Gulf of Mexico Region</i>			
Non-sandbar LCS	931,539*	\$0.40	\$372,616
Fins	46,577	\$15	\$698,655
Total			\$1,071,271

\*Includes landings that were reported as unknown shark

In the Gulf of Mexico region, annual gross revenues for the fleet from non-sandbar LCS meat were \$372,616, while the shark fins were \$698,654. Thus, total average annual gross revenues for non-sandbar LCS shark landings in the Gulf of Mexico region were \$1,071,271 (\$372,616 + \$698,655) (Table 6.12). Directed shark permit holders landed approximately 99 percent of the non-sandbar LCS, whereas incidental shark permit holders landed approximately 1 percent of the non-sandbar LCS. All directed shark permit holders collectively earned approximately \$1,060,558 in average annual gross revenues from non-sandbar LCS landings, whereas all incidental shark permit holders earned approximately \$10,713 (Table 6.12). Divided evenly amongst the directed and incidental shark permit holders that landed non-sandbar LCS, the average directed shark permit holder earned \$58,920 in average annual gross revenues (\$1,060,558 / 18 directed vessels = \$58,920 per vessel), and the average incidental shark permit holder earned \$1,786 in average annual gross revenues from non-sandbar LCS landings (\$10,713 / 6 incidental vessels = \$1,786 per vessel).

Alternative Suite A1 would not alter the species composition or quota for the non-sandbar LCS management group. This measure would only impact the fishermen fishing for the species being considered for removal from the non-sandbar LCS quota: scalloped hammerhead sharks and Gulf of Mexico blacktip sharks. The economic impacts on fishermen fishing for scalloped hammerhead sharks and Gulf of Mexico blacktip sharks is discussed in Sections 6.4.1.1 and 6.4.1.2 respectively. Therefore, under Alternative suite A1, taking no action for non-sandbar LCS would not result in any additional direct socioeconomic impacts in the short or long-term beyond those discussed for scalloped hammerhead and blacktip sharks.

#### *Gulf of Mexico Blacktip Sharks*

As of October 2012, there were 215 directed shark permit holders, 271 incidental permit holders, and 92 shark dealers. From 2008 through 2011, approximately 15 vessels with

directed shark permits landed blacktip sharks, while approximately 2 vessels with incidental shark permits landed blacktip sharks in the Gulf of Mexico region. The average annual gross revenues for the fleet from 2008 through 2011 from Gulf of Mexico blacktip shark meat were \$217,562. Average annual gross revenues for the fleet for blacktip shark fins were \$407,925, making total average annual gross revenues for the fleet for blacktip shark landings for the entire fishery \$625,487 (\$217,562 + \$407,925) (Table 6.13). Directed shark permit holders landed approximately 99.6 percent of the blacktip sharks, whereas incidental shark permit holders landed approximately 0.4 percent of the blacktip sharks. In total, directed shark permit holders collectively earned approximately \$622,985 in average annual gross revenues from blacktip shark landings, whereas incidental shark permit holders earned approximately \$2,502 from blacktip shark landings (Table 6.13). Divided evenly amongst the directed and incidental shark permit holders that landed blacktip shark, the average directed shark permit holder earned \$41,532 in average annual gross revenues ( $\$622,985 / 15$  directed vessels = \$41,532 per vessel), and the average incidental shark permit holder earned \$1,251 in average annual gross revenues from blacktip shark landings ( $\$2,502 / 2$  incidental vessels = \$1,251 per vessel).

**Table 6.13 Median blacktip ex-vessel prices and average annual gross revenues for the fleet from 2008-2011. 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>Gulf of Mexico Region</i>			
Blacktip shark	543,905	\$0.40	\$217,562
Fins	27,195	\$15	\$407,925
Total			\$625,487

Under the No Action Alternative Suite A1, blacktip sharks would remain in the non-sandbar LCS management group and a separate quota would not be established for the species. This alternative would result in short- and long-term direct socioeconomic neutral impacts. Based on the final SEDAR 29 stock assessment, we have determined that the Gulf of Mexico blacktip shark stock is not overfished and overfishing is not occurring, and current landings are believed to be sustainable. Therefore, based on this assessment, the short and long-term direct socioeconomic impacts of maintaining status quo for blacktip sharks are expected to be neutral.

#### *Blacknose Sharks*

Since implementation of Amendment 3 to the 2006 Consolidated HMS FMP in 2010, an average of approximately 25 vessels with directed shark permits landed blacknose sharks, while approximately 3 vessels with incidental shark permits landed blacknose sharks (see Table 6.1 for total shark permit numbers). The average annual gross revenues for the entire fleet from 2010 through 2011 from blacknose shark meat were \$29,409. Average annual gross revenues for blacknose shark fins for the entire fleet were \$23,941, making total average annual gross revenues for blacknose shark landings for the entire fishery \$52,941 (\$29,409 + \$23,941) (Table 6.14). Directed shark permit holders landed approximately 98 percent of the blacknose sharks, whereas incidental shark permit holders landed approximately 2 percent of the blacknose sharks. In total, directed shark

permit holders earned approximately \$51,882 in average annual gross revenues from blacknose shark landings, whereas incidental shark permit holders earned approximately \$1,059 from blacknose shark landings (Table 6.14). Divided evenly amongst the directed and incidental shark permit holders that landed blacknose, the average directed shark permit holder earned \$2,075 in average annual gross revenues ( $\$51,882 / 25$  directed vessels = \$2,075 per vessel), and the average incidental shark permit holder earned \$353 in average annual gross revenues from blacknose shark landings ( $\$1,059 / 3$  incidental vessels = \$353 per vessel).

**Table 6.14 Median blacknose ex-vessel prices and average annual gross revenues for the fleet from 2010-2011. 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>No Region</i>			
Blacknose shark	39,212	\$0.75	\$29,409
Fins	1,961	\$12	\$23,532
Total			\$52,941

Under the Alternative Suite A1, the No Action alternative, there would be neutral direct socioeconomic impacts to directed and incidental shark permit holders as the average annual gross revenues from blacknose shark landings would be the same in the short-term. Neutral social impacts are anticipated as fishermen would be expected to fish in a similar manner as they currently do, and neutral indirect social impacts are anticipated for shark dealers and other entities that deal with shark products as we expect these businesses to operate in the same manner in the short-term. However, in the long-term, because Atlantic blacknose sharks are overfished with overfishing occurring, maintaining status quo could result in a decrease in revenues, which could result in moderate adverse socioeconomic impacts. This could result in direct moderate adverse social impacts as fishermen would have to fish in other fisheries to make up for lost revenues. Transferring to other fisheries may result in relocation expenses, investments in new gear, and inefficiencies that may occur why learning how to optimally fish in a different fishery. There could also be indirect minor adverse social impacts on shark dealers and other entities that deal with shark products as they would also have to diversify or leave the shark business as revenues decrease.

#### *Non-Blacknose Small Coastal Sharks*

Since the implementation of Amendment 3 to the 2006 Consolidated HMS FMP, which established the non-blacknose SCS quota on July 1, 2010, an average of approximately 41 vessels with directed shark permits landed non-blacknose SCS, while approximately 13 vessels with incidental shark permits landed non-blacknose SCS. The average annual gross revenues for the fleet from 2010 through 2011 from non-blacknose SCS meat were \$295,265. Average annual gross revenues for the fleet for non-blacknose SCS fins were \$253,080, making total average annual gross revenues for blacknose shark landings for the entire fishery \$548,345 ( $295,265 + 253,080$ ) (Table 6.15). Directed shark permit holders landed approximately 98 percent of the blacknose sharks, whereas incidental shark permit holders landed approximately 2 percent of the blacknose sharks. In total, directed shark permit holders collectively earned approximately \$537,378 in average

annual gross revenues from non-blacknose SCS landings, whereas incidental shark permit holders earned approximately \$10,967 from non-blacknose SCS landings (Table 6.15). Divided evenly amongst the directed and incidental shark permit holders that landed non-blacknose SCS, the average directed shark permit holder earned \$13,107 in average annual gross revenues ( $\$537,378 / 41$  directed vessels = \$13,107 per vessel), and the average incidental shark permit holder earned \$844 in average annual gross revenues from non-blacknose SCS landings ( $\$10,967 / 13$  incidental vessels = \$844 per vessel).

**Table 6.15 Median non-blacknose SCS ex-vessel prices and average annual gross revenues for the fleet from 2010-2011. 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>No Region</i>			
Non-Blacknose SCS	421,807	\$0.70	\$295,265
Fins	21,090	\$12	\$253,080
Total			\$548,345

Under the Alternative Suite A1, the No Action alternative, there would be neutral socioeconomic impacts to directed and incidental shark permit holders as the average annual gross revenues from non-blacknose SCS landings would be the same in the short-term. Neutral short-term socioeconomic impacts are anticipated as fishermen would be expected to fish in a similar manner as they currently do, and neutral indirect socioeconomic impacts are anticipated for shark dealers and other entities that deal with shark products as we expect these businesses to operate in the same manner in the short term.

#### *Quota Linkages*

Since Alternative Suite A1 does not create any new species management groups or quotas, new quota linkages would be unnecessary. Consequently, there are no additional direct or indirect socioeconomic impacts in maintaining status quo in quota linkages in the short- or long-term beyond those discussed for scalloped hammerhead sharks, blacktip sharks, non-blacknose SCS, and blacknose sharks.

#### *Recreational Measures*

Under Alternative Suite A1, the No Action alternative, we would maintain the existing recreational retention limits for all species. Currently, recreational anglers may only retain sharks that are at least 54 inches fork length. Recreational anglers are allowed to retain one authorized shark species (*i.e.*, non-ridgeback large coastal shark, tiger shark, small coastal shark, or pelagic shark) per vessel per trip. In addition, recreational anglers are also allowed one Atlantic sharpnose and one bonnethead shark with no minimum size per person per vessel per trip. Tournaments awarding points for sharks are unlikely to be impacted by maintaining the 54 inch fork length minimum size. Tournament participants typically target larger sharks than other recreational fishermen and many tournaments have minimum shark sizes greater than 54 inches fork length. This portion of Alternative

Suite A1 would have short-term neutral socioeconomic impacts because it would allow recreational fishermen to continue to target and retain the same size range of sharks, maintaining the current incentives to recreational fish for sharks. In the long-term, however, this portion of Alternative Suite A1 could have minor adverse socioeconomic impacts. Current fishing pressure could lead to further stock declines for those species that are overfished and/or experiencing overfishing, leading to decreased stock health and less availability of the resource for recreational anglers. The reduced availability would likely result in fewer recreational shark angling trips.

### *Conclusion*

When taken as a whole, Alternative Suite A1 would likely have direct neutral social and economic impacts in the short-term because the shark fishery would continue to operate as it currently does. In the long-term, it could cause direct moderate adverse social and economic impacts because, in maintaining the status quo, we would not be making needed changes to the fishery to address overfishing and overfished stocks and the stocks would not rebuild within the rebuilding timeframes. Since Alternative Suite A1 does not address the overfished and/or overfishing determination based on recent stock assessments, we do not prefer this alternative at this time. The decline in catches would lead to a moderate reduction in sales and revenue.

Indirect short- and long-term socioeconomic impacts resulting from any of this Alternative Suite's actions would likely be neutral. The measures in this Alternative Suite would maintain the status quo with respect to shark landings and fishing effort. Consequently, dealers and supporting businesses, such as bait and tackle suppliers, would be unlikely to experience any impacts in the short term. In the long-term, as catches of overfished stocks decline, minor negative socioeconomic impacts would occur as dealers and supporting businesses would have to offset reduced revenues from shark landings.

#### **6.4.2 Alternative Suite A2**

Alternative Suite A2 would establish new species management groups by regions, adjust LCS and SCS quotas, link appropriate quotas, and increase recreational reporting and outreach. We would remove three species of hammerhead sharks (great, scalloped, and smooth) from the non-sandbar LCS management group to form separate regional quotas, and create regional quotas for blacknose sharks and non-blacknose SCS. Also, blacktip sharks would be removed from the Gulf of Mexico non-sandbar LCS management group. Since separate quotas for hammerhead sharks and Gulf of Mexico blacktip sharks would be established, necessitating removal of these species from the non-sandbar LCS management group, the non-sandbar LCS management group would be renamed "aggregated LCS" in both the Atlantic and Gulf of Mexico regions. The new Gulf of Mexico regional base quotas would be as follows: hammerhead sharks 25.3 mt dw; blacktip sharks 256.6 mt dw; aggregated LCS 157.5 mt dw; blacknose sharks 2.0 mt dw; and non-blacknose SCS 45.5 mt dw. The new aggregated LCS management group in the Gulf of Mexico would consist of bull, lemon, nurse, spinner, silky, and tiger sharks. Gulf of Mexico hammerhead shark, Gulf of Mexico blacktip shark, and Gulf of Mexico aggregated LCS quotas would be linked as well as Gulf of Mexico blacknose and Gulf of

Mexico non-blacknose SCS quotas to prevent overfishing of one species while fishing for another species or management group. In the Atlantic region, base quotas would be as follows: hammerhead sharks 27.1 mt dw; aggregated LCS 168.9 mt dw; blacknose sharks 18.0 mt dw; and non-blacknose SCS 176.1 mt dw. The new aggregated LCS management group in the Atlantic region would consist of blacktip, bull, lemon, nurse, spinner, silky, and tiger sharks. Atlantic hammerhead and Atlantic aggregated LCS quotas would be linked as well as Atlantic blacknose and Atlantic non-blacknose SCS quotas to prevent overfishing of one species while fishing for another species or management group. In addition, this alternative would require mandatory reporting of recreational landings of hammerhead sharks, and provide identification guides for all prohibited shark species. This alternative suite differs from the preferred Alternative Suite A6 in that Alternative Suite A6 would not link the Gulf of Mexico blacktip shark quota with the Gulf of Mexico hammerhead shark and non-sandbar LCS quotas, and that Alternative Suite A2 does not include a new 78 inch fork length minimum size limit for recreational landings of hammerhead sharks.

### *Scalloped Hammerhead Sharks*

Under Alternative Suite A2, we would establish an Atlantic region and a Gulf of Mexico region hammerhead shark quota (including scalloped, smooth, and great hammerhead sharks) using the methodology outlined in Chapter 2. Currently, fishermen catch and sell an annual average 57,587 lb dw of hammerhead sharks in the Atlantic region (ACCSP Database, 2008-2011) and 53,717 lb dw in the Gulf of Mexico region (GULFIN Database, 2008-2011). During that same time period (2008-2011), the highest annual landing of hammerhead sharks was 94,129 lb dw in the Atlantic region and 87,839 lb dw in the Gulf of Mexico region. Using the ex-vessel prices described above under Alternative Suite A1 and assuming a fin-to-carcass ratio of 5 percent, maximum landings in those years resulted in an annual ex-vessel value of \$75,303 in the Atlantic region (94,129 lb of meat, 4,706 lb of fins) and \$87,839 in the Gulf of Mexico region (87,839 lb of meat, 4,392 lb of fins) for hammerhead sharks. Under Alternative Suite A2, landings of hammerhead sharks would be limited to 59,736 lb dw in the Atlantic region (2,149 lb above average landings) and 55,722 lb dw in the Gulf of Mexico region (2,005 lb above average landings). Using the ex-vessel prices described above under Alternative Suite A1 and assuming a fin-to-carcass ratio of 5 percent, this would result in the hammerhead shark landings averaging an annual ex-vessel value of \$46,070 in the Atlantic region (57,587 lb of meat, 2,879 lb of fins) and \$53,349 in the Gulf of Mexico region (55,722 lb of meat, 2,786 lb of fins). Under Alternative Suite A2, ex-vessel hammerhead shark revenue, when compared to average landings, would potentially be increased by \$1,719 to \$47,789 in the Atlantic region (59,736 lb of meat, 2,987 lb of fins) and increased by \$2,005 to \$55,722 in the Gulf of Mexico region (55,722 lb of meat, 2,786 lb of fins), assuming the same ex-vessel values and fin-to-carcass ratio. However, because hammerhead sharks are currently counted against the regional non-sandbar LCS quotas, which are much higher than the regional hammerhead shark quotas considered in this alternative, the opportunities to land hammerhead sharks would be reduced. When compared to the highest annual incidental hammerhead landings between 2008 and 2011, the quotas considered in this alternative suite would result in potential revenue reductions of \$27,514 in the Atlantic region and \$32,117 in the Gulf of Mexico region. These

analyses suggest that while fishermen would see an increase in average annual revenue under the quotas considered in Alternative Suite A2, they could see reductions in revenue in at least some years. These potential reductions in revenue could negatively impact fishermen in the directed and incidental hammerhead shark fishery; however, they would not do so every year. Additionally, hammerhead sharks species rarely make up a significant portion of shark landings as there is no directed fishery for hammerhead sharks and all landings are the result of incidental catches made while pursuing other shark species. Therefore, under this alternative, we expect short- and long-term direct minor adverse socioeconomic impacts.

### *Large Coastal Sharks*

Under Alternative Suite A2, we would establish new, separate quotas for hammerhead sharks and Gulf of Mexico blacktip sharks, necessitating removal of these species from the non-sandbar LCS management group (which will then be renamed “aggregated LCS” in both the Atlantic and Gulf of Mexico regions). The regional aggregated LCS quotas would be based on average annual landings of the remaining species (see Chapter 2 for annual landings of remaining species); therefore, those species comprising the aggregated LCS management group would likely not experience a change in fishing pressure as landings would be capped at recent levels. For these reasons, short- and long-term direct socioeconomic impacts resulting from this portion of Alternative Suite A2 are expected to be neutral. We do not expect any additional socioeconomic impacts to occur as the result of the non-sandbar LCS management group measures in this alternative suite.

### *Gulf of Mexico Blacktip Sharks*

As discussed in Chapter 1 of this document, based on the SEDAR 29 Gulf of Mexico blacktip shark stock assessment, we have determined that the Gulf of Mexico blacktip shark stock is not overfished and not experiencing overfishing. These results indicate the Gulf of Mexico blacktip shark stock can sustain current fishing levels. The quota of 256.6 mt dw (565,700 lb dw) blacktip sharks, calculated in Chapter 2 (Table 2.5 and Table 2.6), is representative of the current blacktip shark landings applied to the 2013 Gulf of Mexico non-sandbar LCS quota (see Chapter 2 for further details). Based on current average annual landings, Gulf of Mexico blacktip shark landings result in average annual revenues of \$625,487 across the whole fishery (2008-2011 median ex-vessel values of \$0.40 for meat and \$15 for fins, based on a 5 percent fin-to-carcass ratio). Given the current stock status, fishermen would likely continue to realize this revenue, fishery-wide. Therefore, based on current information, short- and long-term direct socioeconomic impacts are expected to be neutral.

### *Blacknose Sharks*

Under Alternative Suite A2, we would separate blacknose sharks into the Atlantic and Gulf of Mexico regions as recommended in the SEDAR 21 stock assessment. These alternatives would decrease the blacknose shark landings in each region.

In the Atlantic region, a TAC of 7,300 blacknose sharks would be established based on the SEDAR 21 stock assessment. The new quota for the Atlantic blacknose sharks would be 18.0 mt dw (39,749 lb dw) under Alternative Suite A2. Average annual gross revenues for the blacknose shark landings for the Atlantic region would increase by \$741 from \$54,113 under the No Action alternative to \$54,854 under Alternative Suite A2 when compared to average landings from 2010-2011. Although, because the blacknose shark quota considered for the Atlantic region would be less than the current overall blacknose shark quota (19.9 mt dw), there would be some minor, adverse socioeconomic impacts associated with the reduced opportunities to land blacknose sharks. We anticipate that directed and incidental shark permit holders would experience neutral direct socioeconomic impacts in the short- and long-term as blacknose sharks are not the targeted shark species for SCS fishermen.

For the Gulf of Mexico region, we would implement a blacknose shark quota that is equal to the 2011 commercial landings. The new quota would be 2.0 mt dw (4,513 lb dw) under this alternative. This would cause a minor decrease to the average annual gross revenues for the blacknose shark landings for the Gulf of Mexico region from \$5,645 under the No Action alternative to \$5,641 under Alternative Suite A2. We anticipate these directed and incidental shark permit holders would experience neutral direct socioeconomic impacts in the short- and long-term since the new Gulf of Mexico blacknose shark quota would be consistent with current landings.

Under Alternative Suite A2, we anticipate that there would be neutral direct socioeconomic impacts in the short-term from the quotas considered under this alternative suite. In the short-term, change in revenues would be minimal for the 20 directed shark permit and 1 incidental shark permit holders that land blacknose sharks in the Atlantic region, and the 5 directed shark and the 2 incidental shark permits that land blacknose sharks in the Gulf of Mexico region. Over the long-term, the socioeconomic impact would be minor, as blacknose sharks are not the targeted shark species for SCS fishermen, and the fishermen are likely to adapt to the new regulations by fishing in other fisheries, or change their fishing habitats.

#### *Non-Blacknose Small Coastal Sharks*

Alternative Suite A2 would establish regional quotas for non-blacknose SCS based on the non-blacknose SCS landings from 2010 to 2011. Based on the landings data, the non-blacknose SCS quota in the Atlantic region would be 176.1 mt dw (388,222 lb dw) and would be 45.5 mt dw (100,317 lb dw) in the Gulf of Mexico region. In the Atlantic region, an average of approximately 35 vessels with directed shark permits landed non-blacknose SCS, while approximately 9 vessels with incidental shark permits landed non-blacknose SCS. The average annual gross revenues from Atlantic non-blacknose SCS meat were \$265,388, and average annual gross revenues for Atlantic non-blacknose SCS fins were \$221,157. This equates to a total average annual gross revenues from blacknose shark landings for the Atlantic region \$486,545 (Table 6.16).

In the Gulf of Mexico region, since Amendment 3 to the 2006 Consolidated HMS FMP was implemented in 2010, an average of 6 vessels with directed shark permits landed

non-blacknose SCS, while 4 vessels with incidental shark permits landed non-blacknose SCS. The average annual gross revenues from Gulf of Mexico non-blacknose SCS meat were \$31,927 and average annual gross revenues for Gulf of Mexico non-blacknose SCS fins were \$39,909, making total average annual gross revenues for non-blacknose SCS landings for the Gulf of Mexico region \$71,836 (Table 6.16).

**Table 6.16 Median non-blacknose SCS ex-vessel prices and average annual gross revenues for the fleet by region from 2010-2011. 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>Atlantic Region</i>			
Non-Blacknose SCS	368,595	\$0.72	\$265,388
Fins	18,430	\$12	\$221,157
Total			\$486,545
<i>Gulf of Mexico Region</i>			
Non-Blacknose SCS	53,212	\$0.60	\$31,927
Fins	2,661	\$15	\$39,909
Total			\$71,836

Under the Alternative Suite A2, there would be neutral direct and indirect socioeconomic impacts to directed and incidental shark permit holders as the average annual gross revenues from non-blacknose SCS landings would be the same as the status quo in the short- and long- term. Fishermen and shark dealers would be expected to operate in the same manner as the status quo in the short-term. However, this alternative suite could have minor negative direct and indirect socioeconomic impacts on fishermen and shark dealers and associated shark businesses that deal with non-blacknose SCS product if fishing effort increases for non-blacknose SCS. Currently, the non-blacknose SCS fishery has not harvested the allowable quota since it was first established on July 1, 2010, but that could change with smaller regional quotas and if fishermen are displaced from other fisheries.

#### *Quota Linkages*

The quota linkages considered under this alternative suite could have short- and long-term direct, moderate adverse socioeconomic impacts. Quota linkages are explicitly designed to concurrently close multiple shark management groups, regardless of whether all the linked quotas are filled. This provides protection against incidental capture for species for which the quota has been reached, but it can also preclude fishermen from harvesting the entirety of each of the linked quotas. A quantitative analysis of the economic impact is not possible without comparing the rates of hammerhead shark, blacktip shark, and aggregated LCS catch and without knowing the extent to which fishermen can avoid hammerhead sharks because if fisherman are unable to sufficiently avoid hammerhead sharks the management groups will likely close much sooner, but if they can successfully avoid hammerheads, it is likely that they will be able to fully utilize

the other shark quotas. However, a qualitative analysis can provide insight on possible adverse socioeconomic impacts.

Under Alternative Suite A2, both the Atlantic hammerhead shark and Atlantic aggregated LCS management groups would close when landings of either reaches or is expected to reach 80 percent of the quota. In the Atlantic region, if hammerhead shark landings reach 80 percent of the hammerhead shark quota, the aggregated LCS management group would close, regardless of what portion of the aggregated LCS quota has been filled. If we close the management group and the entire aggregated LCS quota has not been landed, the fishery would not realize the full level of revenues possible under the established quota. Similarly, if we close the management groups and the entire hammerhead quota has not been landed, the fishery would not realize the full level of revenues possible under the established quota. However, given that the hammerhead quota for the Atlantic region is larger than average landings of hammerhead sharks in the Atlantic region by a little over than 2,000 lb and that the Atlantic aggregated LCS quota is not changing from average landings, we do not expect either quota to reach or be projected to reach 80 percent significantly faster than the other quota as a result of this alternative suite.

A similar situation could occur in the Gulf of Mexico region under Alternative Suite A2 where both the hammerhead shark and blacktip shark quotas would be linked to the aggregated LCS quota. In the Gulf of Mexico region, the hammerhead shark, Gulf of Mexico blacktip shark, and aggregated LCS management groups would close when landings of any one reaches or is expected to reach 80 percent of its quota. In the Gulf Mexico region, if hammerhead shark landings reach 80 percent of the hammerhead shark quota, both the aggregated LCS and Gulf of Mexico blacktip shark management groups would close, regardless of what portions of the aggregated LCS and Gulf of Mexico blacktip shark quotas have been filled. If we close the management groups and the entire aggregated LCS and Gulf of Mexico blacktip shark quotas have not been landed, the fishery would not realize the full level of revenues possible under the established quotas. Similarly, if we close the management groups and the entire hammerhead shark quota has not been landed, the fishery would not realize the full level of revenues possible under the established quota. However, given that the hammerhead shark quota for the Gulf of Mexico region is larger than average landings of hammerhead sharks in the Gulf of Mexico region by a little over than 2,000 lb and that the Gulf of Mexico aggregated LCS and blacktip shark quotas are not changing from average landings, we do not expect either quota to reach or be projected to reach 80 percent significantly faster than the other quotas as a result of this alternative suite.

This type of quota linkage has already been in place for the blacknose shark and non-blacknose SCS management groups since implementation of Amendment 3 in 2010. The difference between this alternative suite and Alternative Suite A1 (no action) is that this alternative suite splits the quotas by regions, and we would allow inseason quota transfer between non-blacknose SCS regions. Similar to the impacts on the LCS fishery, the socioeconomic impacts of quota linkages on fishermen landing blacknose shark and non-blacknose SCS are hard to quantify. However, we know that under status quo, the quota

linkage resulted in closure of all SCS before the non-blacknose SCS quota was filled only in 2010. In all years since, the blacknose and non-blacknose SCS management groups have remained open through December 31 of each year. We would expect similar impacts from this alternative suite. The ability to transfer quota regionally for non-blacknose SCS in this alternative suite would have minor beneficial socioeconomic impacts for the fishery as the non-blacknose SCS or blacknose shark quota impacts would be reduced as a factor limiting harvest of blacknose sharks. Consequently, the quota linkages considered under this alternative suite could have short- and long-term direct moderate adverse socioeconomic impacts in years with high landings, but should have neutral impacts most years.

### *Recreational Measures*

Under Alternative Suite A2, we would maintain the existing recreational retention limits for all species, implement mandatory reporting of landed hammerhead sharks, and provide identification guides for all prohibited shark species. Currently, recreational anglers may only retain sharks that are at least 54 inches fork length. Recreational anglers are allowed to retain one authorized shark species (*i.e.*, non-ridgeback large coastal shark, tiger shark, small coastal shark, or pelagic shark) per vessel per trip. In addition, recreational anglers are also allowed one Atlantic sharpnose and one bonnethead shark with no minimum size per person per vessel per trip. Tournaments awarding points for sharks are unlikely to be impacted by maintaining the 54 inch fork length minimum size. Tournament participants typically target larger sharks than other recreational fishermen and many tournaments have minimum shark sizes greater than 54 inches fork length. This alternative suite would have short-term neutral socioeconomic impacts because it would allow recreational fishermen to continue to target and retain the same size range of sharks, maintaining the current incentives to recreational fish for sharks. In the long-term, however, this portion of Alternative Suite A2 would have adverse socioeconomic impacts. Current fishing pressure could lead to further stock declines for those species that are overfished and/or experiencing overfishing, leading to decreased stock health and less availability of the resource for recreational anglers. The reduced availability would likely result in fewer recreational shark angling trips.

### *Conclusion*

When taken as a whole, Alternative Suite A2 would likely have direct short- and long-term minor adverse socioeconomic impacts. These impacts would mostly affect fishermen targeting hammerhead sharks and blacknose sharks since the quotas would be established or reduced. These fishermen are likely to adapt to the new regulations by fishing in other fisheries, or changing their fishing habitats. Recreational management measures would maintain current size and bag limits leading to minor long-term adverse impacts if stocks continue to be overfished; however, implementing mandatory reporting of hammerhead shark landings would provide us with better data on recreational exploitation of the fishery while putting a greater burden on recreational anglers. Neutral socioeconomic impacts are expected for fishermen targeting the aggregated LCS and

non-blacknose SCS management groups since the quotas considered are based on the average landings for each species.

Quota linkages could affect the socioeconomic impacts based on the fishing rate of each linked shark quota. Under this alternative suite, management groups with linked quotas would open and close together. If fishermen fill both quotas at about the same rate, there will be little or no unutilized quota. If, however, one of the linked quotas is filled at a much faster rate than others and close management groups with linked quotas, there could be left over quota available that could have been harvested and sold by fishermen. When we compare the socioeconomic impacts of Alternative Suite A2 to the preferred Alternative Suite A6, which does not link hammerhead shark and aggregated LCS quotas to the Gulf of Mexico blacktip shark quota (see section 6.4.6), this alternative suite would cause more socioeconomic impacts overall to fishermen. For this reason and the ecological reasons stated above, we do not prefer this alternative suite at this time.

Indirect short-term minor adverse socioeconomic impacts would likely result from this alternative suite's actions. The measures in this alternative suite adjust quotas based on new scientific information and would impact shark landings. Consequently, it is possible that dealers and supporting businesses such as bait and tackle suppliers may experience minor adverse impacts in the short-term, but since they do not rely solely on the shark fishery and buy from and sell to a variety of fisheries, the impacts are expected to neutral in the long-term. The changes to quotas would impact fishermen retaining certain shark species, but the changes are small enough that dealers and supporting businesses are unlikely to experience impacts from this alternative suite and its effects are therefore expected to be neutral.

### 6.4.3 **Alternative Suite A3**

Alternative Suite A3 would establish new species management groups, adjust LCS and SCS quotas, prohibit retention of commercial blacknose sharks in the Gulf of Mexico region, and increase the hammerhead shark minimum recreational size to 78 inches fork length. We would remove hammerhead sharks from the non-sandbar LCS management group to form a separate non-regional quota of 52.4 mt dw, while non-blacknose SCS quota would remain the same at 221.6 mt dw. We would create regional quotas for blacknose sharks as well as remove blacktip sharks from the Gulf of Mexico non-sandbar LCS management group. The non-sandbar LCS management group would be renamed "aggregated LCS" in both the Atlantic and Gulf of Mexico regions. The new Gulf of Mexico regional base quotas would be as follows: blacktip sharks 380.6 mt dw; and aggregated LCS 157.5 mt dw. The new aggregated LCS management group in the Gulf of Mexico region would consist of bull, lemon, nurse, spinner, silky, and tiger sharks. In the Atlantic region, base quotas would be as follows: aggregated LCS 168.9 mt dw; and blacknose sharks 18.0 mt dw. The new aggregated LCS management group in the Atlantic region would consist of blacktip, bull, lemon, nurse, spinner, silky, and tiger sharks. TAC used for Gulf of Mexico blacknose sharks in this alternative would result in a commercial quota of 0 mt dw. For the recreational fishery, this alternative suite would establish a minimum size for all hammerhead sharks (great, scalloped, and smooth) and increase outreach. This alternative suite differs from the preferred Alternative Suite A6

in that the hammerhead shark quota would not be subdivided between the Atlantic and Gulf of Mexico regions, the non-blacknose SCS quota is not subdivided between regions, and no quota linkages would be established.

### *Scalloped Hammerhead Sharks*

Under Alternative Suite A3, we would remove hammerhead sharks from the non-sandbar LCS quota and establish a separate hammerhead shark quota for the three large species of hammerhead sharks (great, scalloped, and smooth) , similar to the action considered under Alternative Suites A2 and A6. In contrast to Alternative Suites A2 and A6, however, the hammerhead shark quota under Alternative Suite A3 would not be split between the Atlantic and Gulf of Mexico regions. Rather, under this alternative suite, there would be one hammerhead shark quota across both regions. Having one hammerhead shark quota across the Atlantic and Gulf of Mexico regions is unlikely to alter the short- and long-term direct minor adverse socioeconomic impacts expected as described in Alternative Suite A2 because the total quota under both alternative suites is the same. Under Alternative Suite A3, landings of hammerhead sharks would be limited to 115,457 lb dw, which is 4,153 lb above average landings. Using the ex-vessel prices described above under Alternative Suite A1 and assuming a fin-to-carcass ratio of 5 percent, the average annual ex-vessel value of hammerhead landings across the fleet would be \$92,366 (115,457 lb of meat, 5,773 lb of fins). Under Alternative Suite A3, ex-vessel hammerhead shark revenue, when compared to average landings, would potentially be increased by 3,322 from \$89,043 (111,304 lb of meat, 5,565 lb of fins), assuming the same ex-vessel values and fin-to-carcass ratio. However, as described in Alternative suite A2, because hammerhead sharks are currently counted against the regional non-sandbar LCS quotas, which are much higher than the total hammerhead shark quota considered in this alternative, the opportunities to land hammerhead sharks would be reduced. When compared to the highest annual incidental hammerhead landings between 2008 and 2011, the quota considered in this alternative suite would result in potential total revenue reductions of \$53,208. These analyses suggest that while fishermen could see an increase in average annual revenue under the quota considered in this alternative suite, they could see reductions in revenue in at least some years. These potential reductions in revenue could negatively impact fishermen in the directed and incidental hammerhead shark fishery; however, they would not do so every year. Additionally, hammerhead sharks species rarely make up a significant portion of shark landings as there is no directed fishery for hammerhead sharks and all landings are the result of incidental catches made while pursuing other shark species. Therefore, under this alternative suite, as under Alternative Suite A2, we expect short- and long-term direct minor adverse socioeconomic impacts.

### *Large Coastal Sharks*

Management measures for non-sandbar LCS under Alternative Suite A3 are identical to those analyzed under Alternative Suite A2 and A6. We would establish new, separate quotas for hammerhead sharks and Gulf of Mexico blacktip sharks, necessitating removal of these species from the non-sandbar LCS management group (which will then be

renamed “aggregated LCS” in both the Atlantic and Gulf of Mexico). The aggregated LCS quota would be based on average annual landings of the remaining species (see Chapter 2 for annual landings of remaining species). Therefore, those species comprising the aggregated LCS management group would likely not experience a change in fishing pressure as landings would be capped at recent levels. For these reasons, short- and long-term direct socioeconomic impacts expected under this alternative suite and Alternative suite A2 are expected to be neutral. We do not expect any additional socioeconomic impacts to occur as the result of the non-sandbar LCS management group measures in this alternative suite.

### *Gulf of Mexico Blacktip Sharks*

Alternative Suite A3 would create a separate Gulf of Mexico blacktip shark TAC and commercial quota by increasing the TAC considered in Alternative Suite A2 by 30 percent, which is based on the current landings percentage of Gulf of Mexico blacktip sharks (Table 2.5 and Table 2.6). This would result in a commercial quota of 380.6 mt dw (839,090 lb dw), which is a 48 percent increase from the Gulf of Mexico blacktip shark quota calculated in Alternative Suite A2 (256.6 mt dw; 565,700 lb dw). This portion of Alternative Suite A3 would likely result in short- and long-term direct moderate beneficial socioeconomic impacts. Ex-vessel revenue resulting from this quota could reach \$964,954 from Gulf of Mexico blacktip shark landings (2008-2011 median ex-vessel values of \$0.40 for meat and \$15 for fins, based on a 5 percent fin-to-carcass ratio). This is an increase of \$339,467 when compared to the Gulf of Mexico blacktip quota considered under Alternative Suite A2 and A6, and \$339,467 higher than average landings revenue from 2008 to 2011 as discussed under Alternative Suite A1. The increase in blacktip shark quota would allow for increased fishing opportunities and would lead to direct, beneficial socioeconomic impacts. Indirect socioeconomic impacts would similarly be beneficial. In the short- and long-term, this portion of Alternative Suite A3 would likely result in moderate beneficial socioeconomic impacts. Businesses supporting Gulf of Mexico blacktip shark fishing would likely benefit from the increased fishing opportunities. Supporting businesses include dealers, processors, and suppliers of ice, bait, and tackle.

### *Blacknose Sharks*

Under Alternative Suite A3, the mortality of blacknose sharks in the Atlantic region would be reduced to the recommended TAC of 7,300 blacknose sharks from the SEDAR 21 stock assessment. For the Atlantic region, this measure is the same as the measure considered in both Alternative Suites A2, A4, and A6. In summary, as described in Alternative Suite A2, average annual gross revenues for the blacknose shark landings for the Atlantic region would increase by \$741 from \$54,113 under the No Action alternative to \$54,854 when compared to average landings from 2010-2011. Although, because the blacknose shark quota considered for the Atlantic region would be less than the current overall blacknose shark quota (19.9 mt dw), there would be some minor, adverse socioeconomic impacts associated with the reduced opportunities to land blacknose sharks. We anticipate that directed and incidental shark permit holders would experience

neutral direct socioeconomic impacts in the short- and long-term as blacknose sharks are not the targeted shark species for SCS fishermen.

The average annual commercial landings of blacknose sharks within the Gulf of Mexico regional shark fisheries from 2008-2011 were 1,807 Gulf of Mexico blacknose sharks, and average annual recreational landings were 3,215 Gulf of Mexico blacknose sharks over that time period. This would result in a fishing mortality level of 5,022 Gulf of Mexico blacknose sharks ( $1,807 + 3,215 = 5,022$ ). However, other fisheries prosecuted in the Gulf of Mexico region, including the shrimp trawl fisheries and the reef fish fisheries, kill, on average, 14,444 blacknose sharks a year. Given that the TAC under Alternative Suite A3 would be 11,900 sharks, there would be no TAC available for commercial and recreational harvest of blacknose sharks in the Gulf of Mexico region. Thus, under this alternative we would work with the Gulf of Mexico Fishery Management Council to reduce the mortality of blacknose sharks in the Gulf of Mexico shrimp trawl fishery to attain the TAC of 11,900 sharks, and to establish bycatch reduction methods, as appropriate, to reduce mortality in the shrimp trawl and reef fish fisheries. In the SEDAR 21 stock assessment, the blacknose shark bycatch in the shrimp trawl fishery were estimated for 2008-2009. It is important to note that the estimates in Table 6.16 do not take in to account the reduced fishing effort due to the Deepwater Horizon/BP oil spill. On May 11, 2010, we closed portions of the Gulf of Mexico EEZ to all fishing. Thus, a large portion of the fishing grounds for the shrimp fishery in the Gulf of Mexico were closed for at least a portion of the commercial fishing season in 2010 and 2011. Therefore, the average bycatch of blacknose sharks could be overestimated and the closure could have resulted in fewer discards of blacknose sharks.

Currently, the average annual gross revenues for blacknose shark landings for the commercial fishery in the Gulf of Mexico region are \$5,645, but would be reduced to \$0 under this alternative. Under Alternative Suite A3, lost revenues would lead to moderate, direct adverse socioeconomic impacts for the 8 directed shark and the 2 incidental shark permits that land blacknose sharks in the Gulf of Mexico region in the short- and long-term.

#### *Non-Blacknose Small Coastal Sharks*

Alternative Suite A3 would keep the non-blacknose SCS management group as status quo with one regional quota of 221.6 mt dw (488,539 lb dw). As discussed under Alternative Suite A1, there would be neutral direct and indirect socioeconomic impacts to shark permit holders and dealers in the short- and long-term. In summary, the average annual gross revenues for the fleet from 2010 through 2011 from non-blacknose SCS meat were \$295,265. Average annual gross revenues for the fleet for non-blacknose SCS fins were \$253,080, making total average annual gross revenues for blacknose shark landings for the entire fishery \$548,345 (Table 6.15). Divided evenly amongst the directed and incidental shark permit holders that landed non-blacknose SCS, the average directed shark permit holder earned \$13,107 in average annual gross revenues, and the average incidental shark permit holder earned \$844 in average annual gross revenues

from non-blacknose SCS landings. See the discussion in Alternative Suite A1 for more details.

### *Quota Linkages*

Under Alternative Suite A3, no quota linkages would be implemented. All shark management groups would open and close independently of each other. Quota linkages can lead to closures of management groups whose quotas are not yet filled if quotas of other sharks caught concurrently are closed. If each management group opens and closes independently, each quota would have a higher likelihood of being filled, allowing for full realization of potential revenues. Thus, the lack of quota linkages under this alternative suite could lead to direct short-term minor beneficial socioeconomic impacts. However, in the long-term, the lack of quota linkages could lead to continued overfishing and diminished resource availability. Therefore, long-term minor adverse socioeconomic impacts would be expected from this portion of Alternative Suite A3.

### *Recreational Measures*

Alternative Suite A3 would maintain existing size and retention limits except that it would increase the minimum recreational size for all hammerhead sharks (great, scalloped, and smooth) to 78 inches fork length. This alternative suite would also increase recreational shark fishing public outreach efforts. Under this alternative, some anglers would need to release hammerhead sharks that are under this minimum size. That could have some impacts for charter/headboat operators or the surrounding recreational communities if anglers perceive releasing small hammerhead sharks as a reason not to go fishing for sharks. Tournaments awarding points for sharks are unlikely to be significantly impacted by implementing the 78 inch fork length minimum size. Shark tournaments typically target larger, trophy sharks. Based on a preliminary review of tournament rules posted online by registered HMS shark tournaments, many tournaments impose minimum size limits (e.g., 60-66 inch fork length, 150 lb. minimum weight) in excess of the current 54 inch fork length minimum size, or have adopted catch-and-release only policies in the interest of promoting shark conservation. Using a length weight relationship for scalloped hammerhead sharks (Kohler et al., 1996), the 78 inch fork length minimum size equates to a scalloped hammerhead shark of approximately 189 lb ww. In 2012, at the White Marlin Open, an angler broke the Maryland scalloped hammerhead state record of 254 lb ww by landing a 266 lb ww scalloped hammerhead shark (Maryland Department of Natural Resources 2012). As such, because there are tournaments that currently land scalloped hammerhead sharks that exceed the minimum size in this alternative and because some tournaments have minimum sizes greater than 78 inches fork length for sharks, the new minimum length limit would not be expected to have a significant adverse economic impact on tournaments. This alternative would likely result in short- and long-term minor, adverse socioeconomic impacts for recreational shark fishermen who target hammerhead sharks. Increasing the recreational size limit for hammerhead sharks would ensure that only larger or “trophy” sized sharks would be landed and could reduce the opportunities for recreationally landing these species. However, as the scalloped hammerhead stock rebuilds, increased fishing

opportunities may result in the long-term. In addition, this alternative would have neutral direct and indirect socioeconomic impacts in the short- and long-term on the other shark species besides hammerhead sharks since it maintains the status quo.

### *Conclusion*

When taken as a whole, Alternative Suite A3 would likely have direct short- and long-term moderate beneficial socioeconomic impacts, mainly resulting from the increase in Gulf of Mexico blacktip shark quota. Any adverse impacts would mostly affect fishermen catching hammerhead and blacknose sharks. The hammerhead shark quota would be based on the scalloped hammerhead shark TAC and could potentially reduce all hammerhead shark landings. The blacknose shark quota in the Atlantic would be reduced from its current level, while in the Gulf of Mexico there would not be enough TAC available to allow for commercial or recreational harvest of blacknose sharks due to discards in other non-HMS fisheries. Recreational management measures would affect fishermen who catch hammerhead sharks since the increased size limit would result in more hammerhead sharks having to be released. Neutral socioeconomic impacts are expected for fishermen targeting the aggregated LCS and non-blacknose SCS management groups since these management measures would maintain status quo in these management groups. In addition, the lack of quota linkages in Alternative Suite A3 would allow fishermen to fully harvest all of the quotas. While this alternative suite might have more beneficial direct socioeconomic impacts than preferred Alternative Suite A6, the ecological impacts would be adverse and would not achieve the rebuilding plan targets for these stocks.

Indirect short-term moderate beneficial socioeconomic impacts would likely result from this Alternative Suite's actions. The measures in this Alternative Suite adjust quotas based on new scientific information and would impact shark landings. Consequently, the increase in the commercial Gulf of Mexico blacktip shark quota could result in short- and long-term beneficial economic impacts for dealers and supporting businesses such as bait and tackle suppliers. The other changes to quotas (e.g., hammerhead, blacknose) would impact fishermen retaining sharks, but the changes are small enough that dealers and supporting businesses are unlikely to experience impacts from this alternative suite. This increase in the Gulf of Mexico blacktip quota could lead to increased revenues of \$339,467 when compared to the quota considered under preferred Alternative Suite A6, but because there is high degree of uncertainty associated with establishing this quota, and the lack of quota linkage to prevent overfishing on other shark stocks, this alternative is not preferred at this time.

#### **6.4.4 Alternative Suite A4**

Alternative Suite A4 would establish new species management groups by regions, adjust LCS and SCS quotas, prohibit retention of commercial blacknose sharks in the Gulf of Mexico region, link appropriate quotas, and establish a species and management group-specific recreational shark quota. We would remove scalloped hammerhead sharks from the non-sandbar LCS management group to form separate regional quotas, and create regional quotas for blacknose and non-blacknose SCS. Also, blacktip sharks would be

removed from the Gulf of Mexico non-sandbar LCS management group. The non-sandbar LCS management group would be renamed “aggregated LCS” in both the Atlantic and Gulf of Mexico regions. The new Gulf of Mexico regional base quotas would be as follows: scalloped hammerhead sharks 25.8 mt dw; blacktip sharks 1,992.6 mt dw; non-sandbar LCS 185.8 mt dw; and non-blacknose SCS 110.8 mt dw. The new aggregated LCS management group in the Gulf of Mexico region would consist of great and smooth hammerhead, bull, lemon, nurse, spinner, silky, and tiger sharks. In the Atlantic region, base quotas would be as follows: scalloped hammerhead sharks 26.6 mt dw; non-sandbar LCS 180 mt dw; blacknose sharks 18.0 mt dw; and non-blacknose SCS 110.8 mt dw. The new aggregated LCS management group in the Atlantic region would consist of great and smooth hammerhead, blacktip, bull, lemon, nurse, spinner, silky, and tiger sharks. We would link some quotas to prevent overfishing of one species while fishing for another species or management group. This alternative suite differs from the preferred Alternative Suite A6 because it establishes a scalloped hammerhead shark quota rather than a hammerhead shark (great, scalloped, and smooth) quota, it would calculate each species’ contribution to total non-sandbar LCS landings using the highest annual landings rather than average annual landings between 2008 and 2011, it would divide the non-blacknose shark SCS quota evenly between the Atlantic and Gulf of Mexico regions rather than apportion based on historical landings, and would establish species and management group-specific recreational shark quotas.

#### *Scalloped Hammerhead Sharks*

Alternative Suite A4 would use the scalloped hammerhead shark TAC established in the stock assessment to create separate Atlantic and Gulf of Mexico regional quotas applicable to only scalloped hammerheads sharks rather than all three large hammerhead sharks as considered under Alternative suites A2, A3, and A6. The quotas considered in both regions are higher than current landings (see Chapter 2 for landings information). Between 2008 and 2011, an average of 40,904 lb dw of scalloped hammerhead sharks were annually landed in the Atlantic region, and 39,685 lb dw scalloped hammerhead sharks were annually landed in the Gulf of Mexico region. Using the ex-vessel prices described above under Alternative Suite A1 and assuming a fin-to-carcass ratio of 5 percent, average annual ex-vessel value of scalloped hammerhead sharks was \$32,723 in the Atlantic region (40,904 lb of meat; 2,045 lb of fins) and \$39,685 in the Gulf of Mexico region (39,685 lb of meat; 1,984 lb of fins). Under Alternative Suite A4, landings of scalloped hammerhead sharks would be limited to 58,602 lb dw in the Atlantic region (2,149 lb above average landings) and 56,588 lb dw in the Gulf of Mexico region (2,005 lb above average landings). Great and smooth hammerhead sharks could continue to be landed at current levels under the aggregated LCS quota. Since fishermen could continue to land the scalloped hammerhead at current levels, neutral direct socioeconomic impacts in the short and long-term are anticipated to result from this portion of Alternative Suite A4.

#### *Large Coastal Sharks*

Alternative Suite A4 would establish new aggregated LCS quotas in the Atlantic and Gulf of Mexico regions using a similar methodology to that outlined in Alternative Suites A2, A3, and A6, except for one difference. While Alternative Suites A2, A3, and A6 would calculate each species' contribution to total non-sandbar LCS landings using average annual landings between 2008 and 2011, Alternative Suite A4 would instead calculate each species' contribution to total non-sandbar LCS landings using the year with the highest annual landings for the management group between 2008 and 2011 for each species (see Chapter 2 for annual landings of remaining species). The year with the highest non-sandbar LCS landings in the Atlantic region was 2008 and the highest in the Gulf of Mexico region was 2011. This difference in method does not substantially change the quotas; therefore, socioeconomic impacts are unchanged from those described in Alternative Suites A2, A3, and A6. Short- and long-term direct socioeconomic impacts resulting from this portion of Alternative Suite A4 are expected to be neutral. We do not expect any additional socioeconomic impacts to occur as the result of the LCS measures in this Alternative Suite.

#### *Gulf of Mexico Blacktip Sharks*

Alternative Suite A4 would establish a separate Gulf of Mexico blacktip shark quota of 1,992.6 mt dw based upon projections produced by SEFSC stock assessment scientists. This quota would likely result in short- and long-term direct, moderate beneficial socioeconomic impacts. The quota of 1,992.6 mt dw is more than five times the current Gulf of Mexico non-sandbar LCS quota. Ex-vessel revenue resulting from this blacktip shark quota could reach \$5,051,818 in the Gulf of Mexico (\$0.40/ lb of meat; \$15/lb of fins; 5 percent fin-to-carcass ratio). However, it is unlikely that this value would be realized. As discussed in the Quota Linkages section for this alternative, the Gulf of Mexico blacktip shark quota would be linked to the Gulf of Mexico aggregated LCS and scalloped hammerhead shark quotas. All three of these quotas would close when one reached, or was expected to reach, 80 percent of the respective quota. Either the aggregated LCS or scalloped hammerhead quota would likely be filled before the large blacktip quota was filled. Regardless, the increase blacktip quota would allow for increased fishing opportunities and positive socioeconomic impacts. Indirect socioeconomic impacts would similarly be beneficial. In the short- and long-term, this portion of Alternative Suite A4 would likely result in minor beneficial socioeconomic impacts. Businesses that support Gulf of Mexico blacktip shark fishing activities would likely benefit from the increased fishing opportunities. Supporting businesses include dealers, processors, and suppliers of ice, bait, and tackle.

#### *Blacknose Sharks*

Under Alternative Suite A4, the mortality of blacknose sharks in the Atlantic region would be limited to the TAC recommended by the SEDAR stock assessment of 7,300 blacknose sharks. For the Atlantic region, this measure is the same as the measure considered in both Alternative Suites A2, A3, and A6. In summary, as described in Alternative Suite A2, average annual gross revenues for the blacknose shark landings for the Atlantic region would increase by \$741 from \$54,113 under the No Action alternative

to \$54,854 when compared to average landings from 2010-2011. Although, because the blacknose shark quota considered for the Atlantic region would be less than the current overall blacknose shark quota (19.9 mt dw), there would be some minor, adverse socioeconomic impacts associated with the reduced opportunities to land blacknose sharks. We anticipate that directed and incidental shark permit holders would experience neutral direct socioeconomic impacts in the short- and long-term as blacknose sharks are not the targeted shark species for SCS fishermen.

For the Gulf of Mexico region, we would establish a TAC of 9,792 blacknose sharks. As described in Alternative Suite A3, under this alternative suite, there would be no TAC available for commercial and recreational harvest of blacknose sharks in the Gulf of Mexico region given the blacknose shark mortality in non-HMS fisheries in the Gulf of Mexico. We would also work with the Gulf of Mexico Fishery Management Council to reduce bycatch mortality of blacknose sharks in the shrimp trawl and reef fish fisheries. The average annual gross revenues for blacknose shark landings for the commercial fishery are \$5,645, but would be reduced to \$0 under this alternative.

Under Alternative Suite A4, it is anticipated that there would be short-term direct, moderate adverse socioeconomic impacts. In the short and long-term, lost revenues would be moderate for the 5 directed shark and the 2 incidental shark permits that land blacknose sharks in the Gulf of Mexico.

#### *Non-Blacknose Small Coastal Sharks*

Alternative Suite A4 would establish regional quotas for non-blacknose SCS providing half of the current quota to each region. This would result in Atlantic and Gulf of Mexico regional quotas of 244,269.5 lb dw (110.8 mt dw). This alternative would cause significant adverse, direct socioeconomic impacts for shark fishermen and dealers in the Atlantic region in the short- and long-term. Based on current landings since Amendment 3 to the 2006 Consolidated HMS FMP was implemented in 2010, the Atlantic region has averaged 368,595 lb dw of the entire non-blacknose SCS quota. Alternative Suite A4 would restrict fishing of non-blacknose in the Atlantic region to 110.8 mt dw (244,270 lb dw) and potentially reduce current revenue by \$164,109 (\$512,453 current revenue - \$322,436 Alternative Suite A4 revenue). In the Gulf of Mexico region, if fishermen were able to increase their harvest, this alternative could cause beneficial socioeconomic impacts as the quota would be larger than their average landings (53,212 lb dw). This larger quota could potentially increase gross revenues by \$257,928 (\$329,765 Alternative Suite A4 revenue - \$71,836 current revenue). In the short-term, we do not expect the fishermen in the Gulf of Mexico region to fully land the regional quota considered in this alternative suite, because the current non-blacknose small coastal shark quota has not been fully harvested in several years and most of the quota is taken by fishermen in the Atlantic region, not the Gulf of Mexico region. Indeed, the Gulf of Mexico non-blacknose SCS quota considered under this Alternative Suite A4 exceeds the total non-blacknose SCS landings from 2008-2011. However, this alternative suite could cause adverse impacts on blacknose sharks since current fishing and bycatch levels of blacknose sharks might increase in the Gulf of Mexico. The non-blacknose SCS

measures in Alternative Suite A4 would not reduce blacknose shark mortality in the Gulf of Mexico region or decrease the Atlantic non-blacknose SCS fishing levels.

**Table 6.17** Average non-blacknose SCS ex-vessel prices and average annual gross revenues for the fleet by region under proposed A4 quota. 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>Atlantic Region</i>			
Non-Blacknose SCS	244,269.5	\$0.72	\$175,874
Fins	12,213	\$12	\$146,556
Total			\$322,430
<i>Gulf of Mexico Region</i>			
Non-Blacknose SCS	244,269.5	\$0.60	\$146,562
Fins	12,213	\$15	\$183,195
Total			\$329,757

### *Quota Linkages*

Quota linkages under Alternative Suite A4 are nearly identical to those under Alternative Suite A2, except that instead of linking the hammerhead shark quotas to the aggregated LCS quota in the Atlantic and Gulf of Mexico regions, the scalloped hammerhead shark quota would be linked instead. This difference should not change the expected socioeconomic impacts analyzed in Alternative Suite A2. In addition, Alternative Suite A4 would link the Atlantic blacknose shark and non-blacknose SCS quotas and Gulf of Mexico blacknose shark and non-blacknose SCS quotas, and allow inseason quota transfer between the non-blacknose SCS regions. The quota linkages considered under Alternative Suite A4 would be expected to have short and long-term direct moderate adverse socioeconomic impacts.

### *Recreational Measures*

Alternative Suite A4 would establish recreational species and management group-specific shark quotas and would maintain current size and retention limits. This alternative could cause short-term neutral socioeconomic impacts for recreational fishermen as it would restrict landings to current levels. In the long-term, this alternative could have minor, adverse socioeconomic impacts if the species and management group-specific recreational shark quotas limit fishing opportunities due to either increased participants or reductions in recreational quotas. Over the long term, this alternative suite might limit the number of tournaments and charter/headboat vessels that target and land sharks to current levels.

### *Conclusion*

Alternative Suite A4 would likely have direct short and long-term minor, adverse socioeconomic impacts. These impacts would mostly affect fishermen catching blacknose sharks. The blacknose shark quota in the Atlantic region would be reduced,

while there would be no TAC available for commercial and recreational harvest of blacknose sharks in the Gulf of Mexico region given the blacknose shark mortality in non-HMS fisheries in the Gulf of Mexico. Recreational management measures would affect fishermen who retain sharks because we would implement species- and management group-specific quotas for the recreational fishery. Neutral socioeconomic impacts are expected for recreational and commercial fishermen targeting scalloped hammerhead sharks, aggregated LCS, and non-blacknose SCS as detailed in those sections of this alternative suite. While this alternative suite might have minor adverse socioeconomic impacts, there is the potential for more adverse socioeconomic impacts if quotas are exceeded in the future. Although this alternative suite would allow for the highest Gulf of Mexico blacktip shark commercial quota, the quota is based on base model projections that the NMFS scientists who participated in the stock assessment felt had a high degree of uncertainty, and, because these projections were developed outside of the standard SEDAR process and were not peer reviewed, they could not conclude with certainty that such a high level of catch would not result in overfishing. In addition to the uncertainty in the model, the blacktip shark quota considered under this alternative suite could lead to increased bycatch of other species due to increased fishing effort. For all these reasons and because of the potential for additional adverse socioeconomic impacts if quotas are exceeded, this alternative suite is not preferred at this time.

Indirect short-term minor, adverse socioeconomic impacts would likely result from Alternative Suite A4 actions. The measures in this alternative suite adjust quotas based on new scientific information and would impact shark landings. Consequently, dealers and supporting businesses such as bait and tackle suppliers may experience minor adverse impacts in the short-term, but since they do not rely solely on the shark fishery and buy from and sell to a variety of fisheries, the impacts are expected to neutral in the long-term. The changes to quotas would impact fishermen retaining sharks, but the changes are small enough that dealers and supporting businesses are unlikely to experience impacts from this alternative suite.

#### **6.4.5 Alternative Suite A5**

Alternative Suite A5 would close all commercial and recreational shark fisheries. This alternative suite differs from all the other alternatives, including the preferred Alternative Suite A6, because while the other alternatives provide some fishing opportunities for commercial and recreational fishermen, this alternative suite would not.

##### *Scalloped Hammerhead Sharks*

Alternative Suite A5 would close all recreational and commercial shark fisheries. Scalloped hammerhead sharks represent an average of 7.3 percent of annual non-sandbar LCS landings in the Atlantic region (ACCSP Database, 2008-2011) and an average of 4.3 percent of annual non-sandbar LCS landings in the Gulf of Mexico region (GULFIN Database, 2008-2011). Consequently, the scalloped hammerhead portion of Alternative Suite A5 would be expected to only have short- and long-term moderate adverse direct socioeconomic impacts. Currently, scalloped hammerhead sharks provide fishery-wide

revenue of \$72,404 (as discussed under Alternative Suite A1), which would be lost under this alternative suite.

### *Large Coastal Sharks*

Closure of the non-sandbar LCS fishery would have short- and long-term significant adverse direct socioeconomic impacts. Many fishermen rely on the non-sandbar LCS fishery for a large portion of annual earnings. A closure of the fishery would significantly impact the livelihoods of these fishermen. Currently, the non-sandbar LCS fishery provides fishery-wide revenue of \$1,745,071 (as discussed under Alternative Suite A1), which would be lost under this alternative suite.

### *Gulf of Mexico Blacktip Sharks*

Alternative Suite A5 would close all recreational and commercial shark fisheries. Gulf of Mexico blacktip sharks represent an average of 57.9 percent of annual non-sandbar LCS landings in the Gulf of Mexico region (GULFIN Database, 2008-2011). Consequently, the Gulf of Mexico blacktip shark portion of Alternative Suite A5 would be expected to have short- and long-term significant adverse socioeconomic impacts. Currently, Gulf of Mexico blacktip sharks provide fishery-wide revenue of \$625,487 (as discussed under Alternative Suite A1), which would be lost under this alternative suite.

### *Blacknose Sharks*

Alternative Suite A5 would close all recreational and commercial shark fisheries, prohibiting the landing of any blacknose sharks. This alternative would have short- and long-term significant, adverse, socioeconomic impacts on the 25 directed shark permit holders and the 3 incidental shark permit holders that had blacknose shark landings during 2008 through 2011. The result would be a loss of average annual gross revenues of \$52,941 from blacknose shark landings. While this alternative could reduce blacknose mortality below the commercial allowance required to rebuild blacknose shark stocks, it would also eliminate non-blacknose SCS landings, and have the largest social and economic impacts of all the alternative suites considered. This action would require fishermen to switch to other fisheries, and leave the shark fishery altogether. This alternative would also have indirect moderate, adverse socioeconomic impacts in the short-term on other businesses that generate revenue from shark products. These businesses would have to adjust by finding new ways to generate revenue, or find ways to reduce costs. Thus, this alternative would have significant, short-term, adverse socioeconomic impacts. This action would also severely curtail data collection on all SCS that could be used for future stock assessments.

### *Non-Blacknose Small Coastal Sharks*

Alternative Suite A5 would close the entire SCS commercial shark fishery, prohibiting the landing of any SCS, including finetooth, Atlantic sharpnose, and bonnethead sharks. This alternative would have short- and long-term significant, adverse, socioeconomic

impacts on the 41 directed shark permit holders and the 13 incidental shark permit holders that had non-blacknose SCS landings since Amendment 3 was implemented in 2010. The result would be a loss of average annual gross revenues of \$548,345 from non-blacknose SCS landings. This action would require fishermen to switch to other fisheries, and leave the shark fishery altogether. This alternative would also have short- and long-term moderate adverse socioeconomic impacts on other businesses that generate revenue from shark products. These businesses would have to adjust by finding new ways to generate revenue or reduce costs. While this alternative could reduce blacknose shark mortality, it would also eliminate non-blacknose SCS landings, and have the largest socioeconomic impacts of all the alternatives considered.

### *Quota Linkages*

Alternative Suite A5 would close all recreational and commercial shark fisheries, removing the need for quota linkages.

### *Recreational Measures*

Alternative Suite A5 would have direct significant adverse socioeconomic impacts because it would prohibit the retention of all sharks by recreational anglers, including those participating in tournaments. Therefore, recreational anglers would not benefit from the experience of catching and keeping sharks, particularly trophy-size sharks.

### *Conclusion*

This alternative suite would have the largest social and economic impacts of any of the alternative suites considered, and would likely have direct short- and long-term significant adverse socioeconomic impacts because all recreational and commercial shark fishing would be prohibited. Because other alternatives would meet the objectives of this Amendment with less significant adverse socioeconomic impacts, we do not prefer this alternative suite at this time.

Indirect short- and long-term socioeconomic impacts resulting from this Alternative Suite's actions would likely be moderately adverse. The measures in this Alternative Suite would shut down the commercial and recreational shark fisheries, and dealers and supporting businesses such as bait and tackle suppliers would be likely be adversely impacted due to decreased shark catches and sales.

## **6.4.6 Alternative Suite A6**

As described in Chapter 2, this alternative suite was not presented in the draft Amendment, but was developed as a new preferred alternative suite based on public comment and additional analyses. This alternative suite is a new alternative composed of TAC and quota measures from Alternative Suite A2, a combination of quota linkage measures from Alternative Suites A2 and A3, and recreational measures from Alternative Suite A3. Alternative Suite A6 would establish new species management groups by regions, adjust LCS and SCS quotas, link appropriate quotas, and increase the

hammerhead shark minimum recreational size to 78 inches fork length. We would remove three species of hammerhead sharks from the non-sandbar LCS management group to form separate regional quotas, and create regional quotas for blacknose sharks and non-blacknose SCS. Also, blacktip sharks would be removed from the Gulf of Mexico non-sandbar LCS management group. Because separate quotas for hammerhead sharks and Gulf of Mexico blacktip sharks would be established, necessitating removal of these species from the non-sandbar LCS management group, the non-sandbar LCS management group would be renamed “aggregated LCS” in both the Atlantic and Gulf of Mexico regions. The new Gulf of Mexico base quotas would be as follows: hammerhead sharks 25.3 mt dw; blacktip sharks 256.6 mt dw; aggregated LCS 157.5 mt dw; blacknose sharks 2.0 mt dw; and non-blacknose SCS 45.5 mt dw. The new aggregated LCS management group in the Gulf of Mexico region would consist of bull, lemon, nurse, spinner, silky, and tiger sharks. In the Atlantic region, base quotas would be as follows: hammerhead sharks 27.1 mt dw; aggregated LCS 168.9 mt dw; blacknose sharks 18.0 mt dw; and non-blacknose SCS 176.1 mt dw. The new aggregated LCS management group in the Atlantic region would consist of blacktip, bull, lemon, nurse, spinner, silky, and tiger sharks. We would link selected quotas to prevent overfishing of one species while fishing for another species or management group. In addition, the recreational minimum size limit for hammerhead shark species (great, scalloped, and smooth) would be increased to 78 inches fork length.

#### *Scalloped Hammerhead Sharks*

As with Alternative Suite A2, Alternative Suite A6, the preferred alternative, would establish Atlantic and Gulf of Mexico hammerhead shark regional quotas using the methodology outlined in Chapter 2. In summary, currently, fishermen catch and sell an annual average 57,587 lb dw of hammerhead sharks in the Atlantic region and 53,717 lb dw in the Gulf of Mexico region. During that same time period (2008-2011), the highest annual landing of hammerhead sharks was 94,128 lb dw in the Atlantic region and 87,839 lb dw in the Gulf of Mexico. Using the ex-vessel prices described above under Alternative Suite A1 and assuming a fin-to-carcass ratio of 5 percent, maximum landings in those years resulted in an annual ex-vessel value of \$75,302 in the Atlantic region and \$87,839 in the Gulf of Mexico region for hammerhead sharks. Under Alternative Suite A6, harvest of hammerhead sharks would be limited to 59,736 lb dw in the Atlantic region and 55,722 lb dw in the Gulf of Mexico region. Using the ex-vessel prices described above under Alternative Suite A1 and assuming a fin-to-carcass ratio of 5 percent, the quotas considered under Alternative Suite A6 would result in an average annual ex-vessel value for hammerhead sharks of \$47,789 in the Atlantic region and \$55,722 in the Gulf of Mexico region. Under the quotas considered under Alternative Suite A6, ex-vessel hammerhead shark revenue, when compared to average landings, would potentially be increased by \$1,719 in the Atlantic region and increased by \$2,005 in the Gulf of Mexico region, assuming the same ex-vessel values and fin-to-carcass ratio. However, because hammerhead sharks are currently counted against the regional non-sandbar LCS quotas, which are much higher than the regional hammerhead shark quotas, the opportunities to land hammerhead sharks would be reduced. When compared to the highest annual hammerhead shark landings between 2008 and 2011, the quotas would result in potential revenue reductions of \$27,514 in the Atlantic region and

\$32,117 in the Gulf of Mexico region. These analyses suggest that while fishermen would see an increase in average annual revenue under the new quotas considered in this alternative suite and Alternative Suite A2, they could see reductions in revenue in at least some years. These potential reductions in revenue would negatively impact fishermen that land hammerhead sharks; however, they would not do so every year. Additionally, hammerhead sharks species rarely make up a significant portion of shark landings as there is no directed fishery for hammerhead sharks and all landings are the result of incidental catches made while pursuing other shark species. Therefore, short- and long-term direct minor adverse socioeconomic impacts would be expected. For more details regarding these impacts, see Alternative Suite A2.

### *Large Coastal Sharks*

As with Alternative Suite A2, Alternative Suite A6 would establish new, separate quotas for scalloped hammerhead sharks and Gulf of Mexico blacktip sharks, necessitating removal of these species from the non-sandbar LCS management group (which would then be renamed “aggregated LCS” in both the Atlantic and Gulf of Mexico regions). The aggregated LCS quota would be based on average annual landings of the remaining species (see Chapter 2 for annual landings of remaining species); therefore, those species comprising the aggregated LCS management group would likely not experience a change in fishing pressure as landings would be capped at recent levels. For these reasons, short- and long-term direct socioeconomic impacts resulting from this portion of Alternative Suite A6 are expected to be neutral. We do not expect any additional socioeconomic impacts to occur as the result of the aggregated LCS measures in this alternative suite.

### *Gulf of Mexico Blacktip Sharks*

As with Alternative Suite A2, this blacktip shark measure in Alternative Suite A6 is likely to result in short- and long-term direct neutral socioeconomic impacts. As discussed in Chapter 1 of this document, based on the SEDAR 29 Gulf of Mexico blacktip shark stock assessment, we have determined that the Gulf of Mexico blacktip shark stock is not overfished and not experiencing overfishing. These results indicate the Gulf of Mexico blacktip shark stock can sustain current fishing levels. The quota of 256.6 mt dw (565,700 lb dw) blacktip sharks calculated in Chapter 2 (Table 2.5 and Table 2.6) is representative of the current blacktip shark landings applied to the 2013 Gulf of Mexico non-sandbar LCS quota (see Chapter 2 for further details). Based on current average annual landings, Gulf of Mexico blacktip shark landings have average annual revenues of \$625,487 (2008-2011 median ex-vessel values of \$0.40 for meat and \$15 for fins, based on a 5 percent fin-to-carcass ratio). Given the current stock status, fishermen would likely continue to realize this revenue. Therefore, based on current information, short- and long-term direct socioeconomic impacts are expected to be neutral.

### *Blacknose Sharks*

As with Alternative Suite A2, under Alternative Suite A6, we would separate blacknose sharks into the Atlantic and Gulf of Mexico regions as recommended in the SEDAR 21

stock assessment. These alternatives would decrease the blacknose shark landings in each region. In the Atlantic region, a TAC of 7,300 blacknose sharks would be established based on the SEDAR 21 stock assessment. The new quota for the Atlantic blacknose sharks would be 18.0 mt dw (39,749 lb dw) under Alternative Suite A6. Average annual gross revenues for the blacknose shark landings for the Atlantic region would increase by \$741 from \$54,113 under the No Action alternative to \$54,854 under Alternative Suite A6 when compared to average landings from 2010-2011. Although, because the blacknose shark quota for the Atlantic region would be less than the current overall blacknose shark quota (19.9 mt dw), there would be the potential for some minor, adverse socioeconomic impacts associated with the reduced opportunities to land blacknose sharks. We anticipate that directed and incidental shark permit holders would experience neutral direct socioeconomic impacts in the short- and long-term as blacknose sharks are not the targeted shark species for SCS fishermen.

For the Gulf of Mexico, we would implement a blacknose shark quota that is equal to 2011 commercial landings. The new quota would be 2.0 mt dw (4,513 lb dw) under this alternative. This would cause a minor decrease to the average annual gross revenues from blacknose shark landings in the Gulf of Mexico region from \$5,645 under the No Action alternative to \$5,641 under Alternative Suite A6. We anticipate these directed and incidental shark permit holders would experience neutral direct socioeconomic impacts in the short- and long-term since the new Gulf of Mexico blacknose shark quota would be consistent with current landings.

Under Alternative Suite A6, we anticipate that there would be neutral direct socioeconomic impacts in the short-term from the quotas under this alternative suite. In the short-term, change in revenues would be minimal for the 20 directed shark permit and 1 incidental shark permit holders that land blacknose sharks in the Atlantic region, and the 5 directed shark and the 2 incidental shark permits that land blacknose sharks in the Gulf of Mexico region. Over the long-term, the socioeconomic impact would be minor adverse, as blacknose sharks are not the targeted shark species for SCS fishermen, and the fishermen are likely to adapt to the new regulations by fishing in other fisheries, or change their fishing habitats.

#### *Non-Blacknose Small Coastal Sharks*

Alternative Suite A6 would establish regional quotas for non-blacknose SCS based on the non-blacknose SCS landings from 2010 to 2011. Based on the landings data, the non-blacknose SCS quota in the Atlantic region would be 176.1 mt dw (388,222 lb dw) and the Gulf of Mexico quota would be 45.5 mt dw (100,317 lb dw). In the Atlantic region, an average of approximately 35 vessels with directed shark permits landed non-blacknose SCS, while approximately 9 vessels with incidental shark permits landed non-blacknose SCS. The average annual gross revenues from Atlantic non-blacknose SCS meat were \$265,388 and average annual gross revenues for Atlantic non-blacknose SCS fins were \$221,157, making total average annual gross revenues for blacknose shark landings for the Atlantic region \$486,545 (Table 6.16).

In the Gulf of Mexico region, an average of approximately 6 vessels with directed shark permits landed non-blacknose SCS, while approximately 4 vessels with incidental shark permits landed non-blacknose SCS since Amendment 3 to the 2006 Consolidated HMS FMP was implemented in 2010. The average annual gross revenues from Gulf of Mexico non-blacknose SCS meat were \$31,927 and average annual gross revenues for Gulf of Mexico non-blacknose SCS fins were \$39,909, making total average annual gross revenues for non-blacknose shark landings for the Gulf of Mexico fishery \$71,836 (Table 6.16).

Under the Alternative Suite A6, there would be neutral direct and indirect socioeconomic impacts to directed and incidental shark permit holders as the average annual gross revenues from non-blacknose SCS landings would be the same as the status quo in the short- and long- term. Fishermen and shark dealers would be expected to operate in the same manner as the status quo in the short-term. However, this alternative suite could have minor adverse direct and indirect socioeconomic impacts on fishermen and shark dealers and associated shark businesses that deal with non-blacknose SCS product if fishing effort increases for non-blacknose SCS. Currently, the non-blacknose SCS fishery has not harvested the allowable quota since it was first established in July 1, 2010, but that could change with a smaller regional quota and if fishermen are displaced from other fisheries.

#### *Quota Linkages*

As under Alternative Suite A2, the quota linkages for Alternative Suite A6 could have short- and long-term direct moderate adverse socioeconomic impacts. As described earlier, quota linkages are explicitly designed to concurrently close multiple shark management groups, regardless of whether all the linked quotas are filled. This provides protection against incidental capture for species for which the quota has been reached, but it can also preclude fishermen from harvesting the entirety of each of the linked quotas. A quantitative analysis of the economic impact is not possible without comparing the rates of hammerhead shark and aggregated LCS catch and without knowing the extent to which fishermen can avoid hammerhead sharks because if fisherman are unable to sufficiently avoid hammerhead sharks the quotas will likely close much sooner, but if they can successfully avoid hammerhead sharks, it is likely that they will be able to fully utilize the aggregated LCS shark quota. However, a qualitative analysis can provide insight on possible adverse socioeconomic impacts.

Similar to Alternative Suite A2, under Alternative Suite A6, both the Atlantic hammerhead shark and Atlantic aggregated LCS management groups would close when landings of either reaches or is expected to reach 80 percent of the quota and, in the Gulf of Mexico region, the Gulf of Mexico hammerhead shark and Gulf of Mexico aggregated LCS management groups would close when landings of one reaches or is expected to reach 80 percent of its quota. If regional hammerhead shark landings reach 80 percent of the hammerhead shark quota, the associated regional aggregated LCS management group would close, regardless of what portion of the aggregated LCS quota has been filled. If the entire aggregated LCS quota has not been harvested, the fishery would not realize the

full level of revenues possible under the established quota. Similarly, if we close the management groups and the entire hammerhead quota has not been landed, the fishery would not realize the full level of revenues possible under the established quota. However, given that the hammerhead quota for the Atlantic region is larger than average landings of hammerhead sharks in the Atlantic region by a little over than 2,000 lb and that the Atlantic aggregated LCS quota is based on average landings, we do not expect either quota to be reached or be projected to reach 80 percent significantly faster than the other quota as a result of this alternative suite.

For the Gulf of Mexico region, however, unlike Alternative Suite A2, the Gulf of Mexico blacktip shark quota would not be directly linked to the hammerhead shark and aggregated LCS quotas under Alternative Suite A6. The hammerhead shark and aggregated LCS quotas for this region would be linked and those management groups would close together when landings reach or are projected to reach 80 percent of either quota. Separating out the Gulf of Mexico blacktip quota would allow Gulf of Mexico fishermen to continue to fish for blacktip sharks following the closures of the hammerhead shark and aggregated LCS quotas. However, we could close the Gulf of Mexico blacktip shark management group if it appears the amount of hammerhead or other sharks being discarded while fishermen target blacktip sharks is too high and could cause the overall hammerhead shark TAC to be exceeded. In this alternative, we could also transfer hammerhead shark quota between regions to allow for the greatest opportunity to harvest the aggregated LCS quotas while not exceeding the combined regional quotas for hammerhead sharks, which may help to minimize some adverse socioeconomic impacts.

The socioeconomic impacts of quota linkages on fishermen who land blacknose sharks and non-blacknose SCS would be the same as those impacts described regarding the aggregated LCS above since there would be similar scenarios with quota linkages by species and region. As described in Alternative Suite A2, this quota linkage has already been in place for blacknose sharks and non-blacknose SCS since implementation of Amendment 3 in 2010. The difference between this alternative suite and Alternative Suite A1 (no action) is that this alternative suite splits the quotas by regions, and we would allow inseason quota transfer of non-blacknose SCS between regions. Similar to the impacts on the aggregated LCS management group, the socioeconomic impacts of quota linkages on fishermen who land blacknose sharks and non-blacknose SCS are hard to quantify. However, we know that under status quo, the quota linkage caused an early closure of all SCS only in 2010. In all years since, the blacknose shark and non-sandbar SCS management groups have remained open through December 31 of each year. We would expect similar impacts from this alternative suite. In addition, under this alternative suite, we would allow inseason quota transfer of non-blacknose SCS between regions. This would have minor beneficial socioeconomic impacts as the chance of regional non-blacknose SCS quotas causing linked management groups to close would be reduced. Overall, the quota linkages considered under this alternative suite could have short- and long-term direct moderate adverse socioeconomic impacts.

### *Recreational Measures*

As with Alternative Suite A3, Alternative Suite A6 would increase the minimum recreational size for all hammerhead sharks (great, scalloped, and smooth) to 78 inches fork length, and expand outreach to recreational anglers regarding prohibited shark species. Under this alternative, some anglers would need to release hammerhead sharks that are under this minimum size. That could have some impacts for charter/headboat operators or the surrounding recreational communities if anglers perceive releasing small hammerhead sharks as a reason not to go fishing for sharks. Tournaments awarding points for sharks are unlikely to be significantly impacted by implementing the 78 inch fork length minimum size. Shark tournaments typically target larger, trophy sharks. Based on a preliminary review of tournament rules posted online by registered HMS shark tournaments, many tournaments impose minimum size limits (e.g., 60-66 inch fork length, 150 lb. minimum weight) in excess of the current 54 inch fork length minimum size, or have adopted catch-and-release only policies in the interest of promoting shark conservation. Using a length weight relationship for scalloped hammerhead sharks (Kohler et al., 1996), the 78 inch fork length minimum size equates to a scalloped hammerhead shark of approximately 189 lb ww. In 2012, at the White Marlin Open, an angler broke the Maryland scalloped hammerhead state record of 254 lb ww by landing a 266 lb ww scalloped hammerhead shark (Maryland Department of Natural Resources 2012). The angler won a prize of \$5,150. As such, because there are tournaments are currently landing scalloped hammerhead sharks that exceed the minimum size in this alternative and some tournaments have minimum sizes that are close to the weight of a 78 inch fork length scalloped hammerhead shark, we do not believe that the new minimum size for hammerhead sharks would have an adverse economic impact on tournaments. This alternative would likely result in short- and long-term minor, adverse socioeconomic impacts for recreational shark fishermen who target hammerhead sharks. Increasing the recreational size limit for hammerhead sharks would ensure that only larger or “trophy” sized sharks would be landed and could reduce the opportunities for recreationally landing these species. However, as the scalloped hammerhead stock rebuilds, increased fishing opportunities may result in the long-term. In addition, this alternative would have neutral direct and indirect socioeconomic impacts in the short- and long-term on the other shark species besides hammerhead sharks since it maintains the status quo.

### *Conclusion*

When taken as a whole, Alternative Suite A6 would likely have direct short- and long-term minor adverse socioeconomic impacts. These impacts would mostly affect fishermen targeting scalloped hammerhead and blacknose sharks, because the quotas would be reduced. These fishermen are likely to adapt to the new regulations by fishing in other fisheries, or changing their fishing habitats. Recreational management measures would increase the size limit on hammerhead sharks and cause fishermen to catch and release more hammerhead sharks, although tournament participants should not be impacted. Neutral socioeconomic impacts are expected for fishermen targeting the aggregated LCS and non-blacknose SCS management groups since the quotas are based on the average landings for each species.

Quota linkages could affect the socioeconomic impacts based on the fishing rate of each linked shark quota. For example, this alternative suite would link regional hammerhead shark and aggregated LCS quotas so that the two management groups will open and close together. If fishermen fill both quotas at about the same rate, there will be little or no unutilized quota. If, however, one or the other is filled at a much faster rate than the other and both management groups close, there could be left over quota available that could have been harvested and sold by fishermen. We would not link the Gulf of Mexico blacktip shark quota to the Gulf of Mexico hammerhead shark and aggregated LCS quotas, which would allow increased opportunities for fishermen than quota linkage scenarios in other alternative suites (i.e., A2 and A4). When we compare the socioeconomic impacts of Alternative Suite A6 to the other alternative suites, this alternative suite would cause fewer socioeconomic impacts overall to fishermen. For this reason and the ecological reasons described in other chapters, we prefer this alternative suite at this time.

Indirect short-term minor adverse socioeconomic impacts would likely result from this alternative suite's actions. The measures in this alternative suite adjust quotas based on new scientific information and would impact shark landings. Consequently, it is possible that dealers and supporting businesses such as bait and tackle suppliers may experience minor adverse impacts in the short-term, but since they do not rely solely on the shark fishery and buy from and sell to a variety of fisheries, the impacts are expected to neutral in the long-term. The changes to quotas would impact fishermen retaining certain shark species, but the changes are small enough that dealers and supporting businesses are unlikely to experience impacts from this alternative suite and its effects are therefore expected to be neutral.

## **6.5 Dusky Shark Measures**

Based on comments received on the Predraft during scoping, and the addition of Gulf of Mexico blacktip shark to this action, we determined the scope of significant issues of concern that would be addressed in the draft amendment. The Notice of Availability of the DEIS for Amendment 5 and the proposed rule published in the Federal Register on December 7, 2013 (77 FR 73029), and November 26, 2012 (77 FR 70552), respectively. The public comment period ended on February 12, 2013. During the comment period, we received numerous comments on the proposed dusky shark measures regarding the data sources used and the analyses of these data. We also received many comments requesting consideration of approaches to dusky shark fishery management that were significantly different from those we analyzed in the Amendment 5 proposed rule and DEIS. For example, commenters suggested exemptions to a recreational minimum size increase to allow landings of other sharks such as blacktip sharks or "blue" sharks such as shortfin mako or thresher sharks, and other commenters suggested implementing gear restrictions instead of additional pelagic longline closures.

After reviewing all of the comments received, we concluded that further analyses are needed for dusky shark measures. In order to ensure that other shark measures are finalized as expeditiously as possible, we decided to conduct additional dusky shark analyses in a separate proposed action, which will be referred to as Amendment 5b.

Comments received on the dusky shark portions of the November 2012 proposed rule will be considered in that action. This final document — referred to as Amendment A5a to the 2006 Consolidated HMS FMP — finalizes other shark measures needed to maintain rebuilding of sandbar sharks; end overfishing and rebuild scalloped hammerhead and Atlantic blacknose sharks; and establish a TAC and commercial quota and recreational measures for Gulf of Mexico blacknose and blacktip sharks.

## Chapter 6 References

- Kohler, N. E., J. G. Casey, and P. A. Turner. 1996. Length-length and length-weight relationships for 13 shark species from the Western North Atlantic. National Oceanic and Atmospheric Administration, National Marine Fisheries Service, NOAA Technical Memorandum NMFS-NE-110, Woods Hole, MA.
- Maryland Department of Natural Resources. 2012. New Maryland state record scalloped hammerhead shark: angler catches state record scalloped hammerhead at White Marlin Open breaks previous record by 12.5 pounds. Available: <http://sharkyear.com/2012/new-maryland-state-record-scalloped-hammerhead-shark.html>. (March 2013).
- 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. 2012. Stock Assessment and Fishery Evaluation (SAFE) Report for Atlantic Highly Migratory Species 2012. 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.

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## **7.0 REGULATORY IMPACT REVIEW**

The Regulatory Impact Review (RIR) is conducted to comply with Executive Order 12866 (E.O. 12866) and provides analyses of the economic benefits and costs of each alternative to the nation and the fishery as a whole. Certain elements required in an RIR are also required as part of this EIS. This RIR builds upon the data and analysis presented in Chapters 4 and 6 of this document. The information contained in Chapter 7, taken together with the data and analysis incorporated by reference, comprise the complete RIR.

The requirements for all regulatory actions specified in E.O. 12866 are summarized in the following statement from the order:

“In deciding whether and how to regulate, agencies should assess all costs and benefits of available regulatory alternatives, including the alternative of not regulating. Costs and benefits should be understood to include both quantifiable measures (to the fullest extent that these can be usefully estimated) and qualitative measures of costs and benefits that are difficult to quantify, but nonetheless essential to consider. Further, in choosing among alternative regulatory approaches, agencies should select those approaches that maximize net benefits (including potential economic, environmental, public health and safety, and other advantages; distributive impacts; and equity), unless a statute requires another regulatory approach.”

E.O. 12866 further requires Office of Management and Budget review of proposed regulations that are considered to be “significant.” A significant regulatory action is one that is likely to:

- Have an annual effect on the economy of \$100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, local or tribal governments of communities;
- Create serious inconsistency or otherwise interfere with an action taken or planned by another agency;
- Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or
- Raise novel legal or policy issues arising out of legal mandates, the president’s priorities, or the principles set forth in this Executive Order.

### **7.1 Description of the Management Objectives**

Please see Chapter 1 for a full description of the purpose and need for this amendment to the 2006 Consolidated HMS FMP and implementing regulations including fishery management actions. The management goals and objectives of this amendment are to provide for the sustainable management of shark species under authority of the Secretary consistent with the requirements of the Magnuson-Stevens Act and other statutes which may apply to such management, including the ESA, MMPA, and ATCA.

## **7.2 Description of the Fishery**

Please see Chapter 3 for a description of the fisheries that could be affected by these management actions.

## **7.3 Statement of the Problem**

Please see Chapter 1 for a description of a full discussion of the purpose and need for these management actions. The alternative suites considered are designed to address the following objectives:

- End overfishing and achieve optimum yield for scalloped hammerhead and Atlantic blacknose sharks;
- Implement a rebuilding plan for scalloped hammerhead and Atlantic blacknose sharks to ensure that fishing mortality levels for both species are maintained at or below levels that would result in a 70 percent probability of rebuilding in the timeframe recommended by the assessments;
- Maintain the rebuilding plan for sandbar sharks to ensure 70 percent probability of rebuilding in the timeframe recommended by the assessment; and
- Achieve optimum yield and provide an opportunity for the sustainable harvest of Gulf of Mexico blacknose, Gulf of Mexico blacktip sharks, and other sharks, as appropriate, and consistent with scientific advice.

## **7.4 Description of Each Alternative**

Please see Chapter 2 for a summary of each alternative suite and Chapter 4 for a complete description of each alternative suite and its expected ecological, social, and economic impacts. Chapters 6 and 8 provide additional information related to the economic impacts of the alternative suites.

## 7.5 Economic Analysis of Expected Effects of Each Alternative Suite Relative to the Baseline

**Table 7.1 Net Economic Benefits and Costs of Alternative Suites**

Alternative Suite	Scalloped Hammerhead	LCS	Gulf of Mexico Blacktip	Blacknose	Non-blacknose SCS	Quota Linkage	Recreational
A1 No Action	<p>Benefits: No change in fishery. Annual revenues of \$72,404 from landings.</p> <p>Costs: In the long-term, scalloped hammerheads are overfished and experiencing overfishing. The stocks and catches would decline.</p>	<p>Benefits: No change in fishery. Annual revenues of \$1,745,071 from landings.</p> <p>Costs: Neutral</p>	<p>Benefits: No change in fishery. Annual revenues of \$625,487 from landings.</p> <p>Costs: Neutral</p>	<p>Benefits: No change in fishery. Annual revenues of \$52,941 from landings.</p> <p>Costs: In the long-term, a decrease in revenues may be expected as the blacknose shark stocks continue to decline.</p>	<p>Benefits: No change in fishery. Annual revenues of \$548,345 from landings.</p> <p>Costs: In the long-term, a decrease in revenues may be expected as the blacknose shark stocks continue to decline.</p>	<p>Benefits: Neutral</p> <p>Costs: Neutral</p>	<p>Benefits: Continue to allow recreational fishermen to target and retain the same size range of sharks.</p> <p>Costs: In the long-term, current fishing pressure would lead to a declining stock status of those species that are overfished and/or experiencing overfishing, leading to decreased availability of the resource for recreational anglers.</p>

Alternative Suite	Scalloped Hammerhead	LCS	Gulf of Mexico Blacktip	Blacknose	Non-blacknose SCS	Quota Linkage	Recreational
A2	<p>Benefits: Neutral as current average landings are similar to quota. Similar and A6.</p> <p>Costs: Minor adverse long-term impacts as quotas could constrain future fishing opportunities.</p>	<p>Benefits: Neutral. Same A6.</p> <p>Costs: Neutral. Same as A6.</p>	<p>Benefits: Neutral based on stock assessment results of no overfishing occurring.</p> <p>Costs: Neutral</p>	<p>Benefits: Neutral. Same A6.</p> <p>Costs: Neutral. Same as A6.</p>	<p>Benefits: Neutral</p> <p>Costs: Neutral</p>	<p>Benefits: Protect against exceeding a filled fishery quota because of incidental capture in other fisheries.</p> <p>Costs: Would concurrently close multiple shark quotas, regardless of whether all the linked quotas are filled.</p>	<p>Benefits: Continue to allow recreational fishermen to target and retain the same size range of sharks.</p> <p>Costs: In the long-term, current fishing pressure could lead to a declining stock status of those species that are overfished and/or experiencing overfishing, leading to decreased availability of the resource for recreational anglers.</p>

Alternative Suite	Scalloped Hammerhead	LCS	Gulf of Mexico Blacktip	Blacknose	Non-blacknose SCS	Quota Linkage	Recreational
A3	<p>Benefits: Similar to Alternative Suite A6.</p> <p>Costs: Similar to Alternative Suite A6 except that there could be some additional administrative difficulties since hammerhead shark quota would not be split between Atlantic and Gulf of Mexico.</p>	<p>Benefits: Same as Alternative Suite A6.</p> <p>Costs: Same as Alternative Suite A6.</p>	<p>Benefits: Could result in annual landings increasing by up to \$339,467 as compared to current landings</p> <p>Costs: Neutral</p>	<p>Benefits: Neutral</p> <p>Costs: Reduction in annual fishery revenue of \$5,645 in the Gulf of Mexico.</p>	<p>Benefits: Neutral</p> <p>Costs: Neutral</p>	<p>Benefits: No quota linkages means that each quota would have a higher likelihood of being filled, allowing for full realization of potential revenues.</p> <p>Costs: Could result in adverse ecological impacts for overfished shark species that continue to be caught and discarded dead once their management group is closed if other management groups remain open.</p>	<p>Benefits: The management measures would help hammerhead stocks rebuild and possibly increase recreational fishery opportunities in the future.</p> <p>Costs: The increased size limit for hammerhead sharks could reduce the incentive to recreational fish for hammerhead sharks. Could have minor effects on the way tournaments and charter vessels operate, or reduce opportunity and demand for recreational shark fishing.</p>

Alternative Suite	Scalloped Hammerhead	LCS	Gulf of Mexico Blacktip	Blacknose	Non-blacknose SCS	Quota Linkage	Recreational
A4	<p>Benefits: No change in fishery in current fishing levels in the Atlantic and Gulf of Mexico.</p> <p>Costs: In the long-term, species identification issues could result in scalloped hammerhead sharks continuing to be overfished and experiencing overfishing. The stocks and catches would decline.</p>	<p>Benefits: Similar to Alternative Suite A6.</p> <p>Costs: Similar to Alternative Suite A6, since the only difference is that this alternative would instead calculate each species' contributions to total non-sandbar LCS landings using the year with the highest annual landings for the complex between 2008 and 2011.</p>	<p>Benefits: Could result in annual landings increasing by up to \$4,426,331 as compared to current landings. However, it is unlikely this value would be fully realized due to quota linkages.</p> <p>Costs: The stock assessment projections could be overly optimistic due to uncertainties in the base model used to create the projections, which could lead to increased risk that overfishing could occur at this high quota level</p>	<p>Benefits: Same as Alternative Suite A6.</p> <p>Costs: Same as Alternative Suite A6.</p>	<p>Benefits: Increase annual fishery revenue by \$257,928 in the Gulf of Mexico.</p> <p>Costs: Reduction in annual fishery revenue of \$164,109 in the Atlantic. Would also cause adverse impacts on blacknose sharks since current fishing and bycatch levels of blacknose sharks would increase.</p>	Same as Alternative Suite A2.	<p>Benefits: Would allow the current level of recreational landings.</p> <p>Costs: In the long-term this alternative could have minor adverse economic impacts if species-specific recreational shark quotas are exceeded and additional management measures are needed. These impacts would have a greater effect on tournaments and charter vessels that target sharks.</p>

Alternative Suite	Scalloped Hammerhead	LCS	Gulf of Mexico Blacktip	Blacknose	Non-blacknose SCS	Quota Linkage	Recreational
A5	<p>Benefits: Would end commercial shark fishing thus maximizing non-market existence values.</p> <p>Costs: Reduction in annual fishery revenue of \$72,404.</p>	<p>Benefits: Would end commercial shark fishing thus maximizing non-market existence values.</p> <p>Costs: Reduction in annual fishery revenue of \$1,745,071.</p>	<p>Benefits: Would end commercial shark fishing thus maximizing non-market existence values.</p> <p>Costs: Reduction in annual fishery revenue of \$625,487 in the Gulf of Mexico.</p>	<p>Benefits: Would end commercial shark fishing thus maximizing non-market existence values.</p> <p>Costs: Reduction in annual fishery revenue of \$52,941.</p>	<p>Benefits: Would end commercial shark fishing thus maximizing non-market existence values.</p> <p>Costs: Reduction in annual fishery revenue of \$548,345.</p>	<p>Benefits: Neutral</p> <p>Costs: Neutral</p>	<p>Benefits: Recreational anglers practicing catch-and-release fishing for sharks may experience more interactions with sharks if shark stocks increase as a result of the prohibition on retention.</p> <p>Costs: Recreational anglers would not benefit from the experience of catching and keeping sharks, particularly trophy size fish, thus resulting in significant economic costs associated with the loss of recreational consumer surplus and business activity associated with prohibiting the retention of all sharks for recreational anglers.</p>

Alternative Suite	Scalloped Hammerhead	LCS	Gulf of Mexico Blacktip	Blacknose	Non-blacknose SCS	Quota Linkage	Recreational
A6 <i>Preferred Alternative</i>	Benefits: Neutral as current average landings are similar to quota.  Costs: Minor adverse long-term impacts as quotas could constrain future fishing opportunities.	Benefits: Neutral.  Costs: Neutral.	Benefits: Neutral based on stock assessment results of no overfishing occurring.  Costs: Neutral	Benefits: Neutral.  Costs: Neutral.	Benefits: Neutral  Costs: Neutral	Benefits: Protect against exceeding a filled fishery quota because of incidental capture in other fisheries. Would keep Gulf of Mexico blacktip open if other quotas are filled reducing chance of unused quota. Would allow for transfer of hammerhead and non-blacknose SCS quota between regions offering greater flexibility.  Costs: Would concurrently close management groups with linked quotas, regardless of whether all the linked quotas are filled.	Benefits: The management measures would help hammerhead stocks rebuild and possibly increase recreational fishery opportunities in the future.  Costs: The increased size limit for hammerhead sharks could reduce the incentive to recreational fish for hammerhead sharks. Could have minor effects on the way tournaments and charter vessels operate, or reduce opportunity and demand for recreational shark fishing.

## 7.6 Conclusions

As noted above under E.O. 12866, a regulation is a “significant regulatory action” if it is likely to: (1) have an annual effect on the economy of \$100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or state, local, or tribal governments or communities; (2) create a serious inconsistency or otherwise interfere with an action taken or planned by another agency; and (3) materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the legal mandates, the President’s priorities, or the principles set forth in the Executive Order; or, (4) raise novel legal or policy issues arising out of legal mandates, the president’s priorities, or the principles set forth in this Executive Order. The preferred alternatives described in this document do not meet the above criteria. The preferred alternative would have an annual effect on the economy less than \$100 million and would not adversely affect the aforementioned parameters (see Table 7.1). The preferred alternative would also not create an inconsistency or interfere with an action taken by another agency. Furthermore, the preferred suite of alternatives would not materially alter the budgetary impact of entitlements, grants, user fees, the President’s priorities, or the principles set forth in E.O. 12866. Nor would the regulations raise any unique legal or policy issues. The Secretary, through NMFS, has been managing shark species through FMPs since 1993 and amending plans and implementing regulations regularly to modify management measures and add additional species for management. In addition, we have participated in international efforts to develop management measures for stocks affected by multiple nations. The preferred suite of alternatives does not materially depart from this management approach. Therefore, the preferred suite of alternatives described in this document has been determined to be not significant for the purposes of E.O. 12866. The Office of Management and Budget concurred with this determination provided in the listing memo for this rule. A summary of the expected net economic benefits and costs of each alternative, which are based on supporting text in Chapters 4 and 6, can be found in Table 7.1.

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## **8.0 FINAL REGULATORY FLEXIBILITY ANALYSIS**

The Final Regulatory Flexibility Analysis (FRFA) is conducted to comply with the Regulatory Flexibility Act (5 USC 601 et. seq.) (RFA). The goal of the RFA is to minimize the economic burden of federal regulations on small entities. To that end, the RFA directs federal agencies to assess whether the proposed regulation is likely to result in significant economic impacts to a substantial number of small entities, and identify and analyze any significant alternatives to the proposed rule that accomplish the objectives of applicable statutes and minimize any significant effects on small entities. Certain data and analysis required in a FRFA are also included in other chapters of this FEIS. They include: Chapter 1 (purpose and need for action), Chapter 2 (alternative regulatory options to meet the purpose and need), Chapter 3 (description of the affected regulated community), Chapter 4 (economic consequences of amendment and implementing regulations), Chapter 6 (extensive discussion of economic impacts of alternative approaches) and Chapter 7 (Regulatory Impact Review). Therefore, the FRFA incorporates the economic impacts identified in the FEIS by reference as supporting data for this analysis.

### **8.1 Statement of the Need for and Objectives of this Final Rule**

Please see Chapter 1 for a full description of the objectives of Amendment 5a to the 2006 Consolidated HMS FMP and implementing regulations including the preferred fishery management actions. The management goals and objectives of the preferred alternative suite are to provide for the sustainable management of shark species under authority of the Secretary consistent with the requirements of the Magnuson-Stevens Act and other statutes which may apply to such management, including the ESA, MMPA, and ATCA. The Magnuson-Stevens Act mandates that the Secretary provide for the conservation and management of HMS through development of an FMP for species identified for management and to implement the FMP with necessary regulations. In addition, the Magnuson-Stevens Act directs the Secretary, in managing HMS, to prevent overfishing of species while providing for their optimum yield on a continuing basis and to rebuild fish stocks that are considered overfished. The management objectives of the preferred alternative suite are to amend the 2006 Consolidated HMS FMP to rebuild and end overfishing of both the scalloped hammerhead and Atlantic blacknose shark stocks, maintain rebuilding for sandbar sharks, and achieve optimum yield and provide an opportunity for the sustainable harvest of Gulf of Mexico blacknose and Gulf of Mexico blacktip sharks.

### **8.2 A Summary of the Significant Issues Raised By the Public Comments in Response to the Initial Regulatory Flexibility Analysis, a Summary of the Assessment of the Agency of Such Issues, and a Statement of Any Changes Made in the Rule as a Result of Such Comments**

We received many comments on the proposed rule and DEIS during the public comment period. Summarized public comments and our responses to them are included in Appendix A of this document and will be included in the final rule. The specific economic concerns raised in the comments are also summarized here.

Comment 1: We received several comments regarding the adverse economic impact of proposed recreational measures on the Charter/Headboat fishery including one from the Mississippi Department of Marine Resources highlighting the importance of the large coastal shark fishery to the livelihood of Charter/Headboat captains.

Response: We agree that the large coastal shark fishery is important to the HMS Charter/Headboat industry; the new preferred alternative suite to raise the minimum size limit on hammerhead sharks (great, smooth, and scalloped) would have minimal impact on the Charter/Headboat fleet. Recreational regulations would remain the same for all other shark species, and the preferred hammerhead shark regulations would only apply to three hammerhead shark species. Furthermore, the preferred minimum size limit could potentially create a trophy fishery for hammerhead sharks while ensuring the continued sustainability of the hammerhead shark stocks, which could lead to positive long-term economic impacts for the Charter/Headboat fishery.

Comment 2: While reducing catch limits may have an immediate negative economic impact, the impact on shark stocks in the long-term will only be positive.

Response: We agree that the preferred catch limits and quotas would have a positive impact on the long-term sustainability of the associated shark stocks. Additionally, while the preferred quota reductions will have some minor short-term adverse economic impacts, their long-term economic impacts should be positive as they allow for rebuilding of overfished stocks

Comment 3: NMFS is incorrect that the impacts of these proposals will have a neutral effect on the surrounding resources yet will have a minor effect on the social and economic impact of fishermen and their communities. You will see that the current regulations are having a severe negative impact on the surrounding resources as is evidenced by the multitude of damaged and wasted fish due to shark predation.

Response: Under the Magnuson-Stevens Act, we must manage all our Nation's marine fisheries for optimal yield and end overfishing of all fish stocks, including shark fisheries. Current regulations are established under the MSA to manage all our Nation's marine fisheries for optimal yield and to rebuild overfished fish stocks for all fisheries, including sharks. We work closely with the regional fisheries management councils to ensure actions in the HMS fisheries do not jeopardize the continued existence of other fisheries. The cumulative direct and indirect impacts on EFH, predator/prey relationships, and protected resources would be neutral for the short- and long-term because commercial quotas would be similar to current levels and fishing pressure is not expected to change. Sharks are a natural and integral part of the marine ecosystem, and commercial and recreational shark fisheries provide significant positive economic impacts to our coastal communities.

When taken as a whole, the preferred alternative would likely have direct short- and long-term minor adverse socioeconomic impacts. These impacts would mostly affect

fishermen targeting scalloped hammerhead and blacknose sharks, because the quotas would be reduced. These fishermen are likely to adapt to the new regulations by fishing in other fisheries, or changing their fishing habitats. Recreational management measures would increase the size limit on hammerhead sharks and cause fishermen to catch and release more hammerhead sharks, although tournament participants should not be impacted. Neutral socioeconomic impacts are expected for fishermen targeting the aggregated LCS and non-blacknose SCS management groups since the quotas are based on the average landings for each species.

Indirect short-term minor adverse socioeconomic impacts would likely result from this alternative suite's actions. The measures in this alternative suite adjust quotas based on new scientific information and would impact shark landings. Consequently, it is possible that dealers and supporting businesses such as bait and tackle suppliers may experience minor adverse impacts in the short-term, but since they do not rely solely on the shark fishery and buy from and sell to a variety of fisheries, the impacts are expected to be neutral in the long-term. The changes to quotas would impact fishermen retaining certain shark species, but the changes are small enough that dealers and supporting businesses are unlikely to experience impacts from this alternative suite and its effects are therefore expected to be neutral.

Comment 4: The EPA says that while they appreciated NMFS' effort to evaluate the potential economic impact on these communities, more research is needed to address the impact on the fisherman, especially if these proposed limitations will have a disproportionate economic impact on minority and/or low-income populations.

Response: We agree that it is important to assess the economic impacts of regulatory actions on minority and/or low-income populations. However, the preferred alternative suite is expected to have neutral or minor adverse economic impacts at worst, and positive long-term impacts as overfished shark populations are rebuilt. As such, these measures will benefit everyone affected in the long-term. Our analyses of economic impacts used the best data available at this time, and, in future rulemakings, we will use more specific data regarding economic impacts on minority and/or low-income populations if it becomes available. We continue to support the development of methods to identify whether proposed amendments will have disproportionately high adverse impacts on minority or low income populations, as appropriate.

### **8.3 Description and Estimate of the Number of Small Entities to Which the Final Rule Would Apply**

The Small Business Administration has defined a "small" fishing entity as one with average annual receipts of less than \$4.0 million; a small charter/party boat entity is one with average annual receipts of less than \$7.0 million; a small wholesale dealer as one with 100 or fewer employees; and a small seafood processor as one with 500 or fewer employees (13 CFR §121.201). Under these standards, we consider all Atlantic HMS permit holders subject to this rulemaking to be small entities.

The commercial measures in the preferred alternative suite would apply to the 486 commercial shark permit holders in the Atlantic shark fishery based on an analysis of permit holders as of October 2012 (NMFS 2012). Of these permit holders, 215 have directed shark permits and 271 hold incidental shark permits. Not all permit holders are active in the fishery in any given year. We estimate that between 2008 and 2011, approximately 108 vessels with directed shark permits and 71 vessels with incidental shark permits landed sharks. These measures could also affect 92 shark dealers. A further breakdown of these permit holders is provided in Table 3.14.

The recreational measures in the preferred alternative suite would impact HMS angling category and HMS charter/headboat category permit holders as well as HMS tournaments. In general, the HMS charter/headboat category permit holders can be regarded as small businesses, while HMS angling category permits are typically obtained by individuals who are not considered small entities for purposes of the RFA. While HMS tournaments are not themselves small businesses, many of them are organized by small businesses as promotional events. In 2012, 4,129 vessels obtained HMS charter/headboat category permits, and 235 HMS tournaments were registered. Table 6.2 provides the overall historic trend in the number of charter/headboat permit holders and registered HMS tournaments from 2008 to 2012. It is unknown what portion of HMS charter/headboat permit holders actively participate in shark fishing or market shark fishing services for recreational anglers.

We have determined that the rule would not likely affect any small governmental jurisdictions. More information regarding the description of the fisheries affected, and the categories and number of permit holders can be found in Chapter 3.

#### **8.4 Description of the Projected Reporting, Record-keeping, and Other Compliance Requirements of the Proposed Rule, Including an Estimate of the Classes of Small Entities Which Would Be Subject to the Requirements of the Report or Record**

The preferred commercial and recreational measures in Alternative Suite A6 would not introduce any new reporting or record-keeping requirements.

#### **8.5 Description of the Steps the Agency Has Taken to Minimize the Significant Economic Impact on Small Entities Consistent with the Stated Objectives of Applicable Statutes, Including a Statement of the Factual, Policy, and Legal Reasons for Selecting the Alternative Adopted in the Final Rule and the Reason That Each one of the Other Significant Alternatives to the Rule Considered by the Agency Which Affect Small Entities Was Rejected**

One of the requirements of a FRFA is to describe any alternatives to the rule which accomplish the stated objectives and which minimize any significant economic impacts. These impacts are discussed below and in Chapters 4, 6, and 7 of this document. Additionally, the RFA (5 U.S.C. § 603 (c) (1)-(4)) lists four general categories of “significant” alternatives that would assist an agency in the development of significant alternatives. These categories of alternatives are:

1. Establishment of differing compliance or reporting requirements or timetables that take into account the resources available to small entities;
2. Clarification, consolidation, or simplification of compliance and reporting requirements under the rule for such small entities;
3. Use of performance rather than design standards; and,
4. Exemptions from coverage of the rule for small entities.

In order to meet the objectives of this rule, consistent with Magnuson-Stevens Act and ESA, we cannot exempt small entities or change the reporting requirements only for small entities because all the entities affected are considered small entities. Thus, there are no alternatives discussed that fall under the first and fourth categories described above. We do not know of any performance or design standards that would satisfy the aforementioned objectives of this rulemaking while, concurrently, complying with the Magnuson-Stevens Act. Thus, there are no alternatives considered under the third category. As described below, we analyzed several different alternatives in this rulemaking and provide rationale for identifying the preferred alternative to achieve the desired objective.

The alternatives considered and analyzed have been grouped into six alternative suites that address various shark TACs, quotas, quota linkages, and recreational measures. Alternative Suite A1 would maintain the current Atlantic shark fishery (no action). Alternative Suite A2 would establish new species management groups by regions, adjust LCS and SCS quotas, and link appropriate quotas. Alternative Suite A3 would establish new species management groups by region, adjust LCS and SCS quotas with no quota linkages, and increase the hammerhead shark minimum recreational size to 78 inches fork length. Alternative Suite A4 would establish new species management groups by region, adjust LCS and SCS quotas, and establish species-specific recreational shark quotas. Alternative Suite A5 would close all commercial and recreational shark fisheries. Finally, Alternative Suite A6, the preferred alternative, would establish new species management groups by regions, adjust LCS and SCS quotas, link appropriate quotas, and increase the hammerhead shark minimum recreational size to 78 inches fork length. Additionally, Alternative Suites A2, A3, and A6 would also require the Agency to conduct more outreach on shark identification to recreational anglers and Charter/Headboat permit holders which could lead to reduced landings of prohibited species, but we anticipate that any reductions will be minimal.

The potential impacts these alternatives may have on small entities have been analyzed and are discussed in the following sections. The preferred alternative in the FEIS is Alternative Suite A6. The economic impacts that would occur under this preferred alternative suite was compared with the other alternatives to determine if economic impacts to small entities could be minimized while still accomplishing the stated objectives of this rule.

### 8.5.1 **Alternative Suite A1**

Alternative Suite A1 (status quo) would not change current management of the Atlantic shark fisheries.

#### *Scalloped Hammerhead Sharks*

From 2008 through 2011, approximately 22 vessels with directed shark permits had hammerhead shark landings, while approximately 2 vessels with incidental shark permits had hammerhead shark landings in the Atlantic region. In the Gulf of Mexico region, approximately 12 vessels with directed shark permits had hammerhead shark landings, while 1 vessel with an incidental shark permit had hammerhead shark landings. Spread amongst the directed and incidental shark permit holders that landed scalloped hammerhead in the Atlantic region, the average directed shark permit holder earned \$1,443 in average annual gross revenues, and the average incidental shark permit holder earned \$491 in average annual gross revenues from scalloped hammerhead shark landings. Divided evenly amongst the directed and incidental shark permit holders that landed scalloped hammerhead in the Gulf of Mexico region, the average directed shark permit holder earned \$3,303 in average annual gross revenues, and the incidental shark permit holder earned \$40 in annual gross revenues from scalloped hammerhead shark landings. Scalloped hammerhead sharks compose a small portion of total non-sandbar LCS landings; an annual average of 7.3 percent of non-sandbar LCS landings are scalloped hammerhead sharks in the Atlantic region and 4.3 percent on the Gulf of Mexico region. Scalloped hammerhead sharks are overfished with overfishing occurring, and the stock could become increasingly unproductive under status quo, therefore we do not prefer this alternative at this time.

#### *Large Coastal Sharks*

From 2008 through 2011, approximately 43 vessels with directed shark permits had non-sandbar LCS landings, while approximately 14 vessels with incidental shark permits had non-sandbar LCS landings in the Atlantic region. In the Gulf of Mexico region, approximately 18 vessels with directed shark permits had non-sandbar LCS landings, while approximately 6 vessels with incidental shark permits had non-sandbar LCS landings. It is estimated that these permit holders would be the most affected by management measures proposed for non-sandbar LCS. Spread amongst the directed and incidental shark permit holders that landed non-sandbar LCS in the Atlantic region, the average directed shark permit holder earned \$15,200 in average annual gross revenues, and the average incidental shark permit holder earned \$1,444 in average annual gross revenues from non-sandbar LCS landings. Spread amongst the directed and incidental shark permit holders that landed non-sandbar LCS in the Gulf of Mexico region, the average directed shark permit holder earned \$58,920 in average annual gross revenues, and the average incidental shark permit holder earned \$1,786 in average annual gross revenues from non-sandbar LCS landings.

### *Gulf of Mexico Blacktip Sharks*

From 2008 through 2011, approximately 15 vessels with directed shark permits had blacktip shark landings, while approximately 2 vessels with incidental shark permits had blacktip shark landings in the Gulf of Mexico region. Spread amongst the directed and incidental shark permit holders that landed blacktip shark, the average directed shark permit holder earned \$41,532 in average annual gross revenues, and the average incidental shark permit holder earned \$1,251 in average annual gross revenues from blacktip shark landings.

### *Blacknose Sharks*

Since Amendment 3 was implemented in 2010, an average of approximately 25 vessels with directed shark permits had blacknose shark landings, while approximately 3 vessels with incidental shark permits had blacknose shark landings. It is estimated that these permit holders would be the most affected by management measures proposed for blacknose sharks. Spread amongst the directed and incidental shark permit holders that landed blacknose, the average directed shark permit holder earned \$2,075 in average annual gross revenues, and the average incidental shark permit holder earned \$353 in average annual gross revenues from blacknose shark landings.

### *Non-Blacknose Small Coastal Sharks*

Since Amendment 3 was implemented in 2010, an average of approximately 41 vessels with directed shark permits had blacknose shark landings, while approximately 13 vessels with incidental shark permits had non-blacknose SCS landings. It is estimated that these permit holders would be the most affected by management measures proposed for non-blacknose SCS. Spread amongst the directed and incidental shark permit holders that landed non-blacknose SCS, the average directed shark permit holder earned \$13,107 in average annual gross revenues, and the average incidental shark permit holder earned \$844 in average annual gross revenues from non-blacknose SCS landings.

### *Quota Linkages*

Since Alternative Suite A1 does not create any new species or management group quotas, new quota linkages would be unnecessary. Consequently, there are no additional direct or indirect socioeconomic impacts in the short or long-term beyond those discussed for scalloped hammerhead, blacktip sharks, non-blacknose SCS, and blacknose sharks.

### *Recreational Measures*

Under Alternative Suite A1, there would be no changes to the existing recreational retention limits for all species. Therefore, small entities, such as charter/headboat operators and tournaments that target sharks, would not experience any change in economic impact under this alternative.

### *Conclusion*

When taken as a whole, Alternative Suite A1 would likely have neutral economic impacts on small entities in the short-term because the fisheries would continue to operate as status quo. In the long-term, it could cause direct minor adverse economic impacts because we would need to make to changes to the fishery to address the overfishing and overfished stocks. Since Alternative Suite A1 does not address the overfished and/or overfishing determination based on recent stock assessments, we do not prefer this alternative at this time.

### 8.5.2 **Alternative Suite A2**

Alternative Suite A2 would establish new species management groups by regions, adjust LCS and SCS quotas, and link appropriate quotas.

#### *Scalloped Hammerhead Sharks*

Under Alternative Suite A2, we would establish an Atlantic and a Gulf of Mexico hammerhead shark quota (including scalloped, smooth, and great hammerhead sharks) using the methodology outlined in Chapter 2. Compared to average landings the quotas could result in a fishery-wide increase in revenue of \$1,719 in the Atlantic region and \$2,005 in the Gulf of Mexico region. However, because hammerhead sharks are currently counted against the regional non-sandbar LCS quotas, which are much higher than the regional hammerhead shark quotas in Alternative Suite A2, the opportunities to land hammerhead sharks under this alternative suite would be reduced. Fishing activities could be more constrained in future years under the quotas as compared to the historical range of landings. Therefore, impact on the annual revenues of individual vessels actively involved in the fishery are anticipated to be neutral in most years, but minor impacts may be experienced in years of high landings.

#### *Large Coastal Sharks*

Alternative Suite A2 would establish new, separate quotas for scalloped hammerhead sharks and Gulf of Mexico blacktip sharks, necessitating removal of these species from the non-sandbar LCS management group (which will then be renamed “aggregated LCS” in both the Atlantic and Gulf of Mexico regions). The aggregated LCS quota would be based on average annual landings of the remaining species (see Chapter 2 for annual landings of remaining species), therefore, those species composing the aggregated LCS management group would not experience a change in fishing pressure and landings would be capped at recent levels. For these reasons, economic impacts to small entities resulting from this portion of Alternative Suite A2 are expected to be neutral.

#### *Gulf of Mexico Blacktip Sharks*

Alternative suite A2 would establish a new, separate quota for Gulf of Mexico blacktip sharks based on current average landings. This alternative suite’s blacktip shark action would likely result in neutral economic impacts to small entities. As discussed in Chapter 1 of this document, based on the SEDAR 29 Gulf of Mexico blacktip shark stock assessment, we have determined that the Gulf of Mexico blacktip shark stock is not

overfished and not experiencing overfishing (NMFS 2011). These results indicate the Gulf of Mexico blacktip shark stock can sustain current fishing levels and should not result in any additional impacts to small entities.

### *Blacknose Sharks*

Alternative Suite A2 would separate blacknose sharks into the Atlantic and Gulf of Mexico regions as suggested in the SEDAR 21 stock assessment (NMFS 2011). These alternatives would increase the blacknose shark landings in each region. Average annual gross revenues for the blacknose shark landings for the Atlantic region would increase from \$50,501 under the No Action alternative to \$54,854 under Alternative Suite A2. Although, because the blacknose shark quota for the Atlantic region would be less than the current overall blacktip shark quota (19.9 mt dw), there could be some minor, adverse socioeconomic impacts associated with the reduced opportunities to land blacknose sharks. We anticipate that directed and incidental shark permit holders would experience neutral direct socioeconomic impacts in the short- and long-term as blacknose sharks are not the targeted shark species for SCS fishermen. Average annual gross revenues for the blacknose shark landings for the Gulf of Mexico region would decrease slightly from \$5,645 under the No Action alternative to \$5,641 under Alternative Suite A2. NMFS anticipates these directed and incidental shark permit holders would experience minor economic impacts since the new Gulf of Mexico blacknose shark quota is consistent with current landings. In the short-term, lost revenues would be moderate for the 20 directed shark permit and 1 incidental shark permit holders that land blacknose sharks in the Atlantic region, and the 5 directed shark and the 2 incidental shark permits that land blacknose sharks in the Gulf of Mexico.

### *Non-Blacknose Small Coastal Sharks*

Alternative Suite A2 would establish regional quotas for non-blacknose SCS based on the landings since Amendment 3 was implemented in 2010 (NMFS 2010). In the Atlantic, an average of approximately 35 vessels with directed shark permits had non-blacknose shark landings, while approximately 9 vessels with incidental shark permits had non-blacknose SCS landings. In the Gulf of Mexico, an average of approximately 5 vessels with directed shark permits had non-blacknose shark landings, while approximately 2 vessels with incidental shark permits had non-blacknose SCS landings since Amendment 3 was implemented in 2010. Under the Alternative Suite A2, there would be neutral economic impacts to directed and incidental shark permit holders as the average annual gross revenues from non-blacknose SCS landings would be the same as the status quo in the short- and long- term. Fishermen would be expected to operate in the same manner as the status quo in the short-term. However, this alternative suite could have minor negative economic impacts on fishermen if fishing effort increases for non-blacknose SCS. The fishery has never filled the entire quota established for the fishery in 2010, but that could change with a smaller regional quota and if fishermen are displaced from other fisheries.

### *Quota Linkages*

The quota linkages under this alternative suite could have short and long-term moderate adverse economic impacts. Quota linkages are explicitly designed to concurrently close multiple shark management groups, regardless of whether all the linked quotas are filled. This provides protection against incidental capture for species for which the quota has been reached, but it could also preclude fishermen from harvesting the entirety of each of the linked quotas. A quantitative analysis of the economic impact is not possible without comparing the rates of hammerhead shark, blacktip shark, and aggregated LCS catch and without knowing the extent to which fishermen can avoid hammerhead sharks. However, a qualitative analysis can provide insight on the possibility of adverse socioeconomic impacts. Under Alternative Suite A2, both the hammerhead shark and aggregated LCS management groups would close when landings of either reaches or is expected to reach 80 percent of the quota. If hammerhead shark landings reach 80 percent of the quota, the aggregated LCS management group would close, regardless of what portion of the quota has been filled. If the entire aggregated LCS management group has not been harvested, the fishery would not realize the full level of revenues possible under the established quota. However, given that the hammerhead quota for the Atlantic region is larger than average landings of hammerhead sharks in the Atlantic region by a little over than 2,000 lb dw and that the Atlantic aggregated LCS quota is not changing from average landings, we do not expect either quota to reach or be projected to reach 80 percent significantly faster than the other quota as a result of this alternative suite. A similar situation could occur in the Gulf of Mexico region under Alternative Suite A2 where both the hammerhead shark and blacktip shark quotas would be linked to the aggregated LCS quota. In the Gulf of Mexico the hammerhead, Gulf of Mexico blacktip, and aggregated LCS management groups would close when landings of any one reaches or is expected to reach 80 percent of its quota. However, given that the hammerhead quota for the Gulf of Mexico region is larger than average landings of hammerhead sharks in the Gulf of Mexico region by a little over than 2,000 lb dw and that the Gulf of Mexico aggregated LCS and blacktip quotas are not changing from average landings, we do not expect either quota to be reach or be projected to reach 80 percent significantly faster than the other quotas as a result of this alternative suite.

The blacknose shark and non-blacknose SCS socioeconomic impacts would be the same as the LCS since there would be similar scenarios with the quota linkage by species and region. In addition, we would allow inseason quota transfers between non-blacknose SCS regions. This would have minor beneficial economic impacts for the fishery as the non-blacknose SCS quota would not be the limiting factor. Consequently, the quota linkages proposed under this Alternative Suite could have moderate adverse economic impacts, but will likely have neutral impacts most years.

### *Recreational Measures*

Under Alternative Suite A2, there would be no changes to the existing recreational retention limits for all species. Therefore, small entities, such as charter/headboat operators and tournaments that target sharks, would not experience any change in

economic impact under this alternative. However, continued overfishing of selected shark species could lead to long-term adverse economic impacts.

### *Conclusion*

When taken as a whole, Alternative Suite A2 would likely have direct short and long-term minor adverse economic impacts. These impacts would mostly affect fishermen targeting scalloped hammerhead and blacknose sharks since the quotas would restrict the amount of sharks that could be landed some years. These fishermen are likely to adapt to the new regulations by fishing in other fisheries, or change their fishing habitats. Neutral economic impacts are expected for fishermen targeting the aggregated LCS and non-blacknose SCS management groups since the new proposed quotas are based on the average landings for each species. Quota linkages could have moderate adverse economic impacts based on the fishing rate of each linked shark quota in some years, but not all years. Furthermore, failure to alter recreational measures under this alternative could lead to long-term adverse economic impacts due to continued overfishing.

### **8.5.3 Alternative Suite A3**

Alternative Suite A3 would establish new species management groups by regions, adjust LCS and SCS quotas, and increase the hammerhead shark minimum recreational size to 78 inches fork length.

#### *Scalloped Hammerhead Sharks*

Under Alternative Suite A3, NMFS would remove hammerhead sharks from the non-sandbar LCS quota and establish a separate hammerhead shark quota for the three species of large hammerhead sharks (scalloped, smooth, and great hammerhead sharks), similar to Alternative Suites A2 and A6. In contrast to Alternative Suites A2 and A6, however, the hammerhead shark quota under Alternative Suite A3 would not be split between the Atlantic and Gulf of Mexico regions; rather, there would be one hammerhead shark quota across both regions. Although this difference could create some administrative difficulties, it is unlikely to alter the economic impacts from Alternative Suites A2 or A6's minor adverse economic impacts. Alternative Suites A2 and A6 would split the quota between the two regions based on historical landings; therefore, even though there would be one hammerhead shark quota under Alternative Suite A3, a similar breakdown of landings would likely occur.

#### *Large Coastal Sharks*

Non-sandbar LCS management measures under Alternative Suite A3 are identical to those under Alternative Suites A2 and A6. See the Large Coastal Shark section of Alternative Suite A6 for more details on impacts.

### *Gulf of Mexico Blacktip Sharks*

Alternative Suite A3 would create a separate Gulf of Mexico blacktip shark TAC and commercial quota, by increasing the TAC calculated in Alternative Suites A2 and A6 by 30 percent, which is based on the current landings percentage of Gulf of Mexico blacktip sharks (Table 2.5 and Table 2.6). This increase would result in a commercial quota of 380.6 mt dw (839,090 lb dw), which is a 48 percent increase from average Gulf of Mexico blacktip shark landings from 2008-2011 (256.6 mt dw; 565,700 lb dw). This increase would increase average ex-vessel revenues across the fleet by \$339,467 when compared to current revenues.

From 2008 through 2011, approximately 15 vessels with directed shark permits had blacktip shark landings, while approximately 2 vessels with incidental shark permits had blacktip shark landings in the Gulf of Mexico region. Spread amongst the directed and incidental shark permit holders that landed blacktip shark, the average shark permit holder could potentially land up to \$19,969 in additional annual revenue from Gulf of Mexico blacktip sharks.

### *Blacknose Sharks*

The blacknose shark management measures under Alternative Suite A3 are identical to those under Alternative Suites A2 and A6 for the Atlantic region. However, there are differences for the Gulf of Mexico region. Given that the TAC under Alternative Suite A3 would be 11,900 sharks, there would be no TAC available for commercial and recreational harvest of blacknose sharks in the Gulf of Mexico region. We would then work with the Gulf of Mexico Fishery Management Council to reduce the mortality of blacknose sharks in the Gulf of Mexico shrimp trawl fishery to attain the TAC of 11,900 sharks, and to establish bycatch reduction methods, as appropriate, to reduce mortality in the shrimp trawl and reef fish fisheries. Currently, the average annual gross revenues for blacknose shark landings for the entire commercial fishery in the Gulf of Mexico region are \$5,645, but would be reduced to \$0 under this alternative. Under Alternative Suite A3, lost revenues would lead to moderate direct adverse economic impacts for the 8 directed shark and the 2 incidental shark permits that land blacknose sharks in the Gulf of Mexico.

### *Non-Blacknose Small Coastal Sharks*

Alternative Suite A3 would keep the non-blacknose SCS management group as status quo with one regional quota of 221.6 mt dw (488,539 lb dw). There would be neutral economic impacts to shark permit holders.

### *Quota Linkages*

Under Alternative Suite A3, no quota linkages would be implemented. All shark management groups would open and close independently of each other. Quota linkages can lead to closures of shark management groups whether their quotas are fully harvested or if landings indicate linked quotas are within 80 percent of being fully harvested. If

each management group opens and closes independently, each quota would have a higher likelihood of being filled, allowing for full realization of potential revenues. Thus, the lack of quota linkages under this alternative suite could lead to beneficial economic impacts in the short-term, but adverse economic impacts in the long-term if overfishing is allowed to continue.

### *Recreational Measures*

Alternative Suite A3 would increase the minimum recreational size for all hammerhead sharks (great, smooth, and scalloped hammerhead sharks) to 78 inches fork length, and increase outreach to recreational anglers concerning identification of all shark, including prohibited species. Therefore, this alternative would likely result in minor adverse economic impacts for charter/headboat operators and tournaments that target hammerhead sharks because of the reduced incentive to recreationally fish for these species. Increasing the recreational size limit for hammerhead sharks would ensure that only larger or “trophy” sized sharks would be landed.

### *Conclusion*

When taken as a whole, Alternative Suite A3 would likely have moderate adverse economic impacts on small entities. These impacts would mostly affect fishermen catching hammerhead and blacknose sharks. The hammerhead shark quota would be based on the scalloped hammerhead shark TAC and would potentially reduce hammerhead shark landings in years of high landings. The blacknose shark quota in the Atlantic would be reduced, while the Gulf of Mexico blacknose TAC would be insufficient to allow for commercial or recreational harvest due to discards in other fisheries. Recreational management measures would affect fishermen who catch hammerhead sharks since the increased size limit would result in more hammerhead sharks having to be released under this alternative suite. In addition, the lack of quota linkages would allow fishermen to fully harvest all of the quotas. While this alternative suite might have more beneficial direct economic impacts than preferred Alternative Suite A6, the ecological impacts would be adverse and would not achieve the objectives and needs for this rulemaking.

#### **8.5.4 Alternative Suite A4**

Alternative Suite A4 would establish new species management groups by regions, adjust LCS and SCS quotas, link appropriate quotas, and establish a species-specific recreational shark quota.

### *Scalloped Hammerhead Sharks*

Alternative Suite A4 would use the scalloped hammerhead shark TAC established in Hayes et al (2009) to create separate Atlantic and Gulf of Mexico quotas applicable to only scalloped hammerhead sharks rather than all three large hammerhead sharks as considered under Alternative Suites A2, A3, and A6. The quotas in both regions are higher than current landings (see Chapter 2 for landings information). Therefore, we

expect neutral economic impacts. Great and smooth hammerhead sharks could continue to be landed at current levels under the aggregated LCS quota.

### *Large Coastal Sharks*

Alternative Suite A4 would establish new aggregated LCS quotas in the Atlantic and Gulf of Mexico regions using a similar methodology to that outlined in Alternative Suites A2 and A6, except for one difference. While Alternative Suite A6 would calculate each species' contribution to total non-sandbar LCS landings using average annual landings between 2008 and 2011, Alternative Suite A4 would instead calculate each species' contribution to total non-sandbar LCS landings using the year with the highest annual landings for the management group between 2008 and 2011 for each species. The year with the highest non-sandbar LCS landings in the Atlantic was 2008 and the highest in the Gulf of Mexico was 2011. This deviation in method does not substantially change the quotas; therefore, economic impacts are unchanged from Alternative Suites A2 and A6.

### *Gulf of Mexico Blacktip Sharks*

Alternative Suite A4 would establish a separate Gulf of Mexico blacktip shark quota of 1,992.6 mt dw based upon projections produced by SEFSC stock assessment scientists. The quota of 1,992.6 mt dw is more than five times the current Gulf of Mexico non-sandbar LCS quota. Ex-vessel revenue resulting from this blacktip shark quota could increase by up to \$4,426,331 in the Gulf of Mexico region. Spread amongst the 17 directed and incidental shark permit holders that landed blacktip sharks, the average shark permit holder could potentially land up to \$260,372 in additional annual revenue from Gulf of Mexico blacktip sharks. However, it is unlikely that this value would be realized. The Gulf of Mexico blacktip shark quota would be linked to the Gulf of Mexico aggregated LCS and scalloped hammerhead shark quotas. All three of these management groups would close when landings of any of them reached, or was expected to reach, 80 percent of the respective quota. Either the aggregated or scalloped hammerhead quota would likely be filled before the larger blacktip shark quota was filled. Regardless, the increase blacktip shark quota would allow for increased fishing opportunities and positive impacts to small entities.

### *Blacknose Sharks*

Under Alternative Suite A4, the mortality of blacknose sharks in the Atlantic region would be limited to the TAC recommended by the SEDAR stock assessment of 7,300 blacknose sharks. All of the economic impacts resulting for the Atlantic region from this portion of the alternative suite are the same as those analyzed in Alternative Suites A2 and A6.

For the Gulf of Mexico region, we would establish a TAC of 9,792 blacknose sharks. As described in Alternative Suite A3, there would be no TAC available for commercial and recreational harvest of blacknose sharks in the Gulf of Mexico region given the blacknose shark mortality in non-HMS fisheries in the Gulf of Mexico. We would also work with

the Gulf of Mexico Fishery Management Council to reduce bycatch mortality of blacknose sharks in the shrimp trawl and reef fish fisheries. The average annual gross revenues for blacknose shark landings for the commercial fishery are \$5,645, but would be reduced to \$0 under this alternative. Under Alternative Suite A4, it is anticipated that there would be moderate adverse economic impacts. In the short-term lost revenues would be moderate for the 5 directed shark and the 2 incidental shark permits that land blacknose sharks in the Gulf of Mexico region. Over the long-term, the adverse economic impact would be moderate, as the other management measures could be implemented to reduce the discards of blacknose sharks.

#### *Non-Blacknose Small Coastal Sharks*

Under Alternative Suite A4, we would establish regional quotas for non-blacknose SCS by dividing the current quota in half. This alternative would cause significant adverse economic impacts for shark fishermen in the Atlantic region. Alternative Suite A4 would restrict fishing of non-blacknose in the Atlantic to 244,269.5 lb dw and potentially reduce current annual revenue by \$164,109. In the Gulf of Mexico region, this alternative would cause beneficial economic impacts for non-blacknose SCS fishery as the quota would be larger than their average landings. This larger quota could potentially increase gross revenues by \$257,928. However, this alternative suite would cause adverse impacts on blacknose sharks since current fishing and bycatch levels of blacknose sharks could increase. Since Alternative Suite A4 would not reduce blacknose shark mortality in the Gulf of Mexico region and decrease the Atlantic non-blacknose SCS fishing levels, we do not prefer this alternative at this time.

#### *Quota Linkages*

Quota linkages under Alternative Suite A4 are nearly identical to those under Alternative Suite A2, except that instead of linking the hammerhead quotas to the aggregated LCS quota in the Atlantic and Gulf of Mexico regions, the scalloped hammerhead quota would be linked instead. This deviation should not change the expected economic impacts. In addition, we would link the Atlantic blacknose and non-blacknose SCS quotas and Gulf of Mexico blacknose shark and non-blacknose SCS quotas, and allow inseason quota transfer between the non-blacknose SCS regions. The quota linkages proposed under Alternative Suite A4 would be expected to have moderate adverse economic impacts.

#### *Recreational Measures*

Under Alternative Suite A4, we would establish species-specific recreational shark quotas. This alternative would cause short-term neutral economic impacts for recreational fishermen as it would restrict landings to current levels. In the long-term, this alternative could have minor adverse socioeconomic impacts if the species-specific recreational shark quotas are exceeded and we implements additional management measures. This would have a greater effect on tournaments and charter vessels that target sharks.

#### *Conclusion*

Overall, Alternative Suite A4 would likely have direct short- and long-term minor, adverse economic impacts. These impacts would mostly affect fishermen catching blacknose sharks. The blacknose shark quota in the Atlantic region would be reduced, while in the Gulf of Mexico region, there would be no TAC available for commercial and recreational harvest of blacknose sharks given the blacknose shark mortality in non-HMS fisheries in the Gulf of Mexico. Recreational management measures would affect fishermen who retain sharks because we would implement a species-specific quota for the recreational fishery. Neutral economic impacts are expected for recreational and commercial fishermen targeting scalloped hammerhead sharks, aggregated LCS and non-blacknose SCS. While this alternative suite might have minor adverse economic impacts, there is the potential for more adverse economic impacts if quotas are exceeded in the future. Although this alternative suite would allow for the highest Gulf of Mexico blacktip shark commercial quota, it is based on base model projections, which the NMFS scientists who participated in the stock assessment felt had a high degree of uncertainty, and, because these projections were developed outside of the standard SEDAR process and were not peer reviewed, they could not conclude with certainty that such a high level of catch would not result in overfishing. In addition to the uncertainty in the model, the blacktip shark quota proposed under this alternative suite could lead to increased bycatch of other species due to increased fishing effort. For all of these reasons, and because of the potential for additional adverse socioeconomic impacts if quotas are exceeded, we do not prefer this alternative suite at this time.

#### **8.5.5 Alternative Suite A5**

Alternative Suite A5 would close all commercial and recreational shark fisheries.

##### *Scalloped Hammerhead Sharks*

Currently, scalloped hammerhead sharks provide fishery-wide revenue of \$72,404 (as discussed under Alternative Suite A1), which would be lost under this alternative suite. Consequently, the scalloped hammerhead shark portion of Alternative Suite A5 would be expected to only have moderate adverse direct economic impacts.

##### *Large Coastal Sharks*

Closure of the LCS fishery would have significant adverse direct economic impacts. Many fishermen rely on the LCS fishery for a large portion of annual earnings. A closure of the fishery would significantly impact the livelihoods of these fishermen. Currently, commercial landings of non-sandbar LCS generate annual revenues of \$1,745,071 (as discussed under Alternative Suite A1), which would be lost under this alternative suite.

##### *Gulf of Mexico Blacktip Sharks*

Currently, Gulf of Mexico blacktip sharks provide fishery-wide revenue of \$625,487 (as discussed under Alternative Suite A1), which would be lost under this alternative suite and reduce the annual revenue of the approximately 17 direct and incidental shark permit

holders that had blacktip shark landings by \$36,793 per permit holder. Consequently, the Gulf of Mexico blacktip shark portion of Alternative Suite A5 would be expected to have significant adverse economic impacts.

#### *Blacknose Sharks*

Alternative Suite A5 would close the entire blacknose shark management group, prohibiting the landing of any blacknose sharks. This alternative would have significant, adverse, economic impacts on fishermen with directed and incidental shark permits that fish for blacknose: the 25 directed shark permit holders, and the 3 incidental shark permit holders that had blacknose shark landings during 2008 through 2011. The result would be a loss of average annual gross revenues of \$52,941 from blacknose shark landings. While this alternative could reduce blacknose mortality below the commercial allowance required to rebuild blacknose shark stocks, it would also drastically reduce non-blacknose SCS landings, and have the largest social and economic impacts of all the alternatives considered. This action would require fishermen to leave the closed shark fisheries altogether.

#### *Non-Blacknose Small Coastal Sharks*

Alternative Suite A5 would close the entire SCS commercial shark fishery, prohibiting the landing of any SCS, including finetooth, Atlantic sharpnose, and bonnethead. This alternative would have significant, adverse, socioeconomic impacts on fishermen with directed and incidental shark permits that fish for non-blacknose SCS, the 41 directed shark permit holders, and the 13 incidental shark permit holders that had non-blacknose SCS landings since Amendment 3 was implemented in 2010. The result would be a loss of average annual gross revenues of \$548,345 from non-blacknose SCS landings. This action would require fishermen to leave the closed shark fisheries altogether.

#### *Quota Linkages*

Alternative Suite A5 would close all federally managed Atlantic recreational and commercial shark fisheries, obviating the need for quota linkages. The quota linkages portion of Alternative Suite A5 would likely result in no additional economic impacts on small entities.

#### *Recreational Measures*

Alternative Suite A5 would have direct significant adverse socioeconomic impacts because it would prohibit the retention of all sharks for recreational anglers. This would have a significant effect on tournaments and charter vessels that target sharks. Thus, NMFS does not prefer this alternative suite at this time.

#### *Conclusion*

Alternative Suite A5 would likely have significant adverse economic impacts because recreational and commercial shark fishing in the Atlantic, Gulf of Mexico and Caribbean would be prohibited. Because other alternatives would meet the objectives of this

Amendment with less significant adverse socioeconomic impacts, NMFS does not prefer this alternative suite at this time.

### 8.5.6 **Alternative Suite A6**

Alternative Suite A6, the preferred alternative, would establish new species management groups by regions, adjust LCS and SCS quotas, link appropriate quotas, and increase the shark minimum recreational size to 78 inches fork length for great, scalloped, and smooth hammerhead sharks.

#### *Scalloped Hammerhead Sharks*

Under Alternative Suite A6, NMFS would establish an Atlantic and a Gulf of Mexico hammerhead shark quota (including great, scalloped, and smooth hammerhead sharks) using the methodology outlined in Chapter 2. When comparing average landings of hammerhead sharks from 2008-2011 to the preferred quotas revenue in the Gulf of Mexico region would be increased by \$2,005 and increase in the Atlantic region by \$1,719. However, because hammerhead sharks are currently counted against the regional non-sandbar LCS quotas, which are much higher than the preferred regional hammerhead shark quotas, the opportunities to land hammerhead sharks would be reduced in years of higher than average landings. Therefore, there would be minimal impact on the annual revenues of individual vessels actively involved in the fishery most years, but minor adverse impacts in years of higher than average landings.

#### *Large Coastal Sharks*

Alternative Suite A6 would establish new, separate quotas for hammerhead sharks (great, scalloped, and smooth) and Gulf of Mexico blacktip sharks, necessitating removal of these species from the non-sandbar LCS management group (which will then be renamed “aggregated LCS” in both the Atlantic and Gulf of Mexico regions). The aggregated LCS quota would be based on average annual landings of the remaining species (see Chapter 2 for annual landings of remaining species), therefore, those species composing the aggregated LCS management group would not experience a change in fishing pressure and landings would be capped at recent levels. For these reasons, economic impacts to small entities resulting from this portion of Alternative Suite A6 are expected to be neutral.

#### *Gulf of Mexico Blacktip Sharks*

This alternative suite’s blacktip shark action, to set the commercial quota according to recent average landings, is likely to result in neutral economic impacts to small entities. As discussed in Chapter 1 of this document, based on the SEDAR 29 Gulf of Mexico blacktip shark stock assessment, we have determined that the Gulf of Mexico blacktip shark stock is not overfished and not experiencing overfishing. These results indicate the Gulf of Mexico blacktip shark stock can sustain current fishing levels and should not result in any additional impacts to small entities.

### *Blacknose Sharks*

Under Alternative Suite A6, we would separate blacknose sharks into the Atlantic and Gulf of Mexico regions as suggested in the SEDAR 21 stock assessment (NMFS 2011). These alternatives would decrease the blacknose shark landings in each region. Average annual gross revenues for the blacknose shark landings for the Atlantic region would increase from \$54,113 under the No Action alternative to \$54,854 under Alternative Suite A6. We anticipate that these directed and incidental shark permit holders would experience minor adverse economic impacts as blacknose sharks are not the targeted shark species for SCS fishermen. Average annual gross revenues for the blacknose shark landings for the Gulf of Mexico region would decrease from \$5,645 under the No Action alternative to \$5,641 under Alternative Suite A6. We anticipate that these directed and incidental shark permit holders would experience neutral economic impacts since the new Gulf of Mexico blacknose shark quota is consistent with current landings. In the short-term, lost revenues would be moderate for the 20 directed shark permit and 1 incidental shark permit holders that land blacknose sharks in the Atlantic region, and the 5 directed shark and the 2 incidental shark permits that land blacknose sharks in the Gulf of Mexico region.

### *Non-Blacknose Small Coastal Sharks*

Alternative Suite A6 would establish regional quotas for non-blacknose SCS based on the landings since Amendment 3 was implemented in 2010 (NMFS 2010). In the Atlantic region, an average of approximately 35 vessels with directed shark permits had non-blacknose shark landings, while approximately 9 vessels with incidental shark permits had non-blacknose SCS landings. In the Gulf of Mexico region, an average of approximately 5 vessels with directed shark permits had non-blacknose shark landings, while approximately 2 vessels with incidental shark permits had non-blacknose SCS landings since Amendment 3 was implemented in 2010. Under the Alternative Suite A6, there would be neutral economic impacts to directed and incidental shark permit holders as the average annual gross revenues from non-blacknose SCS landings would be the same as the status quo in the short- and long- term. Fishermen would be expected to operate in the same manner as the status quo in the short-term. However, this alternative suite could have minor negative economic impacts on fishermen if fishing effort increases for non-blacknose SCS. The fishery has never filled the entire quota established for the fishery in 2010, but that could change with a smaller regional quota and if fishermen are displaced from other fisheries.

### *Quota Linkages*

The quota linkages preferred under this alternative suite could have short and long-term moderate adverse economic impacts. Quota linkages are explicitly designed to concurrently close multiple shark management groups, regardless of whether all the linked quotas are filled. This provides protection against incidental capture for species for which the quota has been reached, but it could also preclude fishermen from harvesting the entirety of each of the linked quotas. A quantitative analysis of the economic impact is not possible without comparing the rates of hammerhead shark,

blacktip shark, and aggregated LCS catch and without knowing the extent to which fishermen can avoid hammerhead sharks. However, a qualitative analysis can provide insight on the possibility of adverse socioeconomic impacts. Under Alternative Suite A6, both the Atlantic hammerhead shark and Atlantic aggregated LCS management groups would close when landings of either reaches or is expected to reach 80 percent of the quota, and in the Gulf of Mexico region, the hammerhead shark and Gulf of Mexico aggregated LCS management groups would close when landings of either one reaches or is expected to reach 80 percent of its quota. If the entire aggregated LCS quota has not been harvested, the fishery would not realize the full level of revenues possible under the established quota. However, given that the hammerhead shark quotas for the Atlantic and Gulf of Mexico regions are larger than average landings of hammerhead sharks in each region by a little over than 2,000 lb and that the Atlantic and Gulf of Mexico aggregated LCS quotas are not changing from average landings, we do not expect either quota to reach or be projected to reach 80 percent significantly faster than the other quota in either region as a result of this alternative suite. Additionally, unlike Alternative Suite A2, the Gulf of Mexico blacktip shark quota would not be linked to the hammerhead shark and aggregated LCS quotas under Alternative Suite A6. This would allow Gulf of Mexico fishermen to continue to fish for blacktip sharks following the closures of the hammerhead and LCS quotas. We would also have the ability to transfer hammerhead shark quota between regions to allow for the greatest opportunity to harvest the aggregated LCS quotas while not exceeding the combined regional quotas for hammerhead sharks, which may help to further minimize the likelihood of adverse socioeconomic impacts. The blacknose shark and non-blacknose SCS socioeconomic impacts would be the same as the LCS since there would be similar scenarios with the quota linkage by species and region. In addition, we would allow inseason quota transfers between non-blacknose SCS regions. This would have minor beneficial economic impacts for the fishery as the non-blacknose SCS quota would not be the limiting factor. Consequently, the quota linkages proposed under this Alternative Suite could have moderate adverse economic impacts in some years with high landings, but are expected to have neutral impacts most years.

### *Recreational Measures*

Alternative Suite A6 would increase the current recreational size limit for hammerhead shark species to 78 inches fork length, and provide additional outreach to recreational anglers regarding identification of all sharks, including prohibited shark species. Implementation of these management measures would result in minor alterations to the way tournaments and charter vessels operate, and minimal reductions in opportunity and demand for recreational shark fishing, which could create some minor adverse economic impacts in the short-term. However, these measures would help the hammerhead stocks rebuild, reduce accidental harvest of prohibited species, and possibly increase recreational fishing opportunities in the future.

### *Conclusion*

When taken as a whole, Alternative Suite A6 would likely have direct short- and long-term minor adverse economic impacts. These impacts would mostly affect fishermen

targeting scalloped hammerhead and blacknose sharks because the quotas would constrain fishing in years of higher than average landings. These fishermen are likely to adapt to the new regulations by fishing in other fisheries, or change their fishing habitats. Recreational management measures would increase the size limit and cause fishermen to catch and release more hammerhead sharks. Neutral economic impacts are expected for fishermen targeting the aggregated LCS and non-blacknose SCS management groups since the preferred quotas are based on the average landings for each species. Furthermore, quota linkages would affect the economic impacts based on the fishing rate of each linked shark quota, and recreational measures would likely have beneficial economic impacts in the long-term. When we compare the economic impacts of Alternative Suite A6 to the other alternative suites, this alternative suite would cause fewer impacts overall to fishermen. For this reason and the ecological reasons previously discussed, we prefer this alternative suite at this time.

## **8.6 Dusky Shark Measures**

Based on comments received on the Predraft during scoping, and the addition of Gulf of Mexico blacktip shark to this action, we determined the scope of significant issues of concern that would be addressed in the draft amendment. The Notice of Availability of the DEIS for Amendment 5 and the proposed rule published in the Federal Register on December 7, 2013 (77 FR 73029), and November 26, 2012 (77 FR 70552), respectively. The public comment period ended on February 12, 2013. During the comment period, we received numerous comments on the proposed dusky shark measures regarding the data sources used and the analyses of these data. We also received many comments requesting consideration of approaches to dusky shark fishery management that were significantly different from those we analyzed in the Amendment 5 proposed rule and DEIS. For example, commenters suggested exemptions to a recreational minimum size increase to allow landings of other sharks such as blacktip sharks or “blue” sharks such as shortfin mako or thresher sharks, and other commenters suggested implementing gear restrictions instead of additional pelagic longline closures.

After reviewing all of the comments received, we concluded that further analyses are needed for dusky shark measures. In order to ensure that other shark measures are finalized as expeditiously as possible, we decided to conduct additional dusky shark analyses in a separate proposed action, which will be referred to as Amendment 5b. Comments received on the dusky shark portions of the November 2012 proposed rule will be considered in that action. This final document — referred to as Amendment A5a to the 2006 Consolidated HMS FMP – finalizes other shark measures needed to maintain rebuilding of sandbar sharks; end overfishing and rebuild scalloped hammerhead and Atlantic blacknose sharks; and establish a TAC and commercial quota and recreational measures for Gulf of Mexico blacknose and blacktip sharks.

## Chapter 8 References

- NMFS. 2010. Final Amendment 3 to the Consolidated Atlantic Highly Migratory Species Fisheries Management Plan. NOAA, National Marine Fisheries Service, Highly Migratory Species Management Division, Silver Spring, MD. 632 pp.
- NMFS. 2011. SEDAR 21 Stock Assessment Report: HMS Blacknose, Dusky, and Sandbar Sharks . SEDAR, 4055 Faber Place Drive, Suite 201, North Charleston, SC 29405. 415 pp.
- NMFS. 2012. SEDAR 29 Stock Assessment Report: HMS Gulf of Mexico Blacktip Shark. SEDAR, 4055 Faber Place Drive, Suite 201, North Charleston, SC 29405. 197 pp.

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## **9.0 COMMUNITY PROFILES**

### **9.1 Introduction**

The Magnuson-Stevens Act requires, among other things, that all FMPs include a fishery impact statement intended to assess, specify, and describe the likely effects of the measures on fishermen and fishing communities (MSA, sec.303(a)(9)).

NEPA requires federal agencies to consider the interactions of natural and human environments by using a “systematic, interdisciplinary approach which will ensure the integrated use of the natural and social sciences...in planning and decision-making” (NEPA, sec. 102(2)(A)). Moreover, agencies need to address the aesthetic, historic, cultural, economic, social, or health effects, which may be direct, indirect, or cumulative. Consideration of social impacts is a growing concern as fisheries experience increased participation and/or declines in stocks. The consequences of management actions need to be examined to better ascertain and, to the fullest extent possible, mitigate regulatory impacts on affected constituents.

Social impacts are generally the consequences to human populations resulting from some type of public or private action and may include alterations in the ways people live, work or play, relate to one another, and organize to meet their needs. In addition, cultural impacts, which may involve changes in values and beliefs that affect people’s way of identifying themselves within their occupation, communities, and society in general, are included under this interpretation. Social impact analyses help determine the consequences of policy action in advance by comparing the status quo with the projected impacts. Community profiles are an initial step in the social impact assessment process. Although public hearings and scoping meetings provide input from those concerned with a particular action, they do not constitute a full overview of the fishery.

The Magnuson-Stevens Act outlines a set of National Standards that apply to all fishery management plans and the implementation of related regulations. Specifically, National Standard 8 notes that:

“Conservation and management measures shall, consistent with the conservation requirements of this Act (including the prevention of overfishing and rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities in order to: (1) provide for the sustained participation of such communities; and (2) to the extent practicable, minimize adverse economic impacts on such communities” MSA, sec. 301(a)(8)). See also 50 C.F.R. § 600.345 for National Standard 8 Guidelines.

“Sustained participation” is defined to mean continued access to the fishery within the constraints of the condition of the resource (50 C.F.R. § 600.345(b)(4)). It should be clearly noted that National Standard 8 “does not constitute a basis for allocation of resources to a specific fishing community nor for providing preferential treatment based on residence in a fishing community” (50 C.F.R. § 600.345(b)(2)). The Magnuson-Stevens Act further defines a “fishing community” as:

“a community that is substantially dependent upon or substantially engaged in the harvest or processing of fishery resources to meet social and economic needs, and includes fishing vessel owners, operators, crew, and fish processors that are based in such communities” MSA, sec. 301(16)).

Likewise, specific to development and amendment of HMS FMPs, the Magnuson-Stevens Act, paragraph 304(g)(1)(C), requires the Secretary to:

- Evaluate the likely effects, if any, of conservation and management measures on participants in the affected fisheries; and
- Minimize, to the extent practicable, any disadvantage to U.S. fishermen in relation to foreign competitors.

NMFS (2001) guidelines for social impact assessments specify that the following elements are utilized in the development of FMPs and FMP amendments:

1. The size and demographic characteristics of the fishery-related work force residing in the area; these determine demographic, income, and employment effects in relation to the work force as a whole, by community and region.
2. The cultural issues of attitudes, beliefs, and values of fishermen, fishery-related workers, other stakeholders, and their communities.
3. The effects of proposed actions on social structure and organization; that is, on the ability to provide necessary social support and services to families and communities.
4. The non-economic social aspects of the proposed action or policy; these include life-style issues, health and safety issues, and the non-consumptive and recreational use of living marine resources and their habitats.
5. The historical dependence on and participation in the fishery by fishermen and communities, reflected in the structure of fishing practices, income distribution and rights.

## **9.2 Methodology**

### **9.2.1 Previous community profiles and assessments**

A complete description of the updated community profiles and assessments can be found in Chapter 6 of the 2011 SAFE Report (NMFS 2011). Chapter 6 of the 2011 SAFE Report is an update of the 2008 SAFE Report (NMFS 2008), and included available 2010 U.S. Census information. At the time of publication of the DEIS and 2011 HMS SAFE Report, some of the 2010 Census data was unavailable. In the 2012 SAFE Report, these tables were updated with 2010 Census data that is now available, and can be found in the 2012 SAFE Report (NMFS 2012). This chapter is updated from the DEIS to reflect the more recent information.

The 2008 SAFE Report consolidated all of the communities profiled in previous HMS FMPs or FMP amendments and updated the community information where possible. Of the communities profiled, ten (Gloucester and New Bedford, Massachusetts; Barnegat Light and Brielle, New Jersey; Hatteras Village and Wanchese, North Carolina; Islamorada and Madeira Beach, Florida; and Dulac and Venice, Louisiana) were originally selected due to the proportion of HMS landings in the town, the relationship between the geographic communities and the fishing fleets, the existence of other community studies, and input from the HMS and Billfish Advisory Panels. The remaining 15 communities (Wakefield, Rhode Island; Montauk, New York; Cape May, New Jersey; Ocean City, Maryland; Atlantic Beach, Beaufort, and Morehead City, North Carolina; Apalachicola, Destin, Panama City, and Port Salerno, Florida; Orange Beach, Alabama; Grand Isle, Louisiana; and Freeport and Port Aransas, Texas), although not selected initially, have been identified as communities that could be impacted by changes to the current HMS regulations because of the number of HMS permits associated with these communities, and their community profile information has been incorporated into the document. The descriptive community profiles are organized by state and include information provided by Wilson, *et al.* (1998), Kirkley (2005), Impact Assessment, Inc. (2004), and recent information obtained from MRAG Americas, Inc. (2008).

In addition, please refer to the Description of the Affected Environment in Chapter 3, the Environmental Justice analysis in Chapter 4, the Economic Evaluation in Chapter 6, the RIR in Chapter 7, and the FRFA in Chapter 8 of this document for additional information. Furthermore, each of the management alternatives in Chapter 4 includes an assessment of the potential social and economic impacts associated with the alternatives. The preferred alternative suite was selected to minimize economic impacts and provide for the sustained participation of fishing communities, while taking the necessary actions to end overfishing and/or rebuild overfished fisheries as required by the Magnuson-Stevens Act. Please see Chapter 5 for additional information on how preferred alternatives were selected to minimize social and economic impacts.

### **9.3 Overview of the Shark Fishery**

The shark fisheries of the Atlantic and Gulf of Mexico extend from Maine to Texas, and include Puerto Rico and the U.S. Virgin Islands. According to the 2012 SAFE Report, the geographic extent of the shark directed and incidental commercial permit holders is large, but is currently concentrated in the waters off four states as of October 2012; Florida (53.1 percent of shark permits), New Jersey (10.7 percent of shark permits), Louisiana (9.7 percent of shark permits), and North Carolina (6.2 percent of shark permits). The shark fishery is notable for the degree of flexibility of the commercial fishing fleet. Of the 486 vessels in the 2012 fleet, 215 vessels (44 percent) held directed shark fishery permits. The remaining 56 percent (271 vessels) held incidental shark permits and target species other than sharks. Directed shark fishing occurs on a seasonal basis, depending on area and the length of the fishing season, and these vessels fish for different species at other times of the year.

According to the 2012 SAFE Report, as of October 2012, there were 92 federally permitted shark dealers, the majority of whom were located in Florida (29.3 percent). Dealers that possess shark permits also often hold dealer permits for other species such as swordfish, dolphin/wahoo, reef fish and snapper/grouper. The additional permits that the commercial shark fishermen and

dealers possess may help mitigate economic and social impacts of the preferred management measures. For additional information on the directed and incidental shark fishery, please refer to Chapter 3, Description of the Affected Environment.

To recreationally fish for sharks in federal waters, a vessel must either have an HMS angling or HMS Charter/Headboat permit. According to the 2012 SAFE Report, as of October 2012, 23,061 HMS angling permits were issued in 2012, and the top four home ports by state for these permit holders were Florida (17 percent), New Jersey (14 percent), Massachusetts (14 percent), and New York (7 percent). According to the 2012 SAFE Report, as of October 2012, 4,129 HMS Charter/Headboat permits were issued in 2012, and the top four home ports by state for these permit holders were Massachusetts (20 percent), Florida (16 percent), New Jersey (13 percent), and North Carolina (10 percent). There were 238 registered Atlantic HMS tournaments held in 2012 (Davis, pers. comm). Of these, 76 targeted sharks (32 percent). The majority of these shark tournaments took place in Texas (20 percent), New York (16 percent), and New Jersey (13 percent) (Davis, pers. comm).

#### **9.4 Summary of Fisheries Impacts**

The following provides a summary of impacts to participants in the shark fisheries and fishing dependent communities, including measures taken to minimize adverse social and economic effects and to provide for the sustained participation in these fisheries. Based on the foregoing assessment and referenced sections of this document, we have determined that the action would have the following impacts on participants in affected fisheries.

##### *Summary of Impacts*

As explained in Chapters 3 and 4, this amendment could, to various degrees, impact the 486 directed and incidental shark permit holders and 92 federally permitted shark dealers by establishing quotas for hammerhead, aggregated LCS, blacktip, and blacknose sharks, and linking quotas for species that are commonly caught together to open and close at the same time to prevent overfishing on any of these species. Large, negative socioeconomic impacts on a large number of commercial fishermen and fishing communities as a result of these measures are not anticipated as the new quota levels in the preferred alternative suite are similar to recent landings performance in the fishery.

Recreational shark fishermen and communities that rely on recreational shark fishing could also be affected by the preferred alternative suite in this amendment. According to the 2012 SAFE Report, as of October 2012, there were 23,061 HMS angling permit holders, and 4,129 Charter/Headboat permit holders who were authorized to fish recreationally for sharks in federal waters. Measures that would increase the recreational minimum size for hammerhead sharks from 54 inches fork length to 78 inches fork length and increase outreach efforts to the recreational community would have moderate, adverse socioeconomic impacts in the short-term, but could have long-term beneficial impacts if overfished stocks rebuild and lead to increased recreational fishing opportunities.

### *Minimization of Adverse Impacts*

Mitigation of adverse impacts was considered when selecting the preferred alternatives. Where possible, quota alternatives were selected to reflect current fishery landings (e.g., aggregated LCS, Gulf of Mexico blacknose sharks) while ending overfishing and rebuilding overfished stocks to minimize adverse impacts to fishermen and fishing-dependent communities. Please see Chapters 4 and 5 for additional information on how preferred alternatives were selected to minimize social and economic impacts.

### *Effects on Domestic Fishermen*

Preferred alternatives may impact domestic fishermen in relation to foreign competitors. Typically, the main driver for the United States and international shark fisheries are the fins of LCS, and large reductions in domestic LCS harvest could disadvantage fishermen on the global market. The preferred alternative suite in this amendment is not anticipated to result in large reductions in the domestic LCS or SCS harvest.

### *Social Impact Assessment*

This amendment conforms to the following guidelines for social impact assessments (as outlined above):

- We describe the demographic characteristics of the fishery-related work force residing in communities affected by fishery management in Chapter 6 of the 2012 SAFE Report (NMFS 2012). In particular, the demographic, income, and employment effects in relation to the work force as a whole by community and region are discussed in this chapter of the 2012 SAFE Report.
- The preferred scalloped hammerhead shark, aggregated LCS, blacktip shark, blacknose shark, and non-blacknose SCS TACs, quotas, and recreational measures are not expected to but could change the cultural issues of attitudes, beliefs, and values of fishermen, fishery-related workers, other stakeholders, and their communities if fishermen choose to leave the fishery as a result of the management measures in this amendment.
- The preferred scalloped hammerhead shark, aggregated LCS, blacktip shark, blacknose shark, and non-blacknose SCS TACs, quotas, and recreational measures should not affect the social structure and organization, such as the ability to provide necessary social support and services for families and communities. The preferred actions should not affect the non-economic social impacts of the proposed action, such as lifestyle issues, health and safety issues, and the non-consumptive and recreational use of living marine resources and their habitats. The preferred alternative suite would affect commercial fishing practices; however, TACs and quota management measures should have no impacts on lifestyle or health and safety issues. In addition, the preferred measures for the recreational shark fishery would still allow trophy retention of hammerhead sharks and catch and release for the others that do not reach the minimum size of 78 inches fork length.

- The preferred actions could affect the historical dependence on and participation in the commercial and recreational shark fisheries by fishermen and communities, reflected in the structure of fishing practices, income distribution, and rights.

## Chapter 9 References

- Impact Assessment, Inc. 2004. Identifying Communities Associated with the Fishing Industry in Louisiana. La Jolla, California. (NOAA-NMFS-Contract WC133F-02-SE-0297).
- Kirkley, J.E. 2005. The communities of the Atlantic Highly Migratory Species (HMS) Fishery: An overview of change associated with the HMS Fishery Management Plan. Department of Coastal and Ocean Policy, School of Marine Science, Virginia Institute of Marine Science, College of William and Mary, Gloucester Point, Virginia (NOAA-NMFS-HMS contract report).
- MRAG, Americas, Inc., and M. Jepson. 2008. Updated Profiles for HMS Dependent Fishing Communities: Social Impact Assessment Services for HMS Fishing Communities. Solicitation Number: DG133F06RQ0381, 84 pp.
- NMFS. 2001. NMFS Operational Guidelines – Fishery Management Process: Appendix 2(g): Guidelines for Assessment of the Social Impact of Fishery Management Actions. Silver Spring, MD: U.S. Department of Commerce, National Marine Fisheries Service.
- NMFS. 2008. Stock Assessment and Fishery Evaluation (SAFE) Report for Atlantic Highly Migratory Species, 2008. Silver Spring MD: U.S. Department of Commerce, National Marine Fisheries Service. 446 pp.
- NMFS. 2011. Stock Assessment and Fishery Evaluation (SAFE) Report for Atlantic Highly Migratory Species, 2011. Silver Spring MD: U.S. Department of Commerce, National Marine Fisheries Service. 294 pp.
- NMFS. 2012. Stock Assessment and Fishery Evaluation (SAFE) Report for Atlantic Highly Migratory Species, 2012. Silver Spring MD: U.S. Department of Commerce, National Marine Fisheries Service. 204 pp.
- Wilson, D., B.J. McCay, D. Estler, M. Perez-Lugo, J. LaMargue, S. Seminski, and A. Tomczuk. 1998. Social and Cultural Impact Assessment of the Highly Migratory Species Fishery Management Plan and the Amendment to the Atlantic Billfish Fisheries Management Plan. The Ecopolicy Center for Agriculture, Environmental, and Resource Issues, New Jersey Agricultural Experiment Station, Cook College, Rutgers, the State University of New Jersey (NOAA-NMFS-HMS contract report).

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## **10.0 OTHER CONSIDERATIONS**

### **10.1 National Standards**

The analyses in this document are consistent with the National Standard guidelines set forth in the 50 C.F.R. § 600 regulations. The following descriptions are a summary of how the preferred alternatives are consistent with the National Standards. More information can be found in earlier chapters.

National Standard 1 requires us to prevent overfishing while achieving, on a continuing basis, optimum yield from each fishery. As summarized in other chapters, over the past several years, we have undertaken numerous management actions, including the 2006 Consolidated HMS FMP (NMFS 2006), Amendment 2 to the 2006 Consolidated HMS FMP (NMFS 2008), and Amendment 3 to the 2006 Consolidated HMS FMP (NMFS 2010), to address overfishing and to rebuild HMS stocks. The measures in the preferred Alternative Suite A6 in this document are consistent with ongoing management efforts to rebuild, manage, and conserve fisheries in accordance with the Magnuson-Stevens Act and National Standard 1 guidelines.

- Consistent with the SEDAR 21 (SEDAR 2011), SEDAR 29 (SEDAR 2012), and Hayes et al. (2009) stock assessments for blacknose, blacktip, and scalloped hammerhead sharks, the preferred alternative suite would adjust mortality levels to allow for rebuilding and preventing overfishing of these species and for fishermen to harvest, on a continuing basis, optimum yield of these species. Quotas would be established for the aggregated LCS and non-blacknose SCS groups based upon historical landings and best available scientific information, including the SEDAR 11 (SEDAR 2006) and SEDAR 13 (SEDAR 2007) stock assessments for LCS and SCS, respectively. The quota linkages in the preferred alternative suite could result in precluding the non-blacknose SCS and aggregated LCS fisheries from achieving the full quota; however, the quota linkages are necessary in these multispecies fisheries to ensure that the TAC of shark species under a rebuilding plan is not exceeded and to minimize regulatory discards, to the extent practicable. To allow maximum access to the Gulf of Mexico blacktip shark resource, the preferred alternative suite would allow us to open and close the Gulf of Mexico blacktip shark management group independently of the hammerhead shark and aggregated LCS management groups. As described in Chapter 2, dead discards of scalloped hammerhead sharks are already considered under the TAC. Preventing overfishing of scalloped hammerhead sharks while providing opportunities to harvest the healthy Gulf of Mexico blacktip shark stock is consistent with National Standard 1. Further protections for scalloped hammerhead sharks would be provided through an increase in the recreational minimum size for all hammerhead sharks to 78 inches fork length based on information from Hazin et al. (2001). This minimum size would apply to all recreationally caught hammerhead sharks due to the difficulty in differentiating the three large hammerhead shark species. This increase in minimum size would reduce scalloped hammerhead fishing mortality from the recreational sector, providing further protection for the species.

National Standard 2 requires that conservation and management measures be based on the best scientific information available. The measures in the preferred alternative suite in this document are consistent with National Standard 2.

- The preferred alternative suite measures would be consistent with National Standard 2 because they are based on the latest SEDAR 21, SEDAR 29, and Hayes et al. (2009) stock assessments for blacknose, blacktip, and scalloped hammerhead sharks, which we have determined to be the best scientific information available. We also used self-reported fisheries logbook data, dealer reports, and observer reports. The hammerhead shark minimum size is based on information from Hazin et al. (2001). These sources represent the best available science.

National Standard 3 requires that, to the extent practicable, an individual stock of fish be managed as a unit throughout its range and interrelated stocks of fish be managed as a unit or in close coordination. The measures in the preferred alternative suite in this document are consistent with National Standard 3.

- The preferred alternative suite applies to each affected species across its range, as identified by the stock assessments. SEDAR 21 found that there are separate Atlantic and Gulf of Mexico blacknose shark stocks. Hayes et al. (2009) considered scalloped hammerhead sharks to be one stock that ranges throughout the Atlantic and Gulf of Mexico regions, and although the preferred alternative suite establishes separate hammerhead shark quotas for each region, total mortality would still be limited to the scientifically determined TAC across the entire range and quota could be exchanged across the two regions as needed. The recreational minimum size for hammerhead sharks would apply to fishing in all regions, across the entire Atlantic U.S. range of scalloped hammerhead sharks. SEDAR 29 determined that the Gulf of Mexico blacktip shark was separate from stocks in other regions. Thus, Gulf of Mexico blacktip shark measures would apply to the stock within the U.S. Gulf of Mexico.

National Standard 4 requires that conservation and management measures do not discriminate between residents of different states. Furthermore, if it becomes necessary to allocate or assign fishing privileges among various U.S. fishermen, such allocation should be fair and equitable to all fishermen; be reasonably calculated to promote conservation; and should be carried out in such a manner that no particular individual, corporation, or other entity acquires an excessive share of such privileges. The measures in the preferred alternative suite in this document are consistent with National Standard 4.

- The preferred alternative suite does not discriminate between residents of different states as the quotas are separated between the Atlantic and Gulf of Mexico regions based upon scientifically-determined regional stock delineations. The only quotas that are divided between the Atlantic and Gulf of Mexico regions based upon information besides a stock assessment are the non-blacknose SCS and hammerhead shark quotas. These quotas would be divided between the two regions using historical landings proportions, a method that is both fair and equitable to all fishermen. Furthermore, the preferred alternative suite would allow us to transfer non-blacknose SCS and hammerhead shark quota between the two

regions as needed, based on a set of criteria, to ensure equitable distribution should fishing levels and rates change. The recreational minimum size for hammerhead sharks would apply to fishing in all Atlantic, Gulf of Mexico, and Caribbean states and territories, across the entire Atlantic U.S. range of scalloped hammerhead sharks.

National Standard 5 requires that conservation and management measures should, where practicable, consider efficiency in the utilization of fishery resources with the exception that no such measure shall have economic allocation as its sole purpose. The measures in the preferred alternative suite in this document are consistent with National Standard 5.

- Consistent with National Standard 5, the conservation and management measures in the preferred alternative suite were analyzed for changes in the efficiency of utilization of the fishery resource. The primary driver of these measures is to implement mortality adjustments for shark stocks per the SEDAR 21, SEDAR 29, and Hayes et al. (2009) stock assessments for blacknose, blacktip, and scalloped hammerhead sharks. As such, this action considers reducing quotas for affected non-prohibited species. These actions might reduce the efficiency in the utilization of fishery resources; however, most quotas are near the level of historical landings, so any reductions should be minor. If minor reductions in the efficiency of utilization do occur, they are necessary to ensure sustainable fisheries as required under National Standard 1. To mitigate this reduction in efficiency, under the preferred alternative suite, we would establish regional quotas for blacknose sharks, non-blacknose SCS, hammerhead sharks, and aggregated LCS. These regional quotas mitigate overall reductions in efficiency by providing separate quotas that would not be impacted by actions in other regions. Each regional quota can then be most efficiently utilized without being impacted by the other region's activities or fishing rates. The increase in the recreational hammerhead shark minimum size could decrease the efficiency in recreational fishermen's utilization of hammerhead sharks, but the decrease would likely be minor. The increased minimum size would only apply to hammerhead sharks, a group that is readily identifiable from other sharks, so it should not impact the efficiency in utilizing other shark species. Any decrease in recreational fishermen's ability to efficiently utilize hammerhead sharks is necessary to decrease fishing mortality and end overfishing, consistent with National Standard 1.

National Standard 6 states that conservation and management measures shall take into account and allow for variations among, and contingencies in, fisheries, fishery resources, and catches. The measures in the preferred alternative suite in this document are consistent with National Standard 6.

- The preferred alternative suite would implement measures that consider the variations among, and contingencies in, fisheries, fishery resources, and catches. The measures relate to either fishing effort/retention restrictions, including establishing regional quotas and quota linkages. Timely reporting of catch data and the requirement to close the fishery after 80 percent of the quota utilized would allow for these measures to adjust to variations and contingencies, consistent with National Standard 6. Additionally, under the preferred alternative suite, we would establish regional quotas for blacknose sharks, non-blacknose SCS, blacktip sharks (Gulf of Mexico only), hammerhead sharks, and aggregated LCS.

These regional quotas provide a finer geographic scale of management allowing for variations among, and contingencies in, fisheries, fishery resources, and catches. The increase in the recreational hammerhead shark minimum size is a targeted minimum size increase, applicable only to hammerhead sharks and not to other shark species. Although overfishing is only occurring on the scalloped hammerhead shark stock, it would be necessary to apply the minimum size to all hammerhead sharks due to the difficulty in differentiating between species.

National Standard 7 states that conservation and management measures shall, where practicable, minimize costs and avoid unnecessary duplication. The measures in the preferred alternative suite in this document are consistent with National Standard 7.

- The costs associated with the preferred alternative suite are minimal as they would implement measures restricting fishing effort and/or retention. Consistent with National Standard 7, the preferred alternative suite was analyzed to avoid duplication.

National Standard 8 states that conservation and management measures shall, consistent with the conservation requirements of the Magnuson-Stevens Act (including the prevention of overfishing and rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities in order to provide for the sustained participation of such communities, and to the extent practicable, minimize adverse economic impacts on such communities. The measures in the preferred alternative suite in this document are consistent with National Standard 8.

- The preferred alternative suite is necessary to allow rebuilding and/or end overfishing of blacknose and scalloped hammerhead sharks, consistent with National Standard 1. There are some adverse social and economic impacts associated with the preferred alternative suite as a result of the management measures needed to reduce fishing mortality as prescribed by recent stock assessments. We considered a range of alternatives with varying environmental, economic, and social impacts but only certain alternatives would accomplish the goal to rebuild overfished shark species and prevent overfishing. The preferred alternative suite would strike an appropriate balance between positive ecological impacts that are necessary to rebuild and prevent overfishing on depleted stocks while minimizing, to the extent practicable, the severity of negative social and economic impacts that will occur as a result of these actions.

National Standard 9 states that conservation and management measures shall, to the extent practicable, minimize bycatch, and to the extent that bycatch cannot be avoided, minimize the mortality of such bycatch. The measures in the preferred alternative suite in this document are consistent with National Standard 9.

- The preferred alternative suite considers bycatch while focusing on capping fishing mortality. The preferred quota linkages would prevent bycatch of sharks by opening and closing shark management groups at the same time to prevent excessive mortality of one species to occur due to incidental capture while targeting other shark species. . Additionally, the bycatch of hammerhead sharks while fishing for Gulf of Mexico blacktip sharks was explicitly analyzed under the quota linkage section in Alternative Suite A6. See

Section 3.9, 3.10, and 3.11 for more information about bycatch reduction in shark fisheries. Bycatch is not as much of a concern in the recreational rod and reel fishery for hammerhead sharks; however, the increased minimum size would apply to all hammerhead sharks instead of just scalloped hammerhead sharks to address possible misidentification as smooth or great hammerhead sharks.

National Standard 10 states that conservation and management measures shall, to the extent practicable, promote the safety of human life at sea. The measures in the preferred alternative suite in this document are consistent with National Standard 10.

- No impact to safety of life at sea is anticipated to result from the preferred alternative suite. The management measures in the preferred alternative suite would not require fishermen to travel greater distances, fish in bad weather, or otherwise fish in an unsafe manner. During the public comment period for the proposed rule, we received comments that the proposed increase recreational minimum size of all sharks to 96 inches fork length would create unsafe fishing conditions due to the difficulty in subduing and bring on board sharks of this size and larger. Although we now prefer a smaller increase in the minimum size to 78 inches fork length applicable only to hammerhead sharks, we acknowledge that handling large sharks can be difficult. However, minimum size requirements do not require fishermen to retain large sharks and measurements can be taken while the shark is in the water and subdued with tail ropes, *etc.*, as currently occurs in the recreational shark fishery. Furthermore, many recreational shark fishermen target sharks of this size and larger, particularly when participating in a tournament; therefore, we believe a 78 inch fork length minimum size requirement for hammerhead sharks is consistent with National Standard 10.

## **10.2 Consideration of Magnuson-Stevens Act Section 304(g) Measures**

Section 304(g) of the Magnuson-Stevens Act sets forth requirements specific to the preparation and implementation of an FMP or FMP amendment for HMS. See 16 U.S.C. 1854(g) for full text. The summary of the requirements of Section 304(g) and an explanation of how we are consistent with these requirements are below. The impacts of the preferred alternative suite and how it meets these requirements are described in more detail in Chapters 2 and 4 of the document.

### *1. Consult with and consider the views of affected Councils, Commissioners, and advisory groups*

On April 28, 2011, we made the determination that scalloped hammerhead sharks were overfished and experiencing overfishing (76 FR 23794). Following this determination, on October 7, 2011, we published a notice announcing our intent to prepare a proposal for Amendment 5 to the 2006 Consolidated HMS FMP with an EIS in accordance with the requirements of the NEPA (76 FR 62331). We also made the stock status determinations based on the results of the SEDAR 21 process in the October 7, 2011 notice of intent. Determinations in the October 2011 notice included that sandbar sharks are still overfished but no longer experiencing overfishing, and that dusky sharks are still overfished and still experiencing overfishing (i.e., their stock status has not changed). The October 2011 notice also acknowledged that there are two stocks of blacknose sharks, the Atlantic blacknose shark and the

Gulf of Mexico blacknose shark. The Atlantic blacknose shark stock is overfished and experiencing overfishing, and the Gulf of Mexico blacknose shark stock status is unknown.

We released a Predraft of Amendment 5 to the 2006 Consolidated HMS FMP, which summarized and incorporated comments received during scoping, to the HMS Advisory Panel on March 14, 2012, and made it available to the public on the internet for broader public comment. The Predraft included the outcome of stock assessments for sandbar, dusky, scalloped hammerhead, Atlantic blacknose, and Gulf of Mexico blacknose sharks as well as potential management measures for these species/stocks. We requested that the HMS Advisory Panel and consulting parties (Atlantic, Gulf, and Caribbean Fishery Management Councils, Marine Fisheries Commissions, U.S. Coast Guard, and other State and Federal Agency representatives) submit comments on the Predraft by April 13, 2012. Public comments on the Predraft were also accepted and collected.

Following review of the Predraft comments received, we published a Federal Register notice on May 29, 2012 (77 FR 31562) considering the addition of Gulf of Mexico blacktip sharks to Amendment 5. This addition was proposed because Gulf of Mexico blacktip sharks were undergoing a stock assessment as part of the SEDAR 29 process, and that process would be completed before this amendment was finalized. Therefore, we believed that the addition of Gulf of Mexico blacktip sharks to this amendment would facilitate administrative efficiency by optimizing our resources, and would allow us to address new scientific information in the timeliest manner. We also expected that this addition would provide better clarity to and understanding by the public regarding any possible impacts of the rulemaking on shark fisheries by combining potential management measures resulting from recent shark stock assessments into one rulemaking. Public comments on this addition to Amendment 5 were accepted until June 21, 2012. As described in Chapter 1, based on the results of a SEDAR 29 stock assessment for Gulf of Mexico blacktip sharks, the stock is not overfished and is not experiencing overfishing.

The Notice of Availability of the DEIS for Amendment 5 and the proposed rule published in the Federal Register on December 7, 2012 (77 FR 73029), and November 26, 2012 (77 FR 70552), respectively. Written comments received on the issues and options presentation, during the scoping meetings on the Predraft and at the HMS Advisory Panel meeting were considered at all stages when preparing the DEIS and proposed rule. During the public comment period for this proposed rule, we held eight public hearings, two public webinars/conference calls, one meeting and consultation with the HMS Advisory Panel on January 8, 2012, and, if invited, separate Regional Fishery Management Council briefings during the Council's regular meetings. All comments received, including those from the public, the Regional Fishery Management Councils, and the HMS Advisory Panel, were considered at all stages while preparing this document.

## *2. Establish an advisory panel for each FMP*

As part of the 2006 Consolidated HMS FMP, we combined the Atlantic Billfish and HMS Advisory Panels into one panel. This combined HMS Advisory Panel provides representation from the commercial and recreational fishing industry, academia, non-governmental organizations, state representatives, representatives from the Regional Fishery Management

Councils, and the Atlantic and Gulf States Marine Fisheries Commissions. This amendment will not change the HMS Advisory Panel, and we convened a meeting of the HMS Advisory Panel during the scoping and public comment periods of Amendment 5 to discuss and collect comments on potential shark management.

3. *Evaluate the likely effects, if any, of conservation and management measures on participants in the affected fisheries and minimize, to the extent practicable, any disadvantage to U. S. fishermen in relation to foreign competitors.*

Throughout this document, we have described the effects of the management measures and any impacts on U.S. fishermen. The preferred quota alternative suite in this document is necessary to meet Magnuson-Stevens Act mandates to rebuild overfished stocks and prevent overfishing, which in the long-term are not expected to disadvantage U.S. fishermen in relation to foreign competitors.

4. *With respect to HMS for which the United States is authorized to harvest an allocation, quota, or fishing mortality level under a relevant international fishery agreement, provide fishing vessels with a reasonable opportunity to harvest such allocation, quota, or at such fishing mortality level.*

There is currently no international agreement on blacknose or blacktip shark quotas, allocations, or fishing mortality levels. Therefore, this requirement is not applicable for these species. However, hammerhead sharks (including scalloped hammerhead sharks) are the subject of a binding recommendation by ICCAT. This binding recommendation is limited in scope and applies only to those vessels participating in ICCAT fisheries. These vessels include pelagic longline vessels and recreational vessels with tunas, billfish, and/or swordfish on board. These vessels make up a very small percentage of domestic hammerhead catch; therefore, the international management measures do not have a large impact. Furthermore, ICCAT does not establish quota levels for hammerhead sharks. Quotas are domestically established and the preferred alternative suite would not preclude fishermen from fulfilling the preferred hammerhead quota.

5. *Review on a continuing basis, and revise as appropriate, the conservation and management measures included in the FMP.*

We continue to review the need for any revisions to the existing regulations for Atlantic HMS fisheries. Final Amendment 5a to the 2006 Consolidated HMS FMP is the culmination of one of those reviews.

6. *Diligently pursue, through international entities, comparable international fishery management measures with respect to HMS.*

We continue to work with the ICCAT and other international entities such as the CITES to implement comparable international fishery management measures. We will work with US FWS to implement CITES Appendix II listings for porbeagle, oceanic whitetip and great, scalloped and smooth hammerhead sharks. To the extent that some of the management measures in this

amendment are exportable, we will work to provide foreign nations with the techniques and scientific knowledge to implement similar management measures.

7. *Ensure that conservation and management measures under this subsection:*
  - a. *Promote international conservation of the affected fishery;*
  - b. *Take into consideration traditional fishing patterns of fishing vessels of the United States and the operating requirements of the fisheries;*
  - c. *Are fair and equitable in allocating fishing privileges among United States fishermen and do not have economic allocation as the sole purpose; and*
  - d. *Promote, to the extent practicable, implementation of scientific research programs that include the tagging and release of Atlantic HMS.*

All of the objectives of this document indicate how we promote the international conservation of the affected fisheries in order to obtain optimum yield while maintaining traditional fisheries and fishing gear and minimizing economic impacts on U.S. fishermen. The management measures in the preferred alternative suite in this document are expected to meet these goals. More specifically:

- a. As detailed in Item 4 above, there is currently no international agreement on blacknose or blacktip shark quotas, allocations, or fishing mortality levels. Hammerhead sharks (including scalloped hammerhead sharks) are the subject of a binding recommendation by ICCAT, but this recommendation is limited in scope and applies only to those vessels participating in ICCAT fisheries. We will continue to work with the international community to promote conservation in fisheries that span international jurisdiction, as with hammerhead sharks.
- b. The preferred alternative suite explicitly takes traditional fishing patterns into account when establishing regional quotas. Quotas for blacknose sharks, hammerhead sharks, aggregated LCS, and non-blacknose SCS were developed using information from stock assessments, but would be divided between the regions based on historical landing information to ensure fishermen maintain consistent proportional access to the resource.
- c. As noted in Item b above, preferred regional quotas would be allocated based upon historical landings information to ensure fair and equitable access to the resource.
- d. We have a number of Atlantic HMS scientific research programs in place including tagging and release projects. The preferred alternative suite would not directly implement or establish any new scientific programs; however, these actions would not impact existing programs either.

### **10.3 Dusky Shark Measures**

Based on comments received on the Predraft during scoping, and the addition of Gulf of Mexico blacktip shark to this action, we determined the scope of significant issues of concern that would be addressed in the draft amendment. The Notice of Availability of the DEIS for Amendment 5 and the proposed rule published in the Federal Register on December 7, 2013 (77 FR 73029), and November 26, 2012 (77 FR 70552), respectively. The public comment period ended on February 12, 2013. During the comment period, we received numerous comments on the

proposed dusky shark measures regarding the data sources used and the analyses of these data. We also received many comments requesting consideration of approaches to dusky shark fishery management that were significantly different from those we analyzed in the Amendment 5 proposed rule and DEIS. For example, commenters suggested exemptions to a recreational minimum size increase to allow landings of other sharks such as blacktip sharks or “blue” sharks such as shortfin mako or thresher sharks, and other commenters suggested implementing gear restrictions instead of additional pelagic longline closures.

After reviewing all of the comments received, we concluded that further analyses are needed for dusky shark measures. In order to ensure that other shark measures are finalized as expeditiously as possible, we decided to conduct additional dusky shark analyses in a separate proposed action, which will be referred to as Amendment 5b. Comments received on the dusky shark portions of the November 2012 proposed rule will be considered in that action. This final document — referred to as Amendment A5a to the 2006 Consolidated HMS FMP — finalizes other shark measures needed to maintain rebuilding of sandbar sharks; end overfishing and rebuild scalloped hammerhead and Atlantic blacknose sharks; and establish a TAC and commercial quota and recreational measures for Gulf of Mexico blacknose and blacktip sharks.

## Chapter 10 References

- Hayes, C.G., Y. Jiao, and E. Cortes. 2009. Stock assessment of scalloped hammerheads in the western North Atlantic Ocean and Gulf of Mexico. *North American Journal of Fisheries Management* 29:1406-1417.
- Hazin, F., A. Fischer and M. Broadhurst. 2001. Aspects of reproductive biology of the scalloped hammerhead shark, *Sphyrna lewini*, off northeastern Brazil. *Environ. Biol. Fishes* 61: 151-159.
- 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. 1600 p.
- NMFS. 2008. Final Amendment 2 to the Fishery Management Plan for Atlantic Tunas, Swordfish, and Sharks, and Highly Migratory. NOAA, National Marine Fisheries Service, Highly Migratory Species Management Division, Silver Spring, MD. Public Document.
- NMFS. 2010. Amendment 3 to the Final Consolidated Atlantic Highly Migratory Species Fishery Management Plan. NOAA, NMFS, Highly Migratory Species Management Division, 1315 East West Highway, Silver Spring, MD 20910.
- SEDAR. 2006. SEDAR 11 Stock Assessment Report: HMS Large Coastal Sharks. 4055 Faber Place Drive, Suite 201, North Charleston, SC 29405. 375p.
- SEDAR. 2007. SEDAR 13 Stock Assessment Report: Small Coastal Sharks, Atlantic Sharpnose, Blacknose, Bonnethead, and Finetooth Shark. 4055 Faber Place Drive, Suite 201, North Charleston, SC 29405. 375p.
- SEDAR. 2011. SEDAR 21 Stock Assessment Report: HMS Blacknose, Dusky, and Sandbar Sharks. SEDAR, 4055 Faber Place Drive, Suite 201, North Charleston, SC 29405. 415p.
- SEDAR. 2012. SEDAR 29 Stock Assessment Report: Gulf of Mexico Blacktip Sharks. SEDAR, 4055 Faber Place Drive, Suite 201, North Charleston, SC 29405. 415p.

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## 11.0 LIST OF PREPARERS

The development of this rulemaking involved input from many people within NMFS, NMFS contractors, and input from public, constituent groups, and the HMS Advisory Panel. Staff and contractors from the HMS Management Division, in alphabetical order, who worked on this document include:

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The development of this document also involved considerable input from other staff members and Offices throughout NOAA including, but not limited to:

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- National Ocean Service (Steve Thur);
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- The Office of Law Enforcement (Jeff Radonski, Paul Raymond, and Mike Henry)
- NOAA General Counsel (Meggan Engelke-Ros, Megan Walline, Shepherd Grimes, and Caroline Park);
- NMFS NEPA coordinator (Steve Leathery, Cristi Reid, and Patience Whitten); and
- NOAA Program, Planning, and Integration (Steve Kokkinakas).

## **11.1 List of Agencies, Organizations, and Persons Consulted and to Whom Copies of the Environmental Impact Statement Will Be Sent**

Under section 304(g)(1)(A) of the Magnuson-Stevens Act, we are required to consult and consider the comments and views of affected Fishery Management Councils, ICCAT Commissioners and advisory groups, and advisory panels established under section 302(g) of the MSA regarding amendments to an Atlantic HMS FMP. As described below, we provided documents and consulted with the Atlantic, Gulf, and Caribbean Fishery Management Councils, Gulf and Atlantic States Marine Fisheries Commissions, and the HMS Advisory Panel at various stages throughout the process. The electronic version was available on the HMS Management Division website and on regulations.gov, and hard copies and/or CDs of these documents were provided to anyone who requested copies.

We announced status determinations for scalloped hammerhead sharks on April 28, 2011 (76 FR 23794). On October 3, 2011, we announced the availability of stock assessment reports to the general public from the SEDAR process (76 FR 61092). Stock assessment materials were made available on the HMS website as soon as they were publically released ([http://www.nmfs.noaa.gov/sfa/hms/hmsdocument\\_files/sharks.htm](http://www.nmfs.noaa.gov/sfa/hms/hmsdocument_files/sharks.htm)). A Notice of Intent which announced status determinations for sandbar, dusky, and blacknose shark, and intent to conduct scoping and prepare a proposal for Amendment 5 to the 2006 Consolidated HMS FMP with an EIS in accordance with the requirements of the NEPA was published in the Federal Register on October 7, 2011 (76 FR 62331). In this Notice of Intent, we asked for comments on existing commercial and recreational shark management measures that would assist us in determining options for conservation and management of Atlantic sharks consistent with relevant federal statutes. We also specifically requested comments on management measures to reduce fishing mortality of dusky sharks, as these are already prohibited in commercial and recreational fisheries, and scalloped hammerhead sharks. The scoping process included five scoping meetings which were held between October and December 2011 in New Jersey, Louisiana, Florida (2), and North Carolina. In addition, we provided the public and consulting parties an opportunity to comment via a conference call on December 15, 2011, during which the issues and options considered under Amendment 5 were discussed. We also consulted with the New England Fishery Management Council, Mid-Atlantic Fishery Management Council, South Atlantic Fishery Management Council, the Atlantic States Marine Fisheries Commission, and the Gulf States Marine Fisheries Commission between October and December 2011.

Following scoping, we released a Predraft of Amendment 5 to the 2006 Consolidated HMS FMP, which summarized and incorporated comments received during scoping, at the HMS Advisory Panel meeting on March 14, 2012, and made it available to the public on the internet. The Predraft included the outcome of stock assessments for sandbar, dusky, scalloped hammerhead, Atlantic blacknose, and Gulf of Mexico blacknose sharks as well as potential management measures for these species/stocks. We requested that the HMS Advisory Panel and consulting parties submit comments on the Predraft by April 13, 2012. Public comments on the Predraft were also solicited and collected.

Following review of the comments received on the Predraft of Amendment 5, we published a Federal Register notice on May 29, 2012 (77 FR 31562), considering the addition of Gulf of Mexico blacktip sharks to Amendment 5. Gulf of Mexico blacktip sharks were undergoing a

stock assessment as part of the SEDAR 29 process, and that process was expected to be completed before this amendment was finalized. Public comments on this addition to Amendment 5 were accepted until June 21, 2012; these comments were included in Appendix B to the DEIS. The preliminary results of the SEDAR assessment and peer review indicated that the stock is not overfished. However, the peer reviews were not as conclusive regarding whether overfishing was occurring. One peer review agreed with the assessment results that no overfishing was occurring. One peer review indicated a possible concern with that result. Since publication of the Federal Register notice announcing our intent to consider the addition of Gulf of Mexico blacktip sharks in this Amendment, we accepted the results of the stock assessment as final in the Amendment 5 proposed rule. As explained in the proposed rule, the stock assessment indicates that the Gulf of Mexico blacktip shark stock is not overfished and overfishing is not occurring.

The Notice of Availability of the DEIS for Amendment 5 to the 2006 Consolidated HMS FMP and the proposed rule published in the Federal Register on December 7, 2012 (77 FR 73029), and November 26, 2012 (77 FR 10552), respectively. Comments on the proposed rule and the DEIS were accepted until February 12, 2013. An HMS Advisory Panel meeting and six public hearings were held along the Atlantic Coast, including the Caribbean and the Gulf of Mexico. We also held two conference calls/webinars. Additionally, we presented the proposed rule and the DEIS for Amendment 5 to the Mid-Atlantic, South Atlantic, and Caribbean Fishery Management Councils. Neither the Gulf of Mexico nor the New England Fishery Management Councils could provide time during their meetings for this Amendment but both Councils requested and were provide hard copies of the DEIS. The Gulf of Mexico Fishery Management Council provided written comments. Additionally, we provided copies of the DEIS to the EPA Regional Office 1, 2, 3, 4, and 6 and to the Council on Environmental Quality.

During the comment period, we received numerous comments on the proposed dusky shark measures including concern about data sources used and asking for consideration of approaches significantly different from those analyzed in the proposed rule and DEIS. As such, we decided to remove the dusky shark measures from the FEIS and address the dusky shark overfishing and rebuilding plan in a proposed separate action to allow more thorough analysis and consideration of alternatives and information beyond the scope of the original proposal.

After the end of the comment period, we reviewed the public comments, the comments provided by the Northeast Fisheries Science Center (NEFSC) and the SEFSC, and the analyses for the alternatives for the non-dusky shark species and made changes to the preferred alternatives and/or the supporting analyses, as needed, in order to address the comments received and/or other concerns that were raised during the comment period. All comments were considered when finalizing this document. We also received comments from the EPA regarding the DEIS (December 7, 2012, 77 FR 73029). The DEIS received a rating of “LO,” which means “lack of objection.” We respond to EPA’s specific comments in Appendix A in our responses to public comment. Copies of this final document will be sent to the EPA regional offices, the HMS consulting parties (the affected Regional Fishery Management Councils, ICCAT Commissioners and advisory committee, and the HMS Advisory Panel), the Atlantic and Gulf States Marine Fisheries Commissions, and other interested parties. An electronic version will be made

available to the public via the HMS Management Division webpage at <http://www.nmfs.noaa.gov/sfa/hms/index.htm>

**Table 11.1 Individuals that submitted written public comment on Draft Amendment 5 to the 2006 Consolidated HMS FMP**

<b>Name</b>	<b>Affiliation</b>
22,712 concerned citizens	Oceana Form Letter
David Arbeitman	Unidentified
Greg Abrams	Unidentified
Jason Bahr	Unidentified
Pamela Baker	Environmental Defend Fund
Linn D. Barrett	Unidentified
Robert E. Beal	Atlantic States Marine Fisheries Commission
Terri Lei Beideman	Blue Water Fishermen's Association, HMS Advisory Panel member
Christin and Carl Bjornberg	Unidentified
Frank Blum	South Carolina Seafood Alliance
Stephen A. Bortone	Gulf of Mexico Fishery Management Council
Robert H. Boyles	South Carolina Department of Natural Resources
Chester Brewer	Coastal Conservation Association
Ken W. Brodie	Unidentified
Donald Richard Butler	Unidentified
Colin R. Campbell	Let Us Fish.org
Merrill Campbell, Jr.	SCOC Fisheries
Captain Shane Cantrell	The Charter Fisherman's Association
Andrew Shane Cantrell	Fishin Addiction Charters
Daryl Carpenter	Unidentified
Peter J Casagrande	Unidentified
Jeffrey O'Gwynn Chambliss	Chambliss Charter Boast Inc.
Arthur Jack Clubb	Unidentified
Bob F. Cope Jr.	Cape May Charter Boat Association
Bill Cox	Yonges Island Fish Company, Inc
David Lawrence Crain	Unidentified
Stephen Cunningham	Unidentified
Joseph Paul Dalik, III	Unidentified
Christopher Bennet Daughtry	Dynasty Marine Associates, Inc.
Dale Diaz	Mississippi Department of Marine Resources
Frederick Joseph Dirsh	3D Sportfishing
Doebley and Dad LLC	Unidentified
Naomi R. Dutch	Unidentified
Captain Eric Ellis	Unidentified
William Mark Evans	Charter Captains Association

<b>Name</b>	<b>Affiliation</b>
William P. Ferrara	Unidentified
Sonja Fordham	Shark Advocates International, HMS Advisory Panel member
Captain Ryan Jason Freese	Unidentified
Richard Clark Fugler	Unidentified
Thomas H. Fukida	Unidentified
Dennis Francis Galante	Silverton Fishing Club
Captain Tony Geisman	Unidentified
Karen Greesen	Unidentified
Randy Gregory	North Carolina Department of Environment and Natural Resources, Division of Marine Fisheries
Peter Grimbilas	New Jersey Outdoor Alliance, Greater Point Pleasant Charter Boat Association
Ravi Grover	Unidentified
Lawrence Hanwacker	Unidentified
Steven Hain	Unidentified
William F. Hall	Unidentified
Stormy Harrington	Unidentified
Cory Harrington	Unidentified
Captain Henry W. Hauch	ACME Ventures Fishing
Dewey Hemilright	Unidentified
Captain Scott Hickman	Charter Fisherman's Association
Glen Aaron Hopkins	Unidentified
Kurt Vance Howell	Unidentified
Russell Howard Hudson	Directed Sustainable Fisheries, Inc. , HMS Advisory Panel member
Robert Edward Hueter	Mote Marine Laboratory, HMS Advisory Panel member
Steven Edward James	Boston Big Game Fishing Club, HMS Advisory Panel member
Michael J. Johnson	Sea Farmer, Inc.
Amanda Keledjian	Oceana
Carrie Kennedy	Maryland Department of Natural Resources
Jeff Kneebone	Unidentified
Kim Levins	Kashiko Exports
Christopher Lish	Unidentified
Irene Lopez	Unidentified
Captain Eric L. Ludwig	Unidentified
Jessica McCawley	Florida Fish and Wildlife Conservation Commission
Dan Mears	Unidentified
Rick Mears	Unidentified
Stephen Mellett	Manasquan River Marlin & Tuna Club

<b>Name</b>	<b>Affiliation</b>
Michael Guido Miglini	Out to Sea Adventures
Frank Moscaritolo	Unidentified
Heinz J. Mueller	U.S. Environmental Protection Agency
Jim Munizza	Unidentified
Joseph L. Nash	Unidentified
Dr. Ken Neill, III	IGFA Representative; Peninsula Salt Water Sport Fisherman's Association, Inc., HMS Advisory Panel member
Bill McIntyre and Martin T Scalon	Unidentified
Jeff Oden	Unidentified
Sean D. O'Malie	Law Offices of Sean D. O'Malie, PLC
Joseph Osiecki	Unidentified
Thomas Otto	Team Reel Addiction
Anita Potter	Unidentified
Jean Public	Unidentified
Dominick Pucci	Unidentified
Paul Puskas	Unidentified
Robin Riechers	Texas Parks & Wildlife
Ron Wayne Risley	Unidentified
James Roberson	Unidentified
Richard B. Robins, Jr.	Mid-Atlantic Fishery Management Council
Mark Sampson	Fish Finder Adventures, HMS Advisory Panel member
Michael Skoletsky	Shark Savers, Inc.
James Smith	Unidentified
Mark Sokolow	Law Office of Mark Sokolow
Joyce Stanley	U.S. Department of the Interior
Sarah Steers	Unidentified
Captain Joe Sullivan	The Bass Barn.com
Eric Wayne Summers	Texas Saltwater Adventures
Austin Synes	Unidentified
Tim Tawes	Unidentified
Alton Davis Temple	Medical Emergency Professionals
Marc Timothy Troch	Unidentified
Steve Tyler	Unidentified
David Wesley Tysz	Unidentified
Jeff Weakley	Florida Sportsman Magazine
Captain Dennis West	Jersey Coast Shark Anglers, Inc.
Dennis West	Jersey Coast Shark Anglers
Rom A Whitaker	HMS Advisory Panel member
Cynthia Wigren	Atlantic White Shark Conservancy
J "Willie" Willams	Texas Outdoor Organizers

<b>Name</b>	<b>Affiliation</b>
Allan Willis	HMS Advisory Panel Member
Elizabeth Wilson	The Pew Charitable Trusts
Glen Jessie Wong, Jr.	Unidentified
Forrest A. Young	Dynasty Marine Associates, Inc.
Sharon B. Young	The Human Society of the United States

## 12.0 APPENDIX A. RESPONSE TO COMMENTS

### Stock Assessments

Comment 1: We received a variety of comments on the SEDAR stock assessment process and procedures. One commenter wanted an explanation of how NMFS conducts a stock assessment, while another commenter prefers that NMFS conduct a SEDAR stock assessment on all shark species. Another commenter wants us to consider and address sources of mortality of sharks in other commercial fisheries.

Response: Domestic shark stock assessments are generally conducted through the SEDAR process, in which NMFS participates. This process is also used by the South Atlantic, Gulf of Mexico, and Caribbean Fishery Management Councils and is designed to provide transparency throughout the stock assessment process. Generally, SEDAR stock assessments have three stages. Meetings in these stages may be face-to-face or by webinar or conference call. All meetings are open to the public. The first stage of the assessment process focuses on the available data. During this stage, fisheries monitoring programs, life history and other biological data, catch data, and indices of abundance from both fishery-independent (e.g., scientific surveys) and fishery-dependent (e.g., fishermen, dealer and observer reports) sources are reviewed and compiled. The end result of this stage is a summary of all sources of data and relevant research, including all sources of potential mortality for the shark species in other commercial fisheries.

The second stage focuses on the assessment models themselves. During this stage, the participants discuss the available models, how the data fit the models, and any changes needed. The end result of this stage is a complete assessment model and a preliminary determination of the status of the stock.

The third stage is the peer review. During this part, scientists who were not participants in either previous stage and who do not have any conflict of interest review the data and the models to determine if they are appropriate and were conducted correctly. During this stage, the peer reviewers may ask the assessment scientists to re-run models or include specific sensitivity runs to check how the models work. This peer review stage may be done in a public forum or, as was done with the Gulf of Mexico blacktip stock assessment, may be done via a paper review. All reports from all stages of the process are available online at <http://www.sefsc.noaa.gov/sedar/>.

The SEDAR process can take several months to over a year depending on whether the species has been assessed before, if a species needs a full review of a previous assessment, or if the assessment is more of an update to previous assessments. Because the process takes so long and because of the large number of shark stocks that need to be assessed, there are times where we have reviewed stock assessments that were completed and peer reviewed outside of the SEDAR process and have determined the assessment to be appropriate for management. We have done that for both porbeagle and scalloped hammerhead sharks. Additionally, there are some shark stocks that are assessed internationally via the process established by ICCAT. In all cases, we ensure the data and models used are appropriate, all sources of mortality are considered, and that

the end result constitutes the best available science, consistent with National Standard 2 and other requirements.

Comment 2: We received a comment that the non-sandbar LCS management group is not overfished with no overfishing occurring in the mid-Atlantic region.

Response: The LCS management group, including sandbar sharks, was last assessed as a whole in 2006 as part of the SEDAR 11 process. At that time, the peer reviewers found that while the data and assessment model were appropriate, the assessment as a whole was unlikely to produce effective management advice given the potential for conflicting information from the various species components in the catch and abundance index data. Based on this, we determined the status of the LCS management group to be unknown. Therefore, we do not know whether the non-sandbar LCS management group is overfished or if overfishing is occurring given the information currently available.

Comment 3: We received a comment regarding the stock determination for Gulf of Mexico blacktip sharks. The commenter noted that they disagree with the determination that the stock is not overfished and that overfishing is not occurring since they believe the fish population has been dramatically reduced and has not increased over time. In addition, the commenter wanted us to provide background on the data for the past 40 years.

Response: The best available scientific data and a rigorous SEDAR stock assessment process support the conclusion that Gulf of Mexico blacktip sharks are not overfished ( $SSF_{2010}/SSF_{MSY}=2.00-2.78$ ) with no overfishing occurring ( $F_{2010}/F_{MSY}=0.05-0.27$ ). The independent review panel determined that the data used in the stock assessment were considered the best available. They also determined that appropriate standard assessment methods based on general production models and on age-structured modeling were used to derive management benchmarks given the data available. The stock assessment scientists showed in the post-review updates and projections document that process error in recruitment was fully considered and that recruitment in the model was reasonable. They also showed that the low value of  $F_{MSY}$  is consistent with what is expected from the biology of sharks, and that of the three indices mentioned by the reviewer that showed a decline, two show an increase in the terminal year of 2010. Therefore, the stock assessment scientists concluded that the stock assessment result of no overfishing is warranted. Thus, the commenters' contention that the stock is overfished with overfishing occurring is unfounded as is the contention that the GOM blacktip shark population has "been dramatically reduced." In the SEDAR 29 stock assessment, background data for some catch indices were provided that went back as far as 1964. Commenters can access this data and additional background data at the SEDAR 29 stock assessment website at: <http://www.sefsc.noaa.gov/sedar/>.

Comment 4: Commenters asked us to schedule the Atlantic blacktip shark stock assessment in 2013, since the Gulf of Mexico blacktip shark assessment was completed in 2012. They consider the Atlantic blacktip assessment to be "more important" than the non-blacknose SCS (Atlantic sharpnose, bonnethead, and finetooth) assessments.

Response: We aim to conduct a number of shark stock assessments every year and to regularly reassess the stocks. The number of species that can be assessed each year depends on whether assessments are establishing baselines or are only updates to previous assessments. Assessments also depend on ensuring there is data available for a particular species; not all shark species or stocks have enough data to assess. We try to assess shark species as often as possible, particularly for primary commercial and recreational species, and will aim to conduct an Atlantic blacktip shark assessment as soon as practicable.

Comment 5: NMFS should perform a SEDAR stock assessment on all of the hammerhead (scalloped, great, and smooth) shark species. The Hayes et al. (2009) scalloped hammerhead shark stock assessment was not a complete assessment and included modeling assumptions that were driven by flawed recreational harvest data. For smooth and great hammerhead sharks, we need a sufficient assessment of these species, since the impacts of the proposed hammerhead shark measures are only based on scalloped hammerhead sharks.

Response: The Hayes et al. (2009) stock assessment utilized a surplus production model, an approach commonly used in data poor scenarios, and incorporated commercial and recreational landings, fisheries dependent data, fisheries independent data from NMFS observer programs and scientific surveys. We reviewed this paper and concluded that: the assessment is complete; the assessment is an improvement over a 2008 aggregated species assessment for hammerhead sharks; and the assessment is appropriate for U.S. management decisions (76 FR 23794; April 28, 2011). Based on the results of this paper, we determined that scalloped hammerhead sharks were overfished and experiencing overfishing. Scalloped hammerhead sharks are currently a part of the non-sandbar LCS management group and this is the first assessment specific to scalloped hammerhead sharks. We intend to conduct SEDAR stock assessments on scalloped, smooth, and great hammerhead sharks in the future, as soon as practicable given timing, resource limits, and data availability.

Comment 6: NMFS should analyze the seasonality of hammerhead shark catches to avoid closing management groups with quota linkages in the Gulf of Mexico region.

Response: We analyzed a few ways to ensure fishermen can fully harvest the aggregated LCS, hammerhead, and blacktip shark quotas in the Gulf of Mexico region. Due to the short and variable shark fishing season lengths in the Gulf of Mexico region, the seasonality of hammerhead catches is not definitive. In 2010, the non-sandbar LCS fishery was only open for six weeks, while the season remained open for approximately five months in 2011 and 2012. In this amendment, we analyzed the catch composition on a per trip basis. We noticed that the catch composition varied. There were both trips that caught and landed primarily blacktip sharks and trips that caught and landed a mix of aggregated LCS and hammerhead sharks. The aggregated LCS and hammerhead sharks are caught in small amounts on trips targeting Gulf of Mexico blacktip sharks, so this should not affect the mortality rates of hammerhead sharks. In addition, the blacktip shark and aggregated LCS quotas would be set equal to average annual landings from 2008-2011. The preferred Gulf of Mexico hammerhead shark quota would be set using the TAC from the Hayes et al. (2009) stock assessment after accounting for all sources of mortality, but the result are quotas that are slightly higher in both regions than average annual landings from 2008-2011. If fishing continues in a similar fashion to the years 2008-2011, all

three quotas in this region should fill at about the same rate. As long as the quotas do fill at about the same rate, significant additional mortality of aggregate LCS and hammerhead sharks should not occur after these management groups close. Dead discards of scalloped hammerhead sharks in the greater LCS fishery have already been factored into the preferred hammerhead shark quota.

Based on this information, we decided, in preferred Alternative Suite A6, to link the Gulf of Mexico regional quotas for aggregated LCS and hammerhead sharks while allowing the Gulf of Mexico blacktip shark management group to open and close independently. Closing the aggregated LCS management group when landings of hammerhead sharks reaches, or is expected to reach, 80 percent of the hammerhead shark quota would prevent hammerhead sharks from being incidentally caught in the aggregated LCS fishery and the associated continued overfishing. Since the Gulf of Mexico blacktip management group would not necessarily close with the aggregated LCS and hammerhead shark management groups, there is the potential for incidental hammerhead mortality when fishing for blacktip sharks after the hammerhead shark management group has been closed. To address this concern, we would have the authority to close the blacktip shark management group before landings of blacktip sharks reach, or is expected to reach, 80 percent of the blacktip shark quota. This preferred alternative suite should allow fishermen to harvest as much of the Gulf of Mexico blacktip and aggregated LCS quotas as is possible without overfishing scalloped hammerhead sharks.

Comment 7: The State of Florida recommends NMFS coordinate with Regional Fishery Management Council's Scientific and Statistical Committees (SSCs) to develop proper stock assessments with data poor or un-assessed stocks (i.e. Gulf of Mexico blacknose and Atlantic blacktip sharks).

Response: As described above, we conduct most domestic shark stock assessments through the SEDAR process. This process is the same process that the South Atlantic, Gulf of Mexico, and Caribbean Fishery Management Councils use to assess their stocks. The only difference between how the Councils treat stock assessments and how federally managed shark stock assessments are treated by NMFS is that once the stock assessment is complete at the SEDAR level, the Regional Fishery Management Councils have their SSC review each stock assessment. NMFS does not have its own SSC. Instead, the assessment is reviewed internally before being accepted. Because we follow the same process to conduct stock assessments as the Regional Fishery Management Councils, we believe that that shark stock assessments use the same processes to address data poor or un-assessed stocks as the Regional Fishery Management Councils.

Comment 8: Some commenters believe the recent NMFS stock assessments are incomplete due to lack of data, outdated data, and misguided assumptions. As an example, one commenter stated that NMFS assumes that Gulf of Mexico blacknose sharks needs rebuilding because the status of this species is unknown.

Response: As described above, we use the SEDAR process to conduct most domestic shark stock assessments. This process is a transparent one that includes meetings, webinars, and/or conference calls that are open to the public. All the working papers for SEDAR

assessments along with the final reports are available online at <http://www.sefsc.noaa.gov/sedar/>. During the course of the assessment, the participants in the assessment carefully go through all the available data and any underlying assumptions regarding either the data or the models. The participants in the assessment are composed of both NMFS scientists as well as a mix of fishermen, academics, and environmentalists that chosen from the members of the HMS SEDAR Pool. Consideration is given to each participant's expertise. The assessments themselves use the most up to date data available at the time the assessment is started. For example, if discussions about data begin in March of a particular year, the scientists may decide to use data from the previous year if that data has undergone a quality controlled check or the scientists may decide that the previous year's data would not be quality controlled checked and may rely on data from the year before that instead. Because of the lengthy time in conducting an assessment (sometimes more than a year) and then incorporating the assessment results into management measures (this process can take two or more years depending on the action), it can seem as though the data the assessment relied on is out of date. However, in our analyses of potential management measures in this document, we use updated information where available even if that data was not included in the assessment model itself because it was not available at the time (e.g., 2011 commercial landings data) Thus, the assessment and the data upon which it relied remains the best scientific data available at this time, and we are required by National Standard 2 to utilize this information.

Regarding the specific comment about blacknose sharks, the SEDAR 21 blacknose shark stock assessment incorporated new landings and biological information that was not available for previous assessments. This was the first time blacknose sharks were assessed as two separate stocks. The scientists found that while the Atlantic blacknose assessment model appeared robust, the assessment model for the Gulf of Mexico stock did not fit some of the input data. Because of this lack of fit, the Review Panel did not accept the Gulf of Mexico blacknose stock assessment results. Therefore, we declared the status of the Gulf of Mexico blacknose shark stock as "unknown." We would prefer to have a definitive status and will conduct a Gulf of Mexico blacknose shark stock assessment as soon as practicable given timing, resource limits, and data availability. In the meantime, the preferred Alternative Suite A6 caps Gulf of Mexico blacknose shark landings at current levels.

Comment 9: We received multiple comments on the issue of blacknose sharks caught in shrimp trawl nets. One commenter wanted NMFS to develop accountability measures in case the shrimp trawl fishery exceeds its blacknose shark allocation and to improve the quality of the best available science for future management decisions. Another commenter believes the SEDAR estimates of blacknose sharks being caught in shrimp trawl nets are incorrect, that the species is misidentified, and that we need to work with the Gulf of Mexico shrimpers to reduce shark bycatch.

Response: In this amendment, we are only implementing measures to reduce the landings and discards in Atlantic shark fisheries. Regulatory changes to the shrimp trawl fisheries in the South Atlantic and Gulf of Mexico regions would be done through the Council process in those regions. At the blacknose shark stock assessment, we had several shrimp trawl industry scientists involved in estimating the number of blacknose sharks that are caught in shrimp trawl nets. Those scientists were instrumental in reviewing the data and developing the models that

ultimately were used to estimate the number of blacknose sharks caught in shrimp trawl nets. Additionally, since the first blacknose stock assessment in 2007, NMFS has been collecting species-specific shark data reporting from the shrimp trawl observer program. Thus, we feel the stock assessment estimates of blacknose sharks caught in shrimp trawls is appropriate and the best available science.

### **General Support for Measures in the DEIS and Proposed Rule**

Comment 10: We received comments that generally supported the measures in Alternative Suite A2. Commenters liked the idea of regional hammerhead shark, aggregated LCS, and Gulf of Mexico blacktip shark TACs and quotas, the quota linkages in the Atlantic and Gulf of Mexico regions, and the move to more species-specific shark management. The State of Maryland said that they believed the Alternative Suite A2 measures for sandbar, scalloped hammerhead, and blacknose sharks were appropriate.

Response: Most of the management measures that commenters liked in Alternative Suite A2 in the DEIS are also in the preferred Alternative Suite A6 in the FEIS. One change between Alternative Suites A2 and A6 is the quota linkages between Gulf of Mexico hammerhead, aggregated LCS and blacktip sharks. Alternative Suite A2 links all three quotas, while Alternative Suite A6 only links the aggregated LCS and hammerhead quotas. In the FEIS, we prefer linking only the aggregated LCS and hammerhead shark quotas, and not the blacktip shark quota, for two reasons. First, because average landings of hammerhead sharks in the Gulf of Mexico from 2008-2011 are slightly less than the preferred hammerhead shark quota for the Gulf of Mexico, and the preferred aggregated LCS and blacktip shark quotas are calculated based on average landings, it is anticipated that all three quotas will be reached at similar points in time if fishing practices continue as they have since 2008. Second, when analyzing commercial shark fishery observer data in the Gulf of Mexico from 2008-2011, we noticed much lower interactions with hammerhead sharks on trips that were specifically targeting blacktip sharks than on trips that generally targeted sharks. On observed trips outside of the shark research fishery that specifically targeted blacktip sharks, interactions with hammerhead sharks and aggregated LCS was low, while on trips that generically targeted sharks, hammerhead sharks and aggregated LCS had the highest interactions. Therefore, because recent average shark landings have been similar to preferred quotas and because the hammerhead shark and aggregated LCS catch is much higher on trips generally targeting shark than on trips specifically targeting blacktip sharks, we feel that it is appropriate to link the Gulf of Mexico aggregated LCS and hammerhead shark quotas and not link the Gulf of Mexico blacktip shark quota.

Comment 11: One commenter stated that the rule should be completed and implemented by April 2013 since the two-year rebuilding timeline for scalloped hammerhead sharks is in April. The commenter urged NMFS to not lose focus on ending overfishing for hammerhead, blacktip, and blacknose sharks.

Response: We understand the importance of implementing management plans that will rebuild stocks within two years of declaring them overfished as required by the Magnuson-Stevens Act. We have been working on a schedule to implement these measures within that deadline. As this action has progressed, we realize we will not be able to implement final

measures before the two year anniversary of declaring the scalloped hammerhead stock overfished with overfishing occurring. We will, however, implement the final action as soon as procedurally possible and as close as possible to that deadline. The preferred alternative suite should end overfishing of scalloped hammerhead and Atlantic blacknose sharks, consistent with the objective and need for this amendment. Gulf of Mexico blacktip sharks are not experiencing overfishing and the preferred alternative suite in this document is designed to ensure that overfishing of that stock does not occur. While the status of the Atlantic blacktip shark is unknown, we believe that the preferred alternative suite in this document would not cause overfishing.

### **TACs and Quotas**

Comment 12: We received a comment that retention of sandbar sharks should be prohibited in all fisheries, including the shark research fishery. This commenter supported a prohibition rather than the current TAC that allows rebuilding after a long timeframe, in favor of a shorter rebuilding time.

Response: The latest sandbar shark stock assessment in SEDAR 21 found that, while the species is still overfished, overfishing is no longer occurring, and the species has a greater than 70 percent probability of rebuilding by 2070 with a greater than 50 percent probability of rebuilding by 2066 under current regulations and fishing pressure. Under no fishing, the species would likely rebuild by 2046; however, zero fishing pressure is difficult to achieve due to incidental catch. For this reason, a prohibition on sandbar shark retention would likely result in a rebuilding year greater than 2046. Because the current TAC already provides a greater than 70 percent probability of rebuilding, and because overfishing is not occurring and the stock status is improving, we believe that maintaining the current TAC and rebuilding plan is fully consistent with the Magnuson-Stevens Act requirements and the National Standard Guidelines. The benefit of having a small, sustainable, well-regulated sandbar shark fishery outweighs the benefit of a shorter rebuilding timeframe. The small sandbar shark fishery, administered through the shark research fishery, allows fishermen access to the resource that they can in turn sell and also provides important data on the species. The latest stock assessment used information gathered from the shark research fishery, the absence of which would have reduced the confidence in assessment results. For these reasons, we prefer to continue with the rebuilding plan for sandbar sharks currently underway.

Comment 13: Some commenters stated that this amendment needs to provide additional regulations with regard to TACs for blue, porbeagle, or other sharks in the pelagic shark management group.

Response: Pelagic sharks are outside the scope of this rulemaking. As stated in the published Notice of Intent and the Purpose and Need section of this document, this rulemaking addresses the recent stock assessments for scalloped hammerhead sharks, sandbar, blacknose sharks, and blacktip sharks.

Comment 14: Some commenters are concerned that regulations for sandbar, blacknose, scalloped hammerhead, and blacktip sharks force regulatory discards of some species and contribute to mortality that exceeds the TAC, causing overfishing.

Response: Regulations for sandbar, blacknose, scalloped hammerhead, and blacktip sharks are expressly designed to keep mortality below the TAC to end overfishing and rebuild, as necessary. Sandbar sharks are currently on a rebuilding plan, and the latest stock assessment confirms that current regulations will allow the species to rebuild within the required timeframe. The Atlantic blacknose shark assessment provided a TAC necessary to end overfishing and rebuild the stock. All sources of mortality were accounted for when developing a commercial quota, so mortality is unlikely to exceed the established TAC. The Gulf of Mexico blacknose shark stock status is unknown; however, we considered all sources of mortality when calculating the Gulf of Mexico blacknose TAC and capped that commercial quota at recent commercial landings to keep total mortality from exceeding current levels. Scalloped hammerhead sharks are overfished with overfishing occurring and the latest stock assessment provided a TAC that would end overfishing and allow the stock to rebuild. All sources of mortality were accounted for when developing a scalloped hammerhead commercial quota, so mortality is unlikely to exceed the established TAC. The Gulf of Mexico blacktip shark stock is not overfished nor is it experiencing overfishing, and current mortality levels are sustainable.

Regulatory discards are a possibility for any of these species. The nature of regulations that provide an open season (when there is quota is available) and a closed season (when the quota is closed) leaves the possibility that incidentally caught individuals will be discarded if the quota is closed. Many of the discarded fish are alive, but some will not be. Our concern over regulatory discards and additional mortality is one of the reasons we prefer quota linkages for some species in Alternative Suite A6. These regulatory discards are a source of mortality and we take them into consideration when developing commercial quotas within each species or management group's quota. For example, when developing the hammerhead management group quota, we took into account dead discard estimates from a variety of fisheries that interact with scalloped hammerhead sharks, including directed shark fisheries. This estimate, among other sources of mortality, was subtracted from the TAC to provide a sustainable commercial quota. See Chapter 2 for more details of the quota calculations. We strive to prevent or minimize regulatory discards. If we are unable to eliminate dead discards, we account for this mortality to ensure no species or management group exceeds its TAC.

Comment 15: We received a comment that the preferred Gulf of Mexico blacknose shark quota of 2.0 mt dw is too low. The commenter is concerned that higher than expected catch levels or new entrants into the fishery could land too many blacknose sharks resulting in closing both the blacknose shark management group and the linked non-blacknose SCS management group. This commenter requested an increase in the Gulf of Mexico blacknose quota to prevent the stock from becoming a "choke species" for non-blacknose SCS.

Response: The SEDAR 21 stock assessment for Gulf of Mexico blacknose sharks was not accepted by the review panel and was not accepted for management. Consequently, the stock status for Gulf of Mexico blacknose sharks is unknown. Under the preferred alternative, we would cap total mortality based on recent commercial landings, dead discards, and

recreational landings. For 2011, commercial landings for Gulf of Mexico blacknose sharks were 2.0 mt dw. At this time, we do not have any information to support an increase beyond the 2011 commercial landings estimate.

Since the Gulf of Mexico blacknose shark quota is linked to the non-blacknose quota, both management groups would close when either quota reached, or was expected to reach, 80 percent. The Gulf of Mexico blacknose shark quota in the preferred alternative suite is smaller than the non-blacknose SCS quota and would likely fill more quickly, closing the non-blacknose SCS quota before it had been filled (becoming what the commenter termed a “choke species”). However, the Gulf of Mexico blacknose shark quota in the preferred alternative suite is set equal to commercial landings since the implementation of Amendment 3 to the 2006 Consolidated HME FMP (which established a separate blacknose quota and encouraged fishermen to avoid the species), excluding 2010 landings which were impacted by the Deepwater Horizon/BP oil spill fishing closures. Since the preferred quota is based on recent annual landings, it is likely that this quota would last most of the year if the fishery continues as it has. Consequently, it is unlikely that the Gulf of Mexico blacknose shark quota will result in a “choke species.”

Comment 16: The Florida Fish and Wildlife Commission commented that that the blacknose shark quota should be linked to the LCS and sandbar quotas, in addition to the non-blacknose SCS quota. While blacknose sharks are sometimes caught alongside non-blacknose SCS, the Commission stated that blacknose sharks are commonly caught in the LCS and snapper/grouper longline fisheries, especially in South Florida. These sources of mortality were not accounted for in the quota calculations. Additionally, LCS are often caught in the directed SCS fisheries when the LCS attempt to feed on the SCS already caught in the fishing gear (depredation).

Response: In both the Atlantic and Gulf of Mexico regions, all sources of blacknose shark mortality were accounted for in the preferred alternative suite, including other fisheries such as the LCS and snapper/grouper fisheries. In the Atlantic region, the TAC specified in the stock assessment was reduced by recreational landings, research set-asides, and dead discards to derive the commercial quota. These dead discards were estimated using gillnet and bottom longline observer data and were accounted for in the preferred alternative suite’s quota calculations. The Gulf of Mexico TAC and quota were calculated in a slightly different way in the preferred alternative suite, but the dead discards were also accounted for from gillnet and bottom longline observer data.

LCS are sometimes caught in the directed SCS fishery, whether through depredation or conventional capture. In the context of this rulemaking, the only LCS species addressed are hammerhead sharks, the quota for which was calculated in the preferred alternative suite by taking the scalloped hammerhead shark TAC from the stock assessment and subtracting scalloped hammerhead shark recreational landings, research set-aside, and dead discards from the LCS and other fisheries. These dead discards were estimated from logbook data in the directed pelagic longline and bottom longline shark fisheries, gillnet observer program data, and the reef fish observer program. Therefore, dead discards of LCS in the directed SCS fisheries were accounted for when calculating the hammerhead shark quotas.

Comment 17: Some commenters do not support aggregating multiple species into management groups such as the LCS, SCS, and pelagic shark management groups.

Response: As more single-species stock assessments are conducted, we have been moving toward single-species management rather than group management where appropriate. Recent stock assessments that have allowed us to move to some single-species management include: sandbar sharks, Atlantic blacknose sharks, scalloped hammerhead sharks, Gulf of Mexico blacktip sharks, dusky sharks, and porbeagle sharks. At this time, we do not have accepted and approved single species assessments for Gulf of Mexico blacknose sharks or the remaining aggregated LCS species: Atlantic blacktip, silky, tiger, bull, lemon, spinner, nurse, and great and smooth hammerhead sharks. For SCS, we have single-species assessments for Atlantic sharpnose, finetooth, and bonnethead sharks, which indicate that these species are not overfished nor are they experiencing overfishing. However, we manage these species under a single management group since these species co-occur in the SCS fishery. This simplifies quota tracking and management while minimizing the risk of unsustainable fishing occurring on one or more of the stocks. Additionally, some single-species regulations exist in the recreational fishery. Both Atlantic sharpnose and bonnethead sharks are exempt from the recreational minimum size and current regulations allow limited additional retention of these two species above the per vessel bag limit. For pelagic sharks, we have species-specific assessments for porbeagle, blue sharks, and shortfin mako sharks; however, international management for pelagic species complicates single-species management. There are no international quotas for these species or country-specific allocations. Porbeagle and blue sharks were last assessed by the ICCAT SCRS in 2012 which determined that porbeagle sharks were overfished but that overfishing has likely stopped and that blue sharks are neither overfished nor experiencing overfishing. Both of these species are managed under separate quotas. For shortfin mako sharks, we established conservation initiatives in Amendment 3 to the 2006 Consolidated HMS FMP after a 2008 ICCAT SCRS assessment indicated that the North Atlantic stock was experiencing overfishing and approaching an overfished status. These conservation initiatives included outreach and efforts to encourage live release of the species. Since then, a 2012 ICCAT SCRS assessment concluded that indications of potential overfishing shown in the 2008 stock assessment had diminished and that the current level of catches may be considered sustainable. Please visit [http://www.iccat.int/Documents/SCRS/ExecSum/SHK\\_EN.pdf](http://www.iccat.int/Documents/SCRS/ExecSum/SHK_EN.pdf) for more information.

Comment 18: Several commenters expressed support for establishing separate TACs for hammerhead sharks, Atlantic blacknose, Gulf of Mexico blacknose, and Gulf of Mexico blacktip sharks.

Response: We agree that establishing separate quotas and TACs for the two blacknose shark stocks and Gulf of Mexico blacktip sharks will rebuild overfished Atlantic blacknose and scalloped hammerhead sharks, provide additional protection for the Gulf of Mexico blacknose and blacktip stocks, and minimize socioeconomic impacts, consistent with the Magnuson-Stevens Act. For these reasons, we prefer these measures at this time.

Comment 19: Some commenters felt that Atlantic blacktip sharks should be separated from the LCS management group like Gulf of Mexico blacktip sharks.

Response: The peer review panel for the 2006 stock assessment for Atlantic blacktip sharks concluded that while the methods were scientifically sound, the assessment model did not provide reliable estimates of abundance, biomass, or exploitation rates. As a result, we determined the stock status of Atlantic blacktip sharks to be unknown (71 FR 65086; November 7, 2006). Unlike the situation for Gulf of Mexico blacknose sharks, where the status of the stock was declared to be unknown as a result of a peer review of the stock assessment, there is no previous stock assessment for blacktip sharks on which to appropriately base a species-specific TAC or quota. Therefore, because we had no new information to inform a separate quota or TAC, we decided to maintain Atlantic blacktip sharks in the aggregated LCS management group. When we have a peer reviewed and approved stock assessment for Atlantic blacktip sharks, we will reconsider this decision.

Comment 20: The State of Louisiana expressed concern that we conducted a SEDAR stock assessment and then used current landings for the TAC instead of the stock assessment results. In the Magnuson-Stevens Act, there is a mandate for NMFS to manage fisheries towards optimum yield, but the approach preferred in the DEIS does not address that mandate.

Response: Based on SEDAR 29, we made the determination that the Gulf of Mexico blacktip shark stock is not overfished and no overfishing is occurring. However, the SEDAR 29 process did not include the projections and the calculations needed to determine the acceptable biological catch during the stock assessment itself. Rather, the SEFSC calculated the projections after the stock assessment was peer reviewed. The stock assessment noted that current removal rates are sustainable and the subsequent projections, which were completed outside the SEDAR process, indicate that current removals are unlikely to lead to an overfished fish stock by 2040. The projections also indicate that higher levels of removal (those associated with an  $F_{TARGET}$  scenario) are unlikely to result in an overfished stock; however, the methodology for estimating  $F_{TARGET}$  is currently in development for sharks and has yet to be introduced and reviewed within the SEDAR process. Therefore, because the projections for blacktip sharks have not been peer reviewed through the SEDAR process and as described in the preferred Alternative Suite A6 in the FEIS, we would establish a TAC based on current sustainable levels of catch. The TAC based on current sustainable levels of catch would be 413.4 mt dw, the total of all of the sources of mortality (recreational landings, commercial discards, and research set-aside mortality) and the commercial quota. The commercial quota would be calculated by taking the proportion of current Gulf of Mexico blacktip shark landings that make up the Gulf of Mexico non-sandbar LCS quota multiplied by the Gulf of Mexico non-sandbar LCS quota that will be in effect in 2013. This would result in a commercial quota of 256.6 mt dw (565,700 lb dw).

Comment 21: We received comments that lemon, tiger, scalloped hammerhead, and blacknose sharks and any species without a stock assessment should be prohibited.

Response: Although some states have prohibited retention of these species, we have codified criteria that guide our decision whether to declare a species prohibited. The species must meet at least two of following four criteria for us to consider adding it to the prohibited species list:

- 1) Biological information indicates that the stock warrants protection.

- 2) Information indicates that the species is rarely encountered or observed caught in HMS fisheries.
- 3) Information indicates that the species is not commonly encountered or observed caught as bycatch in fishing operations for species other than HMS.
- 4) The species is difficult to distinguish from other prohibited species.

At this time, we do not have a stock assessment for lemon or tiger sharks. Therefore, we do not have information indicating that tiger or lemon sharks meet at least two of these criteria. We will revisit and consider these criteria in a future action if additional data become available about the species in the future indicating that such review is warranted.

Scalloped hammerhead and Atlantic blacknose sharks have stock assessments that form the basis for the management measures under the preferred alternative suite. These stock assessments indicate a level of which can occur while still allowing for the species and stock to rebuild. After taking all sources of mortality, including recreational harvest, into consideration, the TACs in the stock assessment provide room for commercial harvest of the species and stock. This is the basis for the preferred commercial quotas for scalloped hammerhead and Atlantic blacknose sharks. Gulf of Mexico blacknose sharks do not have an accepted stock assessment and the stock status is unknown. Under the preferred alternative suite, we established the quota based on current landings to help prevent future mortality from increasing. At this time, we do not have information that Gulf of Mexico blacknose sharks meet at least two of the above criteria for prohibiting a species.

Comment 22: Commenters suggested that NMFS should cease all shark fishing and that all of these species are overfished and should be considered endangered.

Response: We continually monitor stocks of all species under our jurisdiction and promptly begin the rulemaking process should one of these stocks be determined to be overfished or have overfishing occurring based on the results of a stock assessment. Based on the best available scientific information, we take the required action for those shark species that are determined to be overfished through fishery management actions focused on rebuilding the fishery. Species that are “overfished” as defined by the Magnuson-Stevens Act are not necessarily also “endangered” as defined under the Endangered Species, which applies a different legal standard. We work closely with the NMFS Office of Protected Resources to determine if shark species warrant protection under ESA.

Comments 23: NMFS should remove hammerhead sharks from the LCS management group and designate them as a prohibited species under the ESA.

Response: This amendment is being conducted under the authority of the Magnuson-Stevens Act, not the ESA. While we could consider prohibiting hammerhead sharks under the provisions in the 2006 Consolidated HMS FMP, any consideration of listing hammerhead sharks under the ESA would need to take place through a different process. Regarding listing scalloped hammerhead sharks under the ESA, we received petitions to list scalloped hammerhead and great hammerhead sharks under the ESA. The 90-day finding for the scalloped hammerhead shark petition concluded that the petition presented substantial scientific or commercial information

indicating that the petitioned action may be warranted. Consistent with legal requirements, a status review was conducted to determine if the petitioned action is warranted. The 90-day finding alone does not result in legal obligations pertaining to management of the species. NMFS is now proposing to list four populations of scalloped hammerhead sharks under the ESA, two as threatened and two as endangered (April 5, 2013; 78 FR 20717). However, the species will not be listed in the majority of U.S. waters due to steps fisheries managers and fishermen have already taken to help protect these species NMFS would have to consider management implications for the species if it is listed, consistent with ESA requirements. Two other petitions to list great hammerhead sharks are currently awaiting 90-day findings.

We did consider prohibiting all commercial and recreational shark fishing, which would include fishing for hammerhead sharks, in Alternative Suite A5 but rejected that alternative because prohibiting retention would curtail data collection for future stock assessments and other alternatives would meet the objectives of this Amendment with less significant adverse socioeconomic impacts. Generally, prohibiting hammerhead sharks from retention may not meet rebuilding goals because of the high at-vessel mortality rate of hammerhead sharks on bottom longline gear. Establishing regional TACs and quotas and quota linkages with aggregated LCS should rebuild the scalloped hammerhead stock while minimizing socioeconomic impacts because fishermen could still retain hammerhead sharks which otherwise would be discarded dead if there was a prohibition. We will continue to collect fishery-dependent and independent data to incorporate into stock assessments as well as incorporating new data sources when available and appropriate. .

Comment 24: We received comments that management measures should be coordinated across state, regional, and federal plans.

Response: Although this rulemaking addresses shark regulations in federal waters of the Atlantic Ocean, Gulf of Mexico, and Caribbean Sea, we closely consult with Regional Fisheries Management Councils and affected States to coordinate shark management to the greatest extent practical. Furthermore, federal shark commercial quotas take into account commercial landings from both federal and state waters. Applying all landings, regardless of catch location, to federal shark quotas helps keep total mortality below the TAC.

Comment 25: We received support for the preferred alternative suite's measures to manage all hammerhead sharks together under the same quota due to the similarity in appearance.

Response: Under the preferred alternative suite, we would include all hammerhead sharks under one quota that is divided between two regions. The quota was calculated by taking the scalloped hammerhead shark TAC from the stock assessment and subtracting recreational landings, commercial discards, and research set-aside mortality to establish a quota for commercial landings. Although this calculation provides a cap to scalloped hammerhead commercial landings that keeps mortality below the TAC, all hammerhead landings would count toward this calculated quota. The three hammerhead sharks are difficult to differentiate, with the most evident differences being small differences in the shape of the front of the head. Once the head has been removed and the carcass has been dressed, species identification becomes more

difficult. For this reason, all hammerhead shark landings would count toward the quota calculated using scalloped hammerhead shark-specific data. This would help prevent species misidentification from causing scalloped hammerhead shark mortality to exceed the TAC.

Comment 26: We received comments that the preferred hammerhead shark regional quotas would not reduce landings sufficiently to protect scalloped hammerhead sharks, particularly since the preferred quotas are very close to recent landings and commercial landings would not be significantly reduced.

Response: The stock assessment for scalloped hammerhead sharks by Hayes et al. (2009) determined a TAC under which overfishing for the species would end and rebuilding could occur. Under the preferred alternative suite, the commercial quota for hammerhead sharks was calculated by reducing this TAC by scalloped hammerhead shark recreational landings, the research set-aside mortality, and dead discards. The resulting commercial quota was divided between the two regions using historical landing proportions. The resulting regional hammerhead shark quotas ended up at levels near recent landings. This could lead to the misperception that we are not reducing mortality from commercial landings, despite an assessment that determined the scalloped hammerhead sharks are overfished with overfishing occurring. Two key details can help explain this perceived inconsistency. First, the stock assessment considered data through the year 2006. Since then, commercial landings for all hammerhead sharks, including scalloped hammerhead sharks are at a lower level for a variety of market and management reasons, including Amendment 2 to the 2006 Consolidated HMS FMP which reduced LCS trips limits.

Comment 27: One commenter stated that we should adopt the most precautionary TACs and BLL restrictions for Atlantic blacknose sharks.

Response: The TAC provided by the stock assessment would allow Atlantic blacknose sharks to rebuild by 2043 with a 70 percent probability of success. Under zero fishing mortality, the stock would have a 70 percent change of rebuilding by 2034. This rebuilding year under zero fishing mortality is greater than ten years; therefore, a generation time (9 years) is added to the rebuilding year of 2034 to provide a rebuilding target year of 2043, consistent with the Magnuson-Stevens Act. Under the TAC in the preferred alternative, Atlantic blacknose sharks have a 70 percent probability of rebuilding by 2043. This TAC provides a probability of rebuilding in line with our stated goals for rebuilding depleted stocks. For this reason, we adopted the TAC calculated in the stock assessment.

Different types of BLL effort controls were considered but not further analyzed in the DEIS including gear tending requirements, soak time restrictions, and hook restrictions. We decided to not further consider these actions due to enforcement and monitoring concerns, safety at sea issues, and since the effects of different types of hooks on shark species is not the same for all species, and their conservation benefit for some species is uncertain. For these reasons, we feel that setting a TAC and commercial quota, without further BLL effort controls, for Atlantic blacknose sharks will rebuild the stock. Blacknose shark dead discard estimates are calculated using BLL observer program data and these estimates are considered in the stock

assessment. Furthermore, in each region commercial dead discards of blacknose sharks are used to calculate the TAC so that total mortality from the commercial fishery is accounted for.

Comment 28: Some commenters stated that the Gulf of Mexico blacktip shark quota should be increased above recent landings since the stock is not overfished and overfishing is not occurring.

Response: The SEDAR 29 stock assessment for Gulf of Mexico blacktip sharks found that the stock is not overfished, that overfishing is not occurring, and that current mortality levels are likely sustainable. Beyond these conclusions, the stock assessment does not provide projections for future removal rates. Projections were completed by SEFSC scientists outside the SEDAR process and suggest that current removals are unlikely to lead to an overfished fish stock by 2040 and that higher levels of removal are unlikely to result in an overfished stock; however, the projection methodology for shark stocks that are not overfished is currently in development and has yet to be introduced and reviewed within the SEDAR process for this species. Therefore, these projections have a high degree of uncertainty, and SEFSC scientists noted that they were not peer-reviewed through the SEDAR process. For these two reasons, we do not prefer, at this time, to increase the Gulf of Mexico blacktip shark quota above recent landings.

Comment 29: We received a comment for a new alternative suite consisting of one hammerhead shark quota covering both regions or two quotas equally divided between the regions (Alternative Suite A3); establishing regional aggregated LCS quotas using the base quotas on highest annual landings in each region (method outlined in Alternative Suite A4); establishing a Gulf of Mexico blacktip quota of 1,992.6 mt dw (Alternative Suite A4); not establishing quota linkages (Alternative Suite A3); maintaining current blacknose shark and non-blacknose SCS quotas (Alternative Suite A1); and maintaining current recreational size limits (Alternative Suite A1) while increasing outreach and education efforts.

Response: In the FEIS, we created a new preferred Alternative Suite A6, which is a combination of Alternative Suites A2 and A3, and does not contain any of the measures suggested by the commenter. This preferred alternative suite is a balance between the rebuilding requirements of the Magnuson-Stevens Act by addressing the overfished and overfishing status, while minimizing the socioeconomic impacts to shark fishery participants. Alternative Suite A6 would establish a new hammerhead shark (great, scalloped, and smooth) management group with regional quotas calculated from the average annual landing percentage of hammerhead sharks by region. A separate hammerhead shark quota in each region would allow us to effectively monitor commercial landings of the species to keep mortality within the recommended TAC in the stock assessment and to rebuild within the parameters set by the rebuilding plan. Because hammerhead and Gulf of Mexico blacktip sharks are removed from the non-sandbar LCS management group in Alternative Suite A6, new regional aggregated LCS management groups that do not include those species, as appropriate, would be created. Since this management group has an unknown stock status in both regions, we created regional quotas based on average annual landings from 2008 through 2011 of the species remaining in the management group. Due to the stock status, we did not want to increase the quotas by establishing regional aggregated LCS quotas using the base quotas on highest annual landings in each region as outlined in Alternative Suite A4. The Gulf of Mexico blacktip shark quota would be established

based on average blacktip shark landings from 2008-2011 under Alternative Suite A6. Based on SEDAR 29, the stock assessment showed that current removal rates of Gulf of Mexico blacktip sharks are sustainable, and the subsequent projections, which were completed outside the SEDAR process, indicate that current removals are unlikely to lead to an overfished fish stock by 2040. SEFSC scientists calculated that an increase in mortality might be sustainable, but stated that these projections have a high degree of uncertainty and noted that they were not peer-reviewed through the SEDAR process. For these reasons, we do not prefer, at this time, to increase the Gulf of Mexico blacktip shark quota as in Alternative Suites A3 or A4. In Alternative Suite A6, we linked the quotas of shark species and management groups that are caught together to prevent incidental catch mortality from exceeding the TAC. The aggregated LCS and hammerhead shark quotas and the blacknose and non-blacknose SCS quotas would be linked in each region. The Gulf of Mexico blacktip shark quota would not be linked and the management group would open and close independent of the aggregated LCS and hammerhead shark management groups. The blacknose shark and non-blacknose SCS quotas were first linked by Amendment 3 to the 2006 Consolidated HMS FMP (NMFS 2010) and both quotas are administered as a single region across both the Atlantic and Gulf of Mexico. Since implementation of the Amendment 3, a blacknose shark fishery closure has only caused a closure in the linked non-blacknose SCS fishery once, the first year of implementation. For these fisheries, the quota linkages would not present any substantial impediments to full quota utilization. In addition, we would allow inseason regional quota transfers between regions for hammerhead shark and non-blacknose SCS management groups. Due to the stock assessment and quota linkage, we adjusted the blacknose and non-blacknose shark quota in Alternative Suite A6. We would create separate commercial quotas for Atlantic and Gulf of Mexico blacknose sharks based on the recent blacknose assessments conducted under the SEDAR 21 process, which determined that two separate stocks exist (Atlantic and Gulf of Mexico). In the Atlantic, we established a regional blacknose shark quota based on the stock assessment TAC. The assessment model for the Gulf of Mexico stock did not fit some of the input data, so we used current landings to determine the regional quota. Based on public comment, we would maintain the current recreational management measures on all authorized shark species, except for hammerhead sharks, and address any dusky shark rebuilding measures in a separate rulemaking. Based on the reasons above, we implemented a new preferred alternative suite, which will maximize the beneficial ecological impacts, while minimizing the adverse socioeconomic impacts to the fishery.

### **Quota Linkages**

Comment 30: We received several comments expressing support for the proposed quota linkages as a means to minimize incidental mortality after the quotas have been filled. We also received comments cautioning against the use of quota linkages due to concerns of creating a “choke” species that precludes landings of species with higher quotas. These commenters suggested that quotas linkages cause some quotas to close prematurely, reducing fishing opportunities at an economic cost.

Response: Quota linkages are designed to prevent incidental mortality of one species from occurring in another shark fishery after its management group has closed. For example, under the preferred alternative suite, in each region, the blacknose shark quota is linked to the

non-blacknose SCS quota. If landings of either stock or management group reaches, or is expected to reach, 80 percent of either quota, both management groups would close. If blacknose shark landings in one region trigger a quota closure, the non-blacknose SCS management group in that region would close as well. This would prevent blacknose mortality in the directed non-blacknose SCS fishery from occurring after the quota has been filled. We agree with some of the commenters that this management approach can offer benefits in some cases, specifically for blacknose sharks and non-blacknose SCS in both regions and hammerhead sharks and aggregated LCS in both regions. Analyses in Amendment 3 to the 2006 Consolidated HMS FMP indicated that fishermen can avoid blacknose sharks. The quota linkage between blacknose sharks and non-blacknose SCS management groups, which has been in effect since implementing that amendment, has only been triggered once, in the first year of effectiveness, which reflects the Amendment 3 analysis. The regional hammerhead shark and aggregated LCS quota linkages could result in closure of one of the management groups before its quota is filled, but we anticipate that quotas will be reached at approximately the same rate. Unharvested quota does result in some negative economic impacts, but the protections provided by the quota linkage are important to end overfishing and rebuild stocks. However, as described in Chapter 2 under the preferred alternative suite, we do not expect the hammerhead shark quota in either region to be filled at a significantly faster rate than the aggregated LCS quota. The preferred aggregated LCS quota is set equal to average annual landings in each region from 2008-2011. The preferred hammerhead quota was set using the TAC from the Hayes et al. (2009) stock assessment after accounting for all sources of mortality, but the result are quotas that are slightly higher in both regions than average annual landings from 2008-2011. If fishing continues in a similar fashion to the years 2008-2011, both quotas in each region should fill at about the same rate, reducing the chances of premature management group closures. Although the two quotas would likely be filled at the same rate, we still prefer to link the quotas to provide extra protection for scalloped hammerhead sharks. As described in Chapter 2, scalloped hammerhead sharks are often caught with aggregated LCS. If the hammerhead shark quota is filled more quickly than usual, linking the quotas will provide protection for scalloped hammerhead sharks in the aggregated LCS fishery.

After considering comments provided during the public comment period and analyzing updated data, we no longer prefer to link the Gulf of Mexico blacktip quota to the Gulf of Mexico aggregated LCS and hammerhead shark quotas. In this region, the blacktip shark and aggregated LCS quotas would be set equal to average annual landings from 2008-2011. The preferred Gulf of Mexico hammerhead shark quota would be set using the TAC from the Hayes et al. (2009) stock assessment after accounting for all sources of mortality, but the result are quotas that are slightly higher in both regions than average annual landings from 2008-2011. If fishing continues in a similar fashion to the years 2008-2011, all three quotas in this region should fill at about the same rate. Furthermore, aggregated LCS and hammerhead sharks are caught in small amounts on trips targeting Gulf of Mexico blacktip sharks, so this should not affect the mortality rates of hammerhead sharks. As long as the quotas do fill at about the same rate, significant additional mortality of aggregate LCS and hammerhead sharks should not occur after these management groups close. Dead discards of scalloped hammerhead sharks in the greater LCS fishery have already been factored into the preferred hammerhead shark quota. As a safeguard, the preferred alternative suite would provide us with a mechanism to close the Gulf of Mexico

blacktip shark management group after the hammerhead shark fishery closes if high levels of scalloped hammerhead shark mortality were occurring.

To try to prevent closures with quota remaining to the extent possible, the preferred alternative suite would also allow for the transfer of hammerhead shark quota and non-blacknose SCS quota between regions. The quotas for these two management groups were split for quota linkage purposes and not because of differences in stocks. If one of the regional quotas is filling more quickly than the other, we could transfer quota between regions to maximize access to the resource. When considering quota transfers, we would follow a set of criteria as outlined in Chapter 2. A full analysis of economic impact of quota transfers is available in Chapter 4.

Comment 31: We received comments that instead of implementing quota linkages, we should instead deduct the estimated incidental mortality that would occur after a quota closure, and deduct it from the commercial quota.

Response: Dead discards have already been factored into the quotas where quota linkages would be implemented under the preferred alternative suite: the blacknose sharks and non-blacknose SCS quotas in each region and the aggregated LCS and hammerhead shark quotas in each region. The blacknose shark and non-blacknose SCS quotas were first linked by Amendment 3 to the 2006 Consolidated HMS FMP and both quotas are administered as a single region across both the Atlantic and Gulf of Mexico regions. The blacknose shark quota was established based upon a recent stock assessment. The non-blacknose SCS quota was based on average landings for finetooth, Atlantic sharpnose, and bonnethead sharks. This approach for the non-blacknose SCS quota was used to ensure that fishing mortality of those species would not be increased, consistent with the 2007 SCS stock assessment. This action, although reconsidering the blacknose shark quotas, would only split the non-blacknose SCS quota between the two regions without impacting the dead discard mitigation measures implemented through Amendment 3. Since implementation of the Amendment 3, a blacknose shark fishery closure has only caused a closure in the linked non-blacknose SCS fishery once, the first year of implementation. For these two fisheries, the quota linkage has not presented any substantial impediments to full quota utilization.

Similarly, the aggregated LCS and hammerhead shark quotas in each region would likely be harvested at about the same rate. Both regional aggregated LCS quotas were set equal to average annual landings from 2008-2011. Both regional hammerhead shark quotas were established using the TAC, reduced by non-commercial landings sources of mortality, and then divided among the regions. The resulting commercial quotas are at a level slightly above average annual hammerhead shark landings from 2008-2011. Since both the aggregated LCS and hammerhead quotas are at or slightly below average annual landings, both should be taken at about the same rate and the quota linkages should not present any substantial impediments to full quota utilization.

As noted in our response to Comment 30, we no longer prefer to link the Gulf of Mexico blacktip shark management group to the aggregated LCS and hammerhead shark management groups. All three quotas should be harvested at about the same rate, so the blacktip management group closure would likely occur shortly before or after the hammerhead shark management

group closure. The hammerhead shark quota has also already considered dead discards from a variety of fisheries, including the non-sandbar LCS fishery, of which Gulf of Mexico blacktip sharks are currently a part.

Comment 32: Several commenters, including the Florida Fish and Wildlife Commission, noted that quota linkages could also result in fishermen discarding the species with the smaller quota (sometimes referred to as a “choke species”) to avoid closure of the larger fishery , resulting in unreported dead discards.

Response: The regional aggregated LCS and hammerhead shark quota linkages under the preferred alternative suite are unlikely to result in excessive discards. As discussed in Chapter 2, we expect these two quotas to be harvested at about the same rate, dis-incentivizing discards of hammerhead sharks to keep the aggregated LCS fishery open. Therefore, because the quotas of these management groups are expected to be filled at about the same time we do not expect one management group to overwhelmingly act as a “choke species” on the other management groups.

Currently, the blacknose shark and non-blacknose SCS quotas are linked. These quotas are administered across both regions, but the preferred alternative in this Amendment would separate both into Atlantic and Gulf of Mexico regions. Since implementation of the blacknose shark and non-blacknose SCS quota linkage, we have not received information about excessive discards. When analyzing the impacts of this quota linkage in Amendment 3 to the 2006 Consolidated HMS FMP, we found that fishermen were largely able to avoid blacknose sharks. Furthermore, dead discard estimates from observer programs are collected and factored into the SEDAR 21 stock assessment and will be factored into future assessments as well. For these reasons, total mortality would still be accounted for.

Comment 33: We received comments that we should send updates to dealers and give advanced notice regarding the landings of hammerhead sharks to minimize the risk of a premature aggregated LCS management group closure.

Response: Currently, we send periodic shark landings updates to all interested parties and post these updates online throughout the year. All members of the public have access to these landings updates. As of January 1, 2013, dealers are now required to report all HMS, including sharks, electronically. This new requirement will produce more timely information and can provide more frequent shark landings reports for all interested parties, including dealers. Upon implementation of this amendment, we will also provide landings updates of all management units, including the hammerhead shark management group.

Comment 34: One commenter expressed concern that quota linkages could provide a mechanism for an individual or group to obtain fishing and dealer reports and close shark fisheries through false landings reports.

Response: This type of activity is unlikely. We review logbook and dealer reports regularly and would likely notice these types of reports. Irregularities in the reported information including excessive landings or unusual fishing operations would flag these reports for further review. Furthermore, quota linkages are unlikely to make this practice more effective. If this

action was possible, quota linkages would not increase the effectiveness. Finally, falsifying federal reports is unlawful and penalties would likely dissuade an individual or group from carrying out this type of activity.

Comment 35: The Florida Fish and Wildlife Commission suggested that the proposed management approach on dusky sharks may have significant impacts on hammerhead sharks, and recommends that a more comprehensive management approach be developed that considers sandbar, dusky and hammerhead sharks together.

Response: The recent dusky shark stock assessment (SEDAR 21) determined that dusky sharks are overfished with overfishing occurring. Measures to end overfishing and rebuild this species were included in the DEIS for this action but, as detailed in the Chapter 1, will not be addressed in this rulemaking but will instead be addressed in the upcoming Amendment 5b to the 2006 Consolidated HMS FMP. The measures in that rulemaking to reduce mortality of dusky sharks could have an impact on hammerhead shark mortality; however, any impact would likely be quite low. Dusky sharks and hammerhead sharks are rarely caught together since they largely interact with different gears (pelagic longline for dusky sharks and bottom longline for hammerhead sharks). Furthermore, any measures to reduce mortality of dusky sharks in the pelagic longline fishery is unlikely to affect hammerhead sharks since the retention of hammerhead sharks caught with pelagic longline gear is already prohibited (76 FR 53652). Finally, as detailed in Chapter 1, we need to address overfishing on scalloped hammerhead sharks and implement a rebuilding plan based on a timeline mandated in the Magnuson-Stevens Act. For that reason, we cannot delay action until dusky shark overfishing is addressed.

## **Recreational Issues**

Comment 36: We received a comment stating that since recreational shark fishing is mostly catch-and-release, anglers should be allowed to occasionally land a shark that is not overfished for personal consumption.

Response: Recreational anglers with an HMS Angling Permit or HMS Charter/Headboat Permit are currently allowed to retain one authorized shark per vessel per trip as long as the shark meets the 54 inch minimum size requirement and one additional Atlantic sharpnose and one bonnethead per person per trip with no minimum size. The preferred alternative suite presented in the FEIS increases the minimum size for hammerhead sharks but otherwise does not change these regulations. As such, recreational fishermen would still be allowed to land a limited number of sharks for personal consumption.

Comment 37: We received a comment that many shark species are not good candidates for a catch-and-release fishery and that the proposed minimum size increase could be dangerous and increase discard mortality.

Response: We recognize that an increase in minimum size could cause some safety concerns given the larger size of sharks retained and difficulties associated with bring them onboard and may increase discard mortality. However, we believe that increasing the minimum size as in the preferred Alternative Suite A6 would ensure that only larger hammerhead sharks be

landed and that as the scalloped hammerhead stock rebuilds, increased fishing opportunities may result in the long-term. Furthermore, the increased minimum size would ensure that only larger or “trophy” sized sharks are landed. Post-release mortality rates of sharks in the recreational fishery are generally believed to be low when injuries from hooking and releasing the shark are minimized.

Comment 38: The regulations should be split into three sectors: commercial, recreational, and charter/headboat.

Response: Splitting the current regulations into three sectors as suggested by this comment was not an alternative that was analyzed in the DEIS. Therefore, we cannot make this change at this time in the FEIS. However, we will take this option into consideration in future amendments.

Comment 39: NMFS should divide the HMS recreational permits to separate shark permits from tuna and other HMS permits. Permits should be issued to the individual rather than the vessel. NMFS should also consider requiring operator permits.

Response: In preparing this FEIS, we considered this recommendation to split the HMS recreational permits apart by species, issuing individual and not vessel permits, and requiring operator permits, but found that it was not considered “reasonable” under the NEPA Screening Criteria (see Chapter 2 of the DEIS). Specifically, the alternative is not administratively feasible under current budget restrictions and costs associated with this recommendation require additional resources not available at this time. HMS Angling permits were originally authorized to allow recreational fishing activities for all HMS species (sharks, swordfish, tunas, and billfish) to simplify the permitting process, as some anglers may wish to fish for a variety of HMS species. Additionally, recreational fishing for large pelagic species often results in capture of tunas, swordfish, billfish, or sharks on a given trip. Since Atlantic HMS regulations require permits for species that are likely to be caught, having a single recreational permit for all HMS ensures that a vessel owner is properly permitted in event that an HMS is caught. This system allows for effective management of the recreational fishery at this time. While we do not currently consider this alternative reasonable, we will take these options into consideration in future amendments.

Comment 40: One commenter supported the approach in Alternative Suite A4 that would set species-specific quotas for recreational fisheries.

Response: We considered species-specific shark quotas for the recreational fishery under Alternative Suite A4. Species-specific shark quotas have not been implemented in the recreational fishery due to the difficulty in estimating recreational landings in real-time. Currently, anglers are limited to one authorized shark species per vessel per trip and one Atlantic sharpnose and one bonnethead shark per person per vessel per trip. We determined that Alternative Suite A4 would have minor, beneficial ecological impacts on sandbar sharks, which are currently sometimes landed (though prohibited) due to misidentification by anglers. However, we felt that increasing outreach, an identification guide, and increasing the hammerhead shark minimum size limit would result in beneficial long-term ecological impacts.

Due to the administrative difficulties in establishing and monitoring numerous species-specific recreational quotas at this time, we do not prefer this alternative at this time.

Comment 41: The Florida Fish and Wildlife Conservation Commission does not support that claim that NMFS needs to reduce the recreational mortality of blacknose sharks to meet the rebuilding target for the established total allowable catch. Reductions in recreational mortality are likely not needed as harvest reductions in the Atlantic blacknose shark fishery due management measures in Amendment 3 to the 2006 Consolidated HMS FMP implemented in 2010 were not taken into account for the 2010 stock assessment for Atlantic blacknose, and it is highly questionable that Atlantic blacknose sharks are overfished and experiencing overfishing at this time.

Response: In the calculation of total allowable catch and quotas, we examined 2011 data for commercial landings. The results of the SEDAR 21 stock assessments for blacknose sharks showed the overfished/overfishing status of blacknose sharks in the Gulf of Mexico region is currently unknown and blacknose sharks are overfished and experiencing overfishing in the Atlantic region. The commercial blacknose quota in the Atlantic region is based on the TAC from the SEDAR 21 stock assessment after deducting other sources of mortality including recreational landings. Since the status is unknown in the Gulf of Mexico region, the commercial quota is based on landings capped at a level already reduced since the implementation of Amendment 3 to the 2006 Consolidated HMS FMP. Under the preferred Alternative Suite A6 in the FEIS, current recreational size and retention limits would remain 54 inches fork length, except for the recreational minimum size for hammerhead sharks, which would increase to 78 inches fork length. Blacknose sharks rarely, if ever, reach 54 inches fork length as a maximum size. Blacknose sharks would not be explicitly prohibited, and states may continue to allow recreational landings of blacknose sharks. We believe that these current regulations would continue to provide adequate protection for blacknose sharks in the commercial and recreational fishery. The preferred alternative also includes additional outreach to recreational anglers on identification of sharks.

Comment 42: NMFS needs to be more involved in fishing tournaments.

Response: We require any fishing competition involving Atlantic HMS in which participants must register or in which a prize/award is offered for catching or landing HMS to register their tournament with the HMS Management Division of NMFS at least four weeks prior to the start of the tournament. At that time, the HMS Management Division provides tournaments with copies of compliance guides and recreational placards. The NMFS SEFSC notifies tournament organizers if their tournament has been selected for reporting and all reporting forms must be sent to SEFSC within seven days of the tournament ending. Additionally, NMFS NEFSC often samples sharks landed at shark fishing tournaments and provides outreach to anglers as needed. Tournament operators are responsible for ensuring that anglers are aware of and consistent with federal regulations. Currently, we hold shark identification workshops that are mandatory for shark dealers, although other parties can attend, and have recreational shark identification placards that categorize the differences between the recreational sharks. The placards can be attained on the HMS website (<http://www.nmfs.noaa.gov/sfa/hms/sharks/>) or by contacting the HMS Management Division at

301-427-8503. We are also working on an identification guide for all the prohibited shark species to help with this outreach. Measures in this action will also increase outreach and education on shark identification and recreational measures.

Comment 43: We received a number of comments recommending that NMFS require circle hooks in recreational shark fisheries. The Mid-Atlantic Fishery Management Council recommended that circle hooks be required in shark fishing tournaments. One commenter suggested requiring non-offset circle hooks with natural bait.

Response: We currently do not have hook requirements in the shark recreational fishery, but require the use of circle hooks in billfish tournaments where billfish fishery-specific data indicated a substantial decrease in white marlin mortality when circle hooks were used. The effect of circle hooks is not the same for all species, and their conservation benefit for some species may be mixed (as discussed in Section 2.2 Alternatives Considered but not Further Analyzed in Chapter 2 of the DEIS). We are not aware of any shark-specific research demonstrating the performance of circle hooks in reducing shark mortality in recreational fisheries. We may consider this action, as appropriate, in future amendments.

Comment 44: Texas Parks and Wildlife expressed concern about the level of illegal shark fishing occurring that involves foreign fishing vessels operating illegally in US waters and asserted that the number of sharks harvested illegally far exceeds the landings that Texas has seen in recreational, commercial and/or gear combined.

Response: NOAA and the U.S. Coast Guard are actively working to address illegal fishing vessel incursions into U.S. waters, and NMFS has begun including illegal catches from the border of Texas and Mexico in stock assessments to ensure we are considering all sources of mortality. Illegal fishing is of high concern to us as this capture undermines management and rebuilding strategies, makes stock assessments and capture data less reliable for science, and hurts legal fishermen.

Comment 45: The same laws should apply to commercial or recreational fishermen fishing on boats as those fishing from shore.

Response: Fishermen fishing for sharks from shore are subject to state regulations as they are fishing in state waters. If fishermen are harvesting Atlantic sharks in federal waters, they are required to hold an HMS permit. HMS permit holders must abide by all applicable federal regulations, regardless of where fishing occurs, including in state waters. However, when fishing in the waters of a state with more restrictive regulations, the more restrictive state regulations apply.

Comment 46: Charter boat operators should be able to harvest sharks if the season is open.

Response: Under the HMS Charter/Headboat permit, most Charter/Headboat operators fish under the recreational retention limits for sharks and follow the same retention limits and size limits as would any angler. However, if the vessel has been issued both an HMS Charter/Headboat permit and a commercial shark permit, the vessel operator is allowed to land

commercial limits and use commercial gear types under certain conditions. More information is provided in the HMS 2012 Recreational Compliance Guide.

Comment 47: NMFS received comments supporting an increase in minimum fork length to 78 inches for hammerhead sharks as considered in Alternative Suite A3. One commenter expressed concern that the proposed length of 96 inches is too large for great hammerhead sharks, although appropriate for scalloped and smooth hammerheads. Another commenter suggested that the minimum size for hammerheads be increased to 96 inches fork length or that NMFS should add the species to the prohibited species list.

Response: This recommendation is part of our new preferred Alternative Suite A6 in the FEIS. The larger recreational size limit would limit the retention of scalloped hammerhead sharks to mature individuals. Also, we would include all hammerhead species together for this alternative due to identification issues. Hammerhead sharks are difficult to identify for even experienced fishermen, particularly when dressed with the head removed. We found that this action, as proposed in Alternative Suite A3, would be unlikely to impact tournaments, as participants typically target larger sharks than other recreational fishermen and many tournaments have minimum shark sizes greater than 54 inches fork length. Additionally, increasing the recreational size limit for hammerhead sharks would ensure that only larger, trophy sharks would be landed. The size increase is necessary to end overfishing and rebuild the scalloped hammerhead stock. As the scalloped hammerhead shark stock rebuilds, future fishing opportunities are likely to increase. Due to the difficulty of distinguishing between the different hammerhead shark species, we believe that it is important to have the same minimum size across the three hammerhead shark species. We do not feel that an increase to 96 inches fork length is appropriate at this time.

Comment 48: We received a number of comments recommending that NMFS increase the shark minimum fork length to 72 inches. Commenters suggested 72 inches as a compromise between the current minimum size of 54 inches and the proposed minimum size of 96 inches.

Response: We did not consider a shark minimum size increase to 72 inches fork length in the DEIS because there is no biological reason we are aware of for a 72 inches minimum size. The current minimum size of 54 inches was established due to the size-at-maturity for sandbar sharks. We proposed an increase to 96 inches fork length minimum size due to the size-at-maturity for dusky sharks, which are no longer considered under this amendment. The 78 inches fork length increased minimum size for hammerhead sharks in the preferred alternative is due to the size-of-maturity for scalloped hammerhead sharks.

Comment 49: We received comments that an increase in minimum size limit for all recreationally caught sharks would essentially eliminate the recreational fishery for blacktip sharks as they are smaller sharks. Commenters suggested that blacktip sharks be exempt from the minimum size limit in the Gulf of Mexico region.

Response: We understand the concerns with blacktip sharks specifically with regards to an increase in minimum size as the Gulf of Mexico blacktip shark stock was found to be not overfished and not experiencing overfishing. According to the most recent stock assessment,

current fishing rates are sustainable, and the current quotas maintain these rates. If we exempted Gulf of Mexico blacktip sharks for the recreational minimum size, this would increase mortality on these sharks. The preferred Alternative Suite A6 in the FEIS does not increase the minimum size for blacktip sharks. We may consider exempting Gulf of Mexico blacktip sharks from the minimum size limit in the future.

Comment 50: We should increase the recreational size limit to 60 inches fork length, since some 54 inches fork length mako sharks weigh only 70 lb and that is pretty small for a keeper.

Response: We considered increasing the minimum size to 96 inches fork length for all sharks in recreational fisheries or 78 inches fork length for hammerhead sharks in the DEIS. The Preferred Alternative Suite A6 in the FEIS does not increase the minimum size for mako sharks. In 2012, ICCAT conducted a stock assessment of shortfin mako sharks, which found that shortfin mako sharks are not overfishing and that overfishing is not occurring. Therefore, additional action on shortfin mako sharks is not needed at this time.

Comment 51: We received a number of comments in support of mandatory reporting of recreational landings especially if this data would improve stock assessments. Many commenters, including state agencies Maryland Department of Natural Resources, Florida Fish and Wildlife Conservation Commission, and South Carolina Department of Natural Resources, supported reporting requirements for hammerhead sharks specifically and suggested having information on reporting included on permits and through the HMS online non-tournament reporting system.

Response: Despite many public comments in favor of mandatory reporting of recreational landings, particularly of hammerhead sharks, we have determined to not move forward with this requirement at this time. Estimates of recreational mortality for hammerhead sharks will continue to occur via existing surveys (LPS/MRIP), which NMFS has determined is sufficient for immediate rebuilding purposes, as set out in Alternative Suite 6 (the Preferred Alternative). Recreational shark reporting measures will be further addressed in Amendment 5bwe removed dusky shark regulations and measures from the current action, mandatory reporting of all recreationally landed sharks, not just hammerhead sharks, may be considered in a future action.

Comment 52: We received many comments that strongly supported NMFS' proposal to increase outreach, education, and shark identification training to recreational anglers and tournament participants. Many commenters had specific suggestions for NMFS to improve these efforts. The State of Maryland, South Carolina Department of Natural Resources, Florida Fish and Wildlife Conservation Commission, and the Mid-Atlantic Fishery Management Council expressed their support and suggestions as well. Specific suggestions include: publishing information in sport fishing magazines and websites; send identification placards to all HMS recreational fishing permit holders; hold public seminars; post placards at marinas, fishing jetties, and piers; have identification guides focus on key morphological characteristics of species; and restructure the HMS recreational permits so that anglers cannot harvest sharks without an "endorsement" that can only be received after shark identification training. For charter/headboat

operators, one commenter recommended that NMFS create shark identification videos and post them to popular video-sharing sites and require charter boat permit holders to show to customers. This commenter also suggested that videos of the top five most frequently caught and top five overfished sharks with specific characteristics to look for and instructions on how to differentiate between similar looking species be sent to the Regional Fishery Management Councils. The South Carolina Department of Natural Resources recommended that NMFS emphasize better enforcement of the regulations already in place. One commenter expressed concern about surf-fishermen in Delaware where shark interactions are high and suggested that NMFS have outreach information and shark identification placards at these beaches. One commenter emphasized the need for NMFS to increase outreach to tournaments, especially as some are not registered with HMS. This commenter suggested that placards and checklists be sent to tournament operators and that NMFS check with state enforcement officials or state Sea Grant offices to ensure tournament registration. One commenter also provided suggestions for how to distinguish between different hammerhead shark species. Many emphasized that benefits from increased outreach efforts by NMFS would improve the quality of species-specific catch data for future assessments.

Response: We agree with all commenters that additional outreach and education, particularly to recreational anglers, is important to the success of recreational regulations and in ensuring the sustainability of recreational fishing. We greatly appreciate the many suggestions by commenters on how to improve education and outreach and will take these under consideration. Preferred Alternative Suite A6 in the FEIS would allow for such activities to occur. Currently, we hold shark identification workshops that are mandatory for shark dealers, but others can attend, and have recreational shark identification placards that categorize the differences between the recreational sharks. The placards can be attained on the HMS website (<http://www.nmfs.noaa.gov/sfa/hms/index.htm>) or by contacting the HMS Management Division at 301-427-8503. Additionally, we are currently working on a similar placard for all the prohibited shark species to help with this outreach. In the future, we could increase cooperation with states to improve identification of species in state waters as a larger portion of the recreational catches of some species occurs in state waters. It may also be necessary to work with states to ensure consistent regulations and enforcement.

### **Economic Impacts**

Comment 53: We received several comments regarding the adverse economic impact of proposed recreational measures on the Charter/Headboat fishery including one from the Mississippi Department of Marine Resources highlighting the importance of the large coastal shark fishery to the livelihood of Charter/Headboat captains.

Response: We agree that the large coastal shark fishery is important to the HMS Charter/Headboat industry; the new preferred alternative suite to raise the minimum size limit on hammerhead sharks (great, smooth, and scalloped) would have minimal impact on the Charter/Headboat fleet. Recreational regulations would remain the same for all other shark species, and the preferred hammerhead shark regulations would only apply to three hammerhead shark species. Furthermore, the preferred minimum size limit could potentially create a trophy fishery for hammerhead sharks while ensuring the continued sustainability of the hammerhead

shark stocks, which could lead to positive long-term economic impacts for the Charter/Headboat fishery.

Comment 54: While reducing catch limits may have an immediate negative economic impact, the impact on shark stocks in the long-term will only be positive.

Response: We agree that the preferred catch limits and quotas would have a positive impact on the long-term sustainability of the associated shark stocks. Additionally, while the preferred quota reductions will have some minor short-term adverse economic impacts, their long-term economic impacts should be positive as they allow for rebuilding of overfished stocks.

Comment 55: NMFS is incorrect that the impacts of these proposals will have a neutral effect on the surrounding resources yet will have a minor effect on the social and economic impact of fishermen and their communities. You will see that the current regulations are having a severe negative impact on the surrounding resources as is evidenced by the multitude of damaged and wasted fish due to shark predation.

Response: Under the Magnuson-Stevens Act, we must manage all our Nation's marine fisheries for optimal yield and end overfishing of all fish stocks, including shark fisheries. Current regulations are established under the MSA to manage all our Nation's marine fisheries for optimal yield and to rebuild overfished fish stocks for all fisheries, including sharks. We work closely with the regional fisheries management councils to ensure actions in the HMS fisheries do not jeopardize the continued existence of other fisheries. The cumulative direct and indirect impacts on EFH, predator/prey relationships, and protected resources would be neutral for the short-and long-term because commercial quotas would be similar to current levels and fishing pressure is not expected to change. Sharks are a natural and integral part of the marine ecosystem, and commercial and recreational shark fisheries provide significant positive economic impacts to our coastal communities.

When taken as a whole, the preferred alternative would likely have direct short- and long-term minor adverse socioeconomic impacts. These impacts would mostly affect fishermen targeting scalloped hammerhead and blacknose sharks, because the quotas would be reduced. These fishermen are likely to adapt to the new regulations by fishing in other fisheries, or changing their fishing habitats. Recreational management measures would increase the size limit on hammerhead sharks and cause fishermen to catch and release more hammerhead sharks, although tournament participants should not be impacted. Neutral socioeconomic impacts are expected for fishermen targeting the aggregated LCS and non-blacknose SCS management groups since the quotas are based on the average landings for each species.

Indirect short-term minor adverse socioeconomic impacts would likely result from this alternative suite's actions. The measures in this alternative suite adjust quotas based on new scientific information and would impact shark landings. Consequently, it is possible that dealers and supporting businesses such as bait and tackle suppliers may experience minor adverse impacts in the short-term, but since they do not rely solely on the shark fishery and buy from and sell to a variety of fisheries, the impacts are expected to neutral in the long-term. The changes to quotas would impact fishermen retaining certain shark species, but the changes are small enough

that dealers and supporting businesses are unlikely to experience impacts from this alternative suite and its effects are therefore expected to be neutral.

Comment 56: The EPA says that while they appreciated NMFS' effort to evaluate the potential economic impact on these communities, more research is needed to address the impact on the fisherman, especially if these proposed limitations will have a disproportionate economic impact on minority and/or low-income populations.

Response: We agree that it is important to assess the economic impacts of regulatory actions on minority and/or low-income populations. However, the preferred alternative suite is expected to have neutral or minor adverse economic impacts at worst, and positive long-term impacts as overfished shark populations are rebuilt. As such, these measures will benefit everyone affected in the long-term. Our analyses of economic impacts used the best data available at this time, and, in future rulemakings, we will use more specific data regarding economic impacts on minority and/or low-income populations if it becomes available. We continue to support the development of methods to identify whether proposed amendments will have disproportionately high adverse impacts on minority or low income populations, as appropriate.

### **Concerns Regarding the DEIS**

Comment 57: The DEIS document is over 600 pages and very difficult to understand at times, especially the information, data, and its sources.

Response: We recognize that the DEIS was large and complex because it contained a complete range of alternatives for rebuilding for multiple shark stocks. The removal of the dusky shark measures to a future action has reduced the number of alternatives in the FEIS, and we have made a concerted effort to explain these measures, and their impacts, using language that is as clear and concise as possible.

Comment 58: We received comments that pointed out typographical errors and other errors in the DEIS.

Response: We appreciate these comments and have made the appropriate edits in the FEIS.

Comment 59: The EPA recommended that NMFS provide the reader with a better understanding of when the agency has received the same comment multiple times, thus helping the reader with further public comment.

Response: We appreciate the EPA's comment and made a point to note in the FEIS that we received numerous public comments on the dusky shark measures in the DEIS. In part, these comments helped us make the decision to remove the dusky shark measures from this rulemaking and re-evaluate and analyze approaches to rebuild dusky sharks in an upcoming proposed action.

Comment 60: The EPA commented that NMFS provided a clear and understandable table summarizing preferred alternatives for each shark species.

Response: We appreciate the EPA's comment and note that Table 0.1 in the Executive Summary of the FEIS contains a table that clearly summarizes the preferred alternative suite as well as changes from the DEIS and the reasons for those changes.

Comment 61: The State of North Carolina and Atlantic States Marine Fisheries Commission (ASMFC) recommended moving forward with management measures to achieve ending overfishing for scalloped hammerhead and delaying other measures until they can be more fully analyzed, and emphasized that NMFS should delay the measures to end dusky shark overfishing.

Response: We appreciate the State of North Carolina's and the ASMFC's comment and have removed the dusky shark measures from this rulemaking to re-evaluate and analyze approaches to rebuild dusky sharks in an upcoming proposed action. We did not receive substantive comment to delay any of the measures proposed in the DEIS for blacknose, sandbar, or Gulf of Mexico blacktip sharks; therefore, we are moving forward with these management measures, as well as the management measures to rebuild scalloped hammerhead sharks, in this amendment.

Comment 62: We received a number of requests to extend the DEIS comment period for 45 days. Some of the reasons for this request included additional time for data analysis and extra time for fishermen impacted by Super Storm Sandy to read and comment on the document. The ASMFC was concerned that the two-year rebuilding timeline for scalloped hammerhead sharks would be cited as a reason not to extend the comment period.

Response: We did not extend the DEIS comment period, in part in an attempt to meet our Magnuson-Stevens Act requirement to establish a rebuilding plan within two-years after a stock has been determined to be overfished. Also, the requests to extend the comment period for additional data analysis and public comment were mainly concerned with the dusky shark measures that were included in the DEIS. We would not have been able to complete additional dusky shark data analyses or develop additional measures based on public comment within a 45-day extension of the comment period. Therefore, we decided to remove the dusky shark measures from this rulemaking to re-evaluate and analyze approaches to rebuild dusky sharks in an upcoming proposed action. This will allow us to conduct further data analysis for dusky shark rebuilding measures and allow the public ample opportunity to comment on these upcoming proposed measures, while continuing on the with Amendment A5a to establish a rebuilding plan for scalloped hammerhead sharks.

## **General Comments**

Comment 63: The proposed regulations drive regulatory discards, contribution to mortality over established limits and overfishing. Waste of sharks and inefficiencies from derby rules (e.g., trip limits and market gluts) are in conflict with National Standards 1, 8, 9, and 10.

Response: While conducting assessments and in calculating TACs and quotas, we take regulatory discards into account. As described in Chapter 2, dead discards of scalloped hammerhead sharks are already considered under the TAC. The quota linkages in preferred Alternative Suite A6 are necessary in these multispecies fisheries to ensure that the TAC of shark species under a rebuilding plan is not exceeded and to minimize regulatory discards, to the extent practicable. To allow maximum access to the Gulf of Mexico blacktip shark resource, the preferred alternative suite would allow us to open and close the Gulf of Mexico blacktip shark management group independently of the hammerhead shark and aggregated LCS management groups. We also do not anticipate increased discards in the recreational fishery, as the increase in minimum size to 78 inches fork length is limited to hammerhead sharks.

As part of this FEIS, we have analyzed the consistency with the National Standards and found the action to meet them all. The preferred alternative suite would be consistent with National Standard 1 because it would implement adjustments to mortality levels consistent with the stock assessments for blacknose, blacktip, and scalloped hammerhead sharks that would allow fishermen to harvest optimum yield for these species while allowing for rebuilding and preventing overfishing. With respect to National Standard 8, the preferred alternative strikes an appropriate balance between positive ecological impacts that are necessary to rebuild and prevent overfishing on depleted stocks while minimizing, to the extent practicable, the severity of negative social and economic impacts that will occur as a result of these actions. For National Standard 9, the preferred alternative suite considers bycatch while focusing on capping fishing mortality. The preferred quota linkages would prevent bycatch of sharks by opening and closing shark management groups at the same time to prevent excessive mortality of one species to occur due to incidental capture while targeting other shark species. Additionally, the bycatch of hammerhead sharks while fishing for Gulf of Mexico blacktip sharks was explicitly analyzed under the quota linkage section in Alternative Suite A6. No impact to safety of life at sea is anticipated to result from the preferred alternative suite, meeting National Standard 10. Please see Chapters 2, 4, 6, and 10 for more information.

Comment 64: We received several comments expressing support for us to accelerate the rulemaking process for Amendment 6 to the 2006 Consolidated HMS FMP, which would consider catch shares in some or all of the Atlantic shark fisheries. Some commenters suggested that we should wait to implement the measures in this rulemaking until Amendment 6 is implemented, citing the possibility of increased accountability in the fishery and decreased incentives for discards of sharks.

Response: We are currently working on Amendment 6 to the 2006 Consolidated Highly Migratory Species Fishery Management Plan. Under current limited resources, we do not have the ability to work on both Amendment 6 and Amendment 5 simultaneously. Since statutory mandates require us to implement a rebuilding plan to rebuild overfished species (in this case, scalloped hammerhead sharks) within two years of a stock status determination that the stock is overfished, we must complete this amendment prior to development of Amendment 6 to the 2006 Consolidated HMS FMP. We will consider the issues raised in this comment as we develop draft Amendment 6 to the 2006 Consolidated HMS FMP.

Comment 65: We need to provide clear objectives to both recreational and commercial fisherman to describe what a successful rebuilding plan would look like. What would need to happen for us to increase TACs or bring back the former minimum size limits?

Response: The Magnuson-Stevens Act National Standards bind us to meet certain standards when making fisheries management decisions. National Standard 1 requires us to end overfishing while achieving, on a continuing basis, optimum yield from each fishery. National Standard 8 states that conservation and management measures shall take into account the importance of fishery resources to fishing communities. As mentioned in other comments, we continually monitor stocks of all species under our jurisdiction and promptly begin the rulemaking process should one of these stocks be determined to be overfished or have overfishing occurring based on the results of a stock assessment. As management measures for overfished stocks result in stock rebuilding, we will be able to revisit TACs, minimum size limits, and other management measures to provide more fishing opportunities, consistent with legal requirements.

Comment 66: The current shark regulations have caused the shark populations to increase and cause a direct negative impact on other fishery stocks. Due to the high predation from the abundant sharks, profits in other commercial fisheries have declined on every trip. Not only does this create more discards and waste of our resources, it has a direct impact on the increased cost of fishing due to lost gear.

Response: We are required under the Magnuson-Stevens Act to rebuild overfished fish stocks, including sharks, to manage for optimum yield. We conduct stock assessments and seek to maintain shark stocks at a level that allows them to be harvested at optimum yield while also maintaining their role in the ecosystem. Sharks are top predators and hunt and eat lower trophic level species, including fishes targeted by other fishermen. We work closely with five Atlantic Fishery Management Councils (New England, Mid-Atlantic, South Atlantic, Gulf of Mexico, and the Caribbean), the two Atlantic Interstate Marine Fisheries Commissions (Atlantic States and Gulf States), and the HMS Advisory Panel to promote an ecosystem-based approach to management which takes such interactions into consideration.

Comment 67: We received two comments regarding the listing of sharks under the ESA. One requested to know the status of the scalloped hammerhead shark 90-day finding. The other urged us to continue to promulgate shark regulations in a proactive and conservative way, so that petitions for listing sharks under ESA are found to be without substantial scientific or commercial information indicating that the petitioned action may be warranted. The commenter stated that such listings will almost definitely force time/area closures for a variety of fishermen and reduce fishing opportunities across a number of fisheries. The commenter stated that it is important for fishermen to understand that economic value is excluded from consideration under ESA, and that once these listings occur, fishermen will lose their voice in the regulatory process.

Response: On November 28, 2011 (76 FR 72891), the NMFS Office of Protected Resources determined that the listing of scalloped hammerhead sharks may be warranted and began a status review. Two other petitions to list great hammerhead sharks are currently awaiting 90-day findings. The results of the status review will lead either to a determination that listing

scalloped hammerhead sharks is not warranted or a proposed rule to list the species. The NMFS Office of Protected Resources has also received petitions to list whale, great hammerhead, dusky, and Pacific great white sharks under the ESA. NMFS is reviewing those requests to determine if the petitions contained present substantial scientific or commercial information indicating that the petitioned action may be warranted. We agree with the commenter that if some species of sharks are listed as endangered or threatened under the ESA, there could be changes to how the shark fishery operates and that economic value of a fishery is not considered in the context of ESA.

Comment 68: One comment urged NMFS to try to work with Mexico and other countries, as well as the Department of State, regarding blacktip sharks.

Response: We are dedicated to working with other nations, particularly those with which we share a border, and within international organizations, to promote sustainable management practices of sharks, including blacktip sharks. We participate in annual bilateral meetings with Canada and Mexico as well as the annual ICCAT meetings and stock assessments to discuss management measures for shared stocks. With Mexico in particular, we aim to strengthen our coordination within the Gulf of Mexico and promote sustainable management of shared shark stocks. In SEDAR 29, we invited a Mexican scientist to participate in the stock assessment process. The scientist provided data critical to the assessment of Gulf of Mexico blacktip sharks. We recognize that it is essential to work collaboratively when managing tunas, sharks, and other highly migratory species when stocks are shared and fished by both nations. We also work closely with our colleagues at the Department of State to promote cooperation in this area.

Comment 69: We need to continue investigating measures to minimize mortality after sharks are caught (particularly limits on gear deployment, soak time, and tending) as these hold promise for enhancing recovery of particularly sensitive and depleted shark species.

Response: We have considered alternative approaches to minimize shark mortality, including limits of gear deployment, hook type, soak type, and gear tending. We have found that limiting soak times and requiring gear tending may have safety-at sea implications, especially if fishing vessels are forced to retrieve fishing gear during unsafe sea conditions, and may reduce flexible fishing techniques. Additionally, enforcement at sea is considered impractical for restrictions on soak times as enforcement agents would have to constantly monitor vessels to ensure compliance with this regulation. Regulating quantity and type of hooks deployed (e.g. Selective Magnetic and Repellant Treated (SMART) hooks, circle hooks, or weak hooks), have also been considered as a method for reducing fishing mortality and contribute to rebuilding of overfished stocks. A SMART hook requirement may have potential economic impacts to the bottom longline and pelagic longline fisheries and ecological benefits for blacknose, sandbar, dusky, or scalloped hammerhead sharks have not been demonstrated. The effect of circle hooks is not the same for all species, and their conservation benefit for some species may be mixed (as discussed in Section 2.2 Alternatives Considered but not Further Analyzed in Chapter 2 of the DEIS). A weak hook alternative may protect some species of sub-adult sharks until they have had a chance to reproduce, however, because of the range in size at maturity among shark species, it may be difficult to discern which gauge hook to use to ensure these benefits. Therefore, because these hook options would not achieve the purpose of managing these fishery

resources in a manner that maximizes resources sustainability, while minimizing, to the greatest extent possible, the socioeconomic impacts on affected fisheries, they were not further analyzed.

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