FINAL

ENVIRONMENTAL ASSESSMENT

FOR

A FINAL RULE TO IMPLEMENT THE

SHARK FINNING PROHIBITION ACT

Prepared by

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National Oceanic and Atmospheric Administration
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I. INTRODUCTION (PURPOSE AND NEED FOR ACTION)

On December 21, 2000, President Clinton signed into law the "Shark Finning Prohibition Act" (Act)(Public Law 106-557; Appendix). Section 3 of the Act amended the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) to prohibit any person under U.S. jurisdiction from (i) engaging in the finning of sharks; (ii) possessing shark fins aboard a fishing vessel without the corresponding carcass; and (iii) landing shark fins without the corresponding carcass. Section 9 of the Act defines finning as the practice of taking a shark, removing the fin or fins from a shark (whether or not including the tail), and returning the remainder of the shark to the sea. The Act also requires the National Marine Fisheries Service (NMFS) to promulgate regulations to implement the prohibitions of the statute (section 4), initiate discussion with other nations to develop international agreements on shark finning and data collection (section 5), provide Congress with annual reports describing efforts to carry out the Act (section 6), and establish research programs (sections 7 and 8).

This Environmental Assessment has been prepared to assess the impacts on the human environment that may result from the imposition of the prohibitions of the Act under the alternative implementation approaches considered. This document is intended to provide the necessary analysis of the impacts of implementing sections 3 and 4 of the Act. It covers the impact categories required under the National Environmental Policy Act, as well as presenting information contained in a Regulatory Impact Review/Final Regulatory Flexibility Analysis, prepared pursuant to Executive Order 12866 and the Regulatory Flexibility Act, respectively.

A. Problem Being Addressed

Shark conservation is a serious concern, both domestically and internationally. The United States is of the view that all nations and relevant international fishery organizations should take action to ensure that shark populations are monitored and fishery conservation measures are implemented to ensure that shark stocks are protected from overexploitation. The strong international market for shark fins has increased the potential for harvesting shark stocks at unsustainable levels. In the Act, Congress has found the practice of shark finning to be unacceptable in the United States. Uncontrolled finning can be a factor leading to unsustainable shark harvests, and because the species of shark cannot always be determined from the fins alone in most instances, the effects of the fisheries on specific shark species when finning is practiced cannot be determined. That is, the mortality cannot always be assigned to individual species, so the mortality statistics may not be reliably used in stock assessments. It is the intent of the final action to support sustainable use of shark stocks with a minimum of waste.

B. Potential Applications of the Prohibitions in the Act

The prohibitions in the Act can be construed to apply to different sectors of the fisheries and associated industries in several ways as shown in Tables 1 and 2:

Table 1 Potential Application of the Act to Persons on U.S. Vessels

Vessel Category	Act Applies When
Fishing vessels (including vessels acting in support of fishing, such as transshipment or "mothership" vessels)	1. In waters seaward of the inner boundary of the U.S. Exclusive Economic Zone (EEZ) 2. In port but not making a landing (i.e. not unloading fish or fish products) 3. In port or at sea making a landing or transshipment (i.e. unloading fish or fish products)
All other vessels, including cargo or shipping vessels	1. In waters seaward of the inner boundary of the U.S. EEZ, State waters, or high seas 2. In transit through the U.S. EEZ 3. In port but not making a landing (i.e. not unloading any products) 4. In port or at sea making a landing or transshipment (i.e., unloading products which could include fish or fish products)

Table 2 Potential Application of the Act to Persons on Foreign Vessels

Vessel Category	Act Applies When
Fishing vessels (including vessels acting in support of fishing, such as transshipment or "mothership" vessels)	1. Fishing in the U.S. EEZ 2. Transiting the U.S. EEZ 3. In port and making a landing of fish or fish products
All other foreign vessels	1. Transiting the U.S. EEZ 2. In port but not making a landing of fish or fish products 3. In port and making a landing, which could include fish or fish products

The application of the Act's prohibitions thus could be construed in several different ways. For example, the prohibition of finning could be interpreted to apply to:

1. only U.S. fishing vessels wherever they are in or beyond of the U.S. EEZ;
2. all U.S. and foreign fishing vessels while in the U.S. EEZ;
3. foreign fishing vessels only when fishing in the U.S. EEZ;
4. all domestic vessels wherever they are seaward of the inner boundary of the U.S. EEZ when they bring a shark or shark fins on board the vessel.

Similarly, while the prohibition on possession of shark fins without carcasses appears to be specific to fishing vessels, it:

1. could be applied to non-fishing vessels;

2. could be applied to a foreign fishing vessel that is transiting the U.S. EEZ and has its fishing gear stowed;
3. could be applied to a foreign fishing vessel that is in a U.S. port obtaining provisions but not unloading fish.

The prohibition on landing shark fins without corresponding carcasses:

1. is not specific with respect to type of vessel and could be applied to all U.S. and foreign vessels, including cargo vessels;
2. could be applied to a foreign fishing vessel in a U.S. port.

II. ALTERNATIVE A - FINAL APPLICATION OF PROHIBITIONS OF THE ACT

The final action (preferred alternative) is to apply the prohibitions as shown in Table 3:

Table 3 Alternative A - Final Application of the Prohibitions

VESSEL TYPE	FINNING PROHIBITED	POSSESSION OF FINS WITHOUT CORRESPONDING CARCASS PROHIBITED	LANDING OF FINS WITHOUT CORRESPONDING CARCASS PROHIBITED
Domestic Fishing Vessels	Yes Seaward of the inner boundary of the U.S. EEZ	Yes Seaward of the inner boundary of the U.S. EEZ	Yes All ports
All other Domestic Vessels	Yes Seaward of the inner boundary of the U.S. EEZ	No	No
Foreign Fishing Vessels	Yes In U.S. EEZ	No	Yes In U.S. EEZ or U.S. port
All Other Foreign Vessels	No	No	No

Consistent with the prohibitions in the Act, the final regulations would specify that:

1. Persons on U.S. fishing vessels may not engage in shark finning seaward of the inner boundary of the U.S. EEZ. A person may remove and retain fins from a shark harvested seaward of the inner boundary of the U.S. EEZ on a vessel, but the corresponding carcass must also be retained on board the vessel.

2. Persons on U.S. fishing vessels may not possess on board their vessels shark fins harvested seaward of the inner boundary of the U.S. EEZ without the corresponding shark carcass.

3. Persons on U.S. fishing vessels may not land, for sale or for any other purpose, shark fins harvested seaward of the inner boundary of the U.S. EEZ without the corresponding carcass.

4. Foreign fishing vessel operators may not engage in finning in the U.S. EEZ and may not land, for sale or any other purpose, shark fins without the corresponding carcass into a U.S. port. In this context, a vessel that has obtained shark fins from a foreign fishing vessel at sea is considered "in support of fishing" and therefore is considered a foreign fishing vessel. This is to deal with a situation that historically has arisen in the western Pacific, where foreign cargo vessels occasionally landed shark fins obtained from foreign fishing vessels at sea. This activity would be prohibited under the final action.

5. Once a landing has begun, all shark fins harvested seaward of the inner boundary of the U.S. EEZ and other shark products (carcasses, fillets, other parts) would have to be landed and weighed at the same time.

6. It would be a rebuttable presumption that any shark fins harvested seaward of the inner boundary of the U.S. EEZ and landed from any U.S. or foreign fishing vessel, or found on board a U.S. fishing vessel, were taken, held, or landed in violation of these regulations if the total weight of shark fins landed or found on board exceeds 5 percent of the total weight of dressed shark carcasses landed or found on board the vessel.

The final action would not apply to the finning of sharks harvested from state waters. The prohibitions contained in the Act were enacted as an amendment to the Magnuson-Stevens Fishery Conservation and Management Act. The latter Act grants authority to the Secretary and the eight fishery management councils to regulate fisheries in ocean areas seaward of state territorial waters, while providing in section 306(a) that such authority shall not be construed as extending or diminishing the jurisdiction or authority of any State within its boundaries. Neither the language nor the legislative history of the Shark Finning Prohibition Act reveal an intent by Congress to extend federal fishery management authority to regulate state shark fisheries, or the finning of sharks taken in such state fisheries. Thus, while the prohibitions contained in the Act are construed to apply to the finning, possession and landing of sharks harvested seaward of state territorial waters, for sharks harvested within the boundaries of state territorial jurisdiction, the comprehensive prohibition of shark finning would require either corresponding state regulation or a specific exception allowing for federal regulation of state shark fisheries in accordance with section 306(b) of the Magnuson Stevens Act.

The final action would not have any effect on state regulations applicable to sharks and their fins harvested from state waters or on state regulations regarding shark finning activities occurring in state waters that are more stringent. Moreover, the final action would not affect any of the regulations implementing the Fishery Management Plan for Atlantic tunas, swordfish, and sharks (NMFS 1999) or the Atlantic Spiny Dogfish FMP (MAFMC & NEFMC 1999).

The Act does not specify whether the 5 percent threshold of shark fins to carcasses applies to the weight of the whole carcass or to the dressed carcass. Most shark carcasses are landed dressed, and NMFS has applied the 5 percent limit to dressed carcasses in the past in the Atlantic, Gulf, and Caribbean shark finning limitation. In these fisheries, carcass or dressed means a fish that has been gutted and the head and fins have been removed, but is otherwise in whole condition. Therefore, NMFS will use this definition in the final regulations to implement the Act.

The Act does not specify whether the 5 percent threshold should be applied using the wet weight of shark fins or should be applied using dry weight of shark fins. NMFS has used wet weight to apply the 5 percent limit for shark fins landed in the Atlantic, Gulf, and Caribbean, where the fins are generally wet when landed. In the western Pacific, foreign vessels generally have landed dry fins, and it is believed that about half the weight of the fin is lost in the drying process. Domestic vessels, on the other hand, generally land fins that are relatively wet as the fishing trips are normally 20 days or less and complete drying may not be achieved in that time. After considering comments on the proposed rule (66 FR 34401, June 28, 2001), NMFS has concluded that wet weight will be used as in the Atlantic, Gulf and Caribbean approach.

III. ALTERNATIVES CONSIDERED AND REJECTED

A. No Action (Status Quo) - Current Management

Under this alternative, NMFS would not promulgate regulations to implement the Act. As the Act requires NMFS to promulgate regulations, this alternative is rejected. However, the No Action Alternative (current management) is used as the baseline for determining the impacts of the final action and the other alternatives considered.

B. Alternative B - Limited Application of the Prohibitions of the Act

In this alternative, the Act would have been construed to apply only to persons on U.S. fishing vessels and not to any other vessels. The following provisions would have been codified into the regulations:

1. Persons on U.S. fishing vessels may not engage in shark finning seaward of the inner boundary of the U.S. EEZ. A person may remove and retain fins from a shark harvested seaward of the inner boundary of the U.S. EEZ on a vessel, but the corresponding carcass must also be retained on board the vessel.

2. Persons on U.S. fishing vessels may not possess on board their vessels shark fins harvested seaward of the inner boundary of the U.S. EEZ without the corresponding shark carcass.

3. Persons on U.S. fishing vessels may not land, for sale or for any other purpose, shark fins harvested seaward of the inner boundary of the U.S. EEZ without the corresponding carcass.

4. It would be a rebuttable presumption that any shark fins harvested seaward of the inner boundary of the U.S. EEZ and landed from any domestic or foreign fishing vessel, or found on board a U.S. fishing vessel, were taken, held or landed in violation of the regulations promulgated pursuant to the Act if the total weight of shark fins landed or found on board exceeds 5 percent of the total weight of whole shark carcasses or the whole weight equivalent of dressed carcasses landed or found on board a vessel.

This alternative application of the Act would have applied the prohibitions as shown in Table 4.

Table 4 Alternative B - Limited Application of the Prohibitions

VESSEL TYPE	FINNING PROHIBITED	POSSESSION OF FINS WITHOUT CORRESPONDING CARCASS PROHIBITED	LANDING OF FINS WITHOUT CORRESPONDING CARCASS PROHIBITED
Domestic fishing Vessels	Yes Seaward of the inner boundary of the U.S. EEZ	Yes Seaward of the inner boundary of the U.S. EEZ	Yes All ports
All Other Domestic vessels	Yes Seaward of the inner boundary of the U.S. EEZ	No	No
Foreign Fishing Vessels	No	No	No
All Other Foreign Vessels	No	No	No

As in the final action, a vessel that has obtained shark fins from a fishing vessel at sea, whether foreign or domestic, is considered “in support of fishing” and therefore considered a fishing vessel. The restrictions in Alternative B would not apply to sharks harvested in state waters.

C. Alternative C - Broader Applications of the Prohibitions of the Act

Under this alternative, all foreign vessels would have been prohibited from finning in the U.S. EEZ. Foreign fishing vessels would be prohibited from possessing or landing fins without corresponding carcasses in the U.S. EEZ or in any U.S. port. Foreign non-fishing vessels could possess fins without the corresponding carcasses in the U.S. EEZ for the purpose of transiting to

another port and could land fins. This is to allow international trade shipments that could include shark fins or other shark products without corresponding carcasses. Under this alternative, no domestic vessels, fishing or non-fishing, could engage in finning or possess fins without corresponding carcasses seaward of the inner boundary of the U.S. EEZ or land fins without corresponding carcasses in any port. The restrictions in Alternative C would not apply to sharks harvested from state waters.

Table 5 portrays the application of the prohibitions under this alternative.

Table 5 Alternative C - Broader Application of the Prohibitions

VESSEL TYPE	FINNING PROHIBITED	POSSESSION OF FINS WITHOUT CORRESPONDING CARCASS PROHIBITED	LANDING OF FINS WITHOUT CORRESPONDING CARCASS PROHIBITED
Domestic Fishing Vessels	Yes Seaward of the inner boundary of the U.S. EEZ	Yes Seaward of the inner boundary of the U.S. EEZ	Yes All ports
All Other Domestic Vessels	Yes Seaward of the inner boundary of the U.S. EEZ	Yes Seaward of the inner boundary of the U.S. EEZ	Yes All ports
Foreign Fishing Vessels	Yes In the U.S. EEZ	Yes In U.S. EEZ or U.S. port	Yes In the U.S. EEZ or U.S. port
All Other Foreign Vessels	Yes In U.S. EEZ	No	No

D. Alternative D - Broadest Application of the Prohibitions

Under this alternative, the prohibitions would have been applied to all U.S. vessels operating seaward of the inner boundary of the U.S. EEZ and to all foreign vessels transiting the U.S. EEZ or in a U.S. port. NMFS would adopt measures to apply to virtually all U.S. vessels that in any way might be involved in finning or in trade in shark fins seaward of the inner boundary of the U.S. EEZ and to all foreign vessels that in any way might be involved in finning or in trade in shark fins in the U.S. EEZ, as shown in Table 6. The restrictions in Alternative D would not apply to sharks harvested in state waters.

Table 6 Alternative D - Broadest Application of the Prohibitions

VESSEL TYPE	FINNING PROHIBITED	POSSESSION OF FINS WITHOUT CORRESPONDING CARCASS PROHIBITED	LANDING OF FINS WITHOUT CORRESPONDING CARCASS PROHIBITED
Domestic Fishing Vessels	Yes Seaward of the inner boundary of the U.S. EEZ	Yes Seaward of the inner boundary of the U.S. EEZ	Yes All ports
All Other Domestic Vessels	Yes Seaward of the inner boundary of the U.S. EEZ	Yes Seaward of the inner boundary of the U.S. EEZ	Yes All ports
Foreign Fishing Vessels	Yes In the U.S. EEZ	Yes In the U.S. EEZ or U.S. port	Yes In the U.S. EEZ or U.S. port
All Other Foreign Vessels	Yes In the U.S. EEZ	Yes In the U.S. EEZ or U.S. port	Yes In the U.S. EEZ or U.S. port

E. Additional Regulatory Measures

Some additional restrictions also could have been applied in any of the above alternatives to facilitate monitoring of the fisheries and enforcement of the prohibitions. For example:

1. U.S. fishers could have been required to mark or segregate shark fins harvested from seaward of the inner boundary of the U.S. EEZ and carcasses in a manner that would allow an authorized officer to clearly establish that certain fins came from specific sharks. This could be done, for example, by requiring that the fins be attached to the body of the shark in some manner or by using markers that were coded to match fins and carcasses.

2. There could have been added reporting and administrative requirements for U.S. fishers, such as having to notify U.S. authorities in advance of a landing of sharks and fins harvested seaward of the inner boundary of the U.S. EEZ to specify the expected time, place and date of arrival at port.

3. A license could have been required for any fisher who wants to land shark fins harvested seaward of the inner boundary of the U.S. EEZ so that special efforts could be made to track the volume of fins landed and the species involved. This added information would be beneficial for tracking the fisheries and determining the effects of fishing mortality on the stocks.

4. Dealers and buyers could have been prohibited from purchasing shark fins harvested seaward of the inner boundary of the U.S. EEZ from any U.S. fisher without first determining that the fisher has the corresponding carcass in his/her possession.

5. Dealers and buyers could have been required to supply documentation for inspection and copying at the request of an authorized officer to demonstrate that the dealer or buyer had determined that the fisher had the corresponding shark carcasses for any fins harvested seaward of the inner boundary of the U.S. EEZ that were purchased from the fisher. Any logbook requirements currently in place would be modified, and where no logbook requirements are in place a new collection will be imposed, to ensure that any fishing that results in catch of sharks is properly recorded and that the reports are filed with NMFS.

F. Alternative Considered but Not Analyzed

Defer Action to Individual Fishery Management Plans (FMPs)

Under the Magnuson-Stevens Act, eight regional fishery management councils have been established to develop FMPs for fisheries of the United States. In addition, the Secretary of Commerce is charged with responsibility for the FMP for Tuna, Swordfish and Sharks in the Atlantic Ocean, Gulf of Mexico, and Caribbean Sea. In many instances, fishery management plans already exist that govern to some extent fishing for sharks. Under this alternative to implement the Act, the fishery management councils (and the Secretary for Atlantic and Gulf of Mexico fisheries) would have been charged with the requirement to develop measures to carry out the Act for the shark fisheries in their respective areas of authority. NMFS would have evaluated all proposed actions for consistency with the Act. This alternative would not have met the deadline in the Act because the responsible parties could not take action to have regulations in place within 6 months of the effective date of the Act. Therefore, this alternative was not further analyzed.

IV. AFFECTED ENVIRONMENT

A. Status of Shark Stocks - Introduction

Sharks are species of fish in the class Chondrichthyes, or cartilaginous fishes. As a group, sharks (and many other elasmobranchs) present an array of issues and challenges for fisheries management and conservation. They are generally at the top of the food chain and their abundance is relatively small compared to groups at lower trophic levels. They are often characterized by late age of maturity and relatively slow growth and reproductive rates. From a management perspective, these species have not had high commercial value, so there has been little attention paid to sharks compared to many bony fishes and they have been given low management and research priority.

In recent years, however, there has been increasing international concern about the status of shark stocks and the sustainability of their exploitation in world fisheries. As the commercial value of some species and/or shark products has grown, there have been increased fishing efforts directed at sharks and the evidence of overfishing of some species has increased. In turn, several international initiatives have been undertaken to promote greater understanding of sharks in the ecosystem and greater efforts to conserve the many species taken in world fisheries. These led to adoption of an International Plan of Action for the Conservation and Management of Sharks (IPOA) by the Food and Agricultural Organization of the United Nations, an agreement to which the United States is a party.

In adopting the IPOA, in February 2001, NMFS released the United States National Plan of Action for Conservation of Sharks (NPOA) to promote increased awareness of the need to ensure that fishery management programs consider the vulnerability of sharks, both in directed fisheries and in fisheries in which sharks are taken incidentally. Among the objectives relevant to this action are to minimize unutilized incidental catches of sharks and to encourage full utilization of dead sharks. The practice of shark finning is counter to both objectives.

1. Status of Atlantic Sharks (excluding spiny dogfish)[1]

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. Seventy-two species are managed under the Atlantic HMS FMP pursuant to Secretarial authority; spiny dogfish also occur along the U.S. coast, however management for this species is under the joint authority of the New England and Mid-Atlantic Fishery Management Councils.

a. Large Coastal Sharks. This group includes 11 species such as sandbar, blacktip, tiger, spinner, and hammerhead sharks. Large coastal sharks as a group are considered overfished. Recent stock assessments (NMFS 1998) have indicated the need for reductions in the commercial quota. These reductions (one in 1997, additional in 1999) led to several lawsuits. A settlement agreement that included an independent peer review of the 1998 stock assessment was reached in Decemeber 2000. Three of the four reviewers found that the scientific conclusions and scientific management recommendations contained in the 1998 large coastal sharks stock assessment were not based on scientifically reasonable uses of the appropriate fisheries stock assessment techniques and the best available (at the time of the assessment) biological and fishery information. The results and recommendations of the reviewers will be used in the next stock assessment planned for early 2002.

b. Pelagic Sharks. This group consists of 5 species, including shortfin mako, blue and thresher sharks. The status of pelagic sharks, as a group, is currently unknown. While the 1993 Shark FMP concluded that this species group was fully fished, the reference points needed to establish

[1] Spiny dogfish are managed under a separate Spiny Dogfish FMP.

the current status, as outlined in the 1999 HMS FMP, have not been defined. A formal stock assessment on this species group has not been conducted to establish the status of these stocks and to measure the efficacy of current regulations. The 1993 Shark and 1999 HMS FMPs reviewed catch rates, landing and discard data, and biological information to establish harvest levels for commercial and recreational fisheries. An international stock assessment for blue, mako, and porbeagle sharks is planned for 2004.

c. Small Coastal Sharks. This group consists of 4 species, including Atlantic sharpnose, blacknose, and bonnethead sharks. The 1993 FMP defined small coastal sharks as fully fished. A stock assessment for these species has not been conducted since 1993. Thus, despite increases in landings, the 1999 HMS FMP had to use the reference points defined in the 1993 Shark FMP to determine the current status of small coastal sharks. For this reason, small coastal sharks are considered fully fished. As with pelagic sharks, a stock assessment is needed for these species in order to establish the status of these stocks and to measure the efficacy of current regulations. NMFS intends to conduct a small coastal shark assessment in early 2002.

d. Prohibited Species. In April 1997, NMFS prohibited possession of five species of sharks: whale, basking, sand tiger, bigeye sand tiger, and white sharks. These species were identified as highly susceptible to overexploitation and the prohibition on possession was a precautionary measure to ensure that directed fisheries did not develop. Dusky, night, and sand tiger sharks were petitioned and added to Candidate Species List under the ESA in the fall of 1997. However, NMFS had already prohibited possession of sand tiger sharks in the commercial and recreational fisheries, and thereby had already afforded those species the maximum protection possible within its fisheries management jurisdiction.

The 1999 HMS FMP prohibited the retention of an additional 14 species of sharks, including dusky and night sharks, based on a precautionary approach that prohibits retention of any species unless its stock size can support and sustain fishing mortality sufficiently to meet the FMP's objectives. This action was selected because it helps prevent development of directed fisheries or markets for uncommon or seriously depleted species. This action was selected for dusky and night sharks due to catch rate data that indicate large population declines since the early 1970s, and will allow for faster rebuilding for these species, if bycatch mortality is not too large. All sharks not authorized for retention must be released in a manner that ensures the maximum probability of survival.

e. Deepwater/Other Sharks. This group consists of 33 species including smooth dogfish, cat sharks, gulper sharks, and lanternsharks. The level of landings and discards, for any fishery, of species in the deepwater and other species group is generally unknown. However, given the nature of the species in this species group and the gear types being used, it is unlikely these species are overfished at this time.

For more detailed information on the status of Atlantic Ocean and Gulf of Mexico sharks, see the HMS FMP (NMFS 1999) and the associated 2001 Stock Assessment and Fishery Evaluation report (NMFS 2001A).

2. Status of Spiny Dogfish

The spiny dogfish *(Squalus acanthia*s) is a common small shark that inhabits the temperate and sub-Arctic latitudes of the North Atlantic Ocean. In the Northwest Atlantic, spiny dogfish range from Labrador to Florida, but are most abundant from Nova Scotia to Cape Hatteras. They migrate seasonally, moving north in spring and summer, and south in fall and winter (MAFMC and NEFMC 1999). Spiny dogfish school by size until they mature and then school by both size and sex. Canadian research surveys indicate that spiny dogfish are distributed throughout the Canadian Maritimes during the summer months. The stock is concentrated in U.S. waters during the fall through spring. Spiny dogfish are considered a unit stock in the Northwest Atlantic Ocean and, as such, represent an interjurisdictional stock (MAFMC and NEFMC 1999).

The combination of increased fishing mortality, declining biomass of mature females, and low recruitment have contributed to the overfished condition of the stock. The fishing mortality rate (F) has correspondingly risen from below an estimated F=0.1 in the 1980s to the current estimate of F=0.3. Dogfish landings have been primarily composed of females because they attain a larger size than males, and large fish are preferred by the processing sector. The 26th Northeast Regional Stock Assessment Workshop (SAW 26), in 1998, indicated that biomass estimates of mature females (> 80 cm) have declined by over 50 percent since 1989. The removal of a large portion of the female spawning stock since 1989 has reversed the trend of increasing mature biomass since the late 1970s. Recruitment of juvenile spiny dogfish was the lowest on record in 1997. In addition, length frequency data from both U.S. commercial landings and research surveys indicate a pronounced decrease in the average size of females in recent years. For example, the mean length of females landed in the commercial fishery has declined from 38 inches in 1982 to 33 inches in 1996 (MAFMC and NEFMC 1999).

3. Status of West Coast Sharks

Little is known about most shark stocks on the West Coast. However, a fishery management plan for highly migratory species (including some species of sharks) fisheries is in development by the Pacific Fishery Management Council. The working draft (PFMC 2001) indicates that sharks need to be managed with special care because their productivities (the rebound potentials or per capita rates of population increase) are low compared to most exploited teleost fishes - a result of late ages at maturity and low fecundities. The common thresher is the most productive of these sharks, yet its population is capable of increasing by only 4-7% per year when at its MSY-producing size. If depleted to 50% below the biomass that produces MSY, the time needed to recover with fishing eliminated is 6.7-11.6 years. The less productive sharks require even lower exploitation rates and have longer doubling times. Thus even relatively low catches could overfish these sharks, or even collapse their populations, and expected recovery times can be two

decades long. Further, because individuals that have not yet reproduced will often be taken (they are already large-sized as juveniles), conservation of reproductive potential is a concern.

Fisheries for such sharks thus require preventive, precautionary management, i.e., development under protective regimes. At the least, protection of reproducing females and allowance of only gradual expansions of fishing effort are needed.

a. Common Thresher. About ninety percent of the commercial landings of common thresher is presently taken in the California-Oregon driftnet fishery for swordfish, where this shark is the second most valuable species landed. Adults as well as juveniles are caught. This fishery began in 1977-78 in the Southern California Bight (SCB), with the thresher specifically targeted. From early on and amid signs of population decline, various restrictions were implemented by the State of California to protect reproducing females, as well as striped marlin, marine mammals, and increasingly targeted swordfish.

After 1981, the directed fishery for common thresher was affected by various season and area closures. The spring-season directed fishery originally began February 1, but by 1990 driftnet fishing was either entirely prohibited or restricted to distances greater than 75 miles from shore up through mid-August (Hanan et al. 1993). Driftnetting was allowed inshore the rest of the year (August 15 to January 31), but with various limits depending upon place and month. These closures strongly reduced fishing effort, especially within 20 miles of shore where most threshers were caught.

Catches peaked early in this fishery with approximately 1000 mt taken in 1982 (Hanan et al. 1993), then declined sharply in 1986, and have been low since. CPUE also declined. Since 1990 annual catches have averaged 200-300 mt (1990-1998 period) and appear stable (Holts et al. 1998).

The early increase to peak catches, with strong decline thereafter along with fishing effort and CPUE, is symptomatic of the “fishing-up” effect (Ricker 1975), i.e., early elevated catches from unsustainable fishing and then strong stock reduction and fishery contraction. This is an expected exploitation pattern for low productivity species that nevertheless accumulate sizable, fishable biomasses.

Exploitation reduced the common thresher population as indicated by the decline in CPUE (Holts et al.1998), but the magnitude of decline is exaggerated and affected by the various area and time closures, the offshore expansion, and the shift in emphasis within the fishery from shark to swordfish. The closures reduced annual catches by approximately 50% of the peak years (Calliet et al. 1991, Hanan et al. 1993), and likely altered catchabilities according to size and reproductive behavior.

Present levels of fishing effort appear to have allowed some stock growth, as seen in the rise of CPUEs in certain areas between Pt. Conception and the Channel Islands (Hill and Holts, uppubl 1997). Catches are expected to increase, but sustainable levels will always be much less than the unsustainable catches of the early years (MSY is equivalent to as little as 4-7% of the standing population that supplied the initial fishing-up catches). The Pacific States Marine Fisheries Commission adopted a 340 mt coastwide annual landings guideline for this shark, a limit not surpassed since 1991. Further protection comes from the California driftnet fishery being limited entry, with permits not being re-issued.

Common thresher populations off Baja California may be of the same stock as fished off the U.S. west coast. Transboundary movements of tagged specimens have been observed. Little is known about the fisheries off Mexico, since the shark landings there are generally not reported by species.

A production-biomass relationship can be developed for the thresher shark based on its estimated rebound potential and present size relative to its original, unfused level. By this method MSY is estimated as approximately 320 mt, with present biomass 0.84-1.05B_{MSY} and above B_{MSST} (=0.77B_{MSY}). Exploitation is presently producing about 300mt, which is within the MSY range. Since the CPUE trend indicates slow stock recovery, overfishing is probably not occurring. Thus F/F_{MSY} is < 1.0. The common thresher is no longer a primary targeted species for most fishers, and continued slow recovery is expected.

b. Pelagic Thresher and Bigeye Thresher. Little is known of the biology and status of these sharks. They are minor components of west coast fisheries, and presumably are not overexploited. The bigeye thresher occurs regularly in driftnet catches, whereas the pelagic is taken mainly in warm-water years. Catches are under 50 mt/yr.

c. Shortfin Mako. This shark is also taken primarily by the California driftnet fishery for swordfish (82% of commercial mako landings). Although present catches are only about 100 mt/yr, the mako is still the third most valuable species taken. Like the common thresher, its catches have been affected by the changes that occurred in that fishery. Its catches peaked early at 240 mt in 1982, and then declined (Cailliet et al. 1991). Makos are also taken in smaller amounts by California-based longliners operating beyond the EEZ (Vojkovich and Barsky 1998). During 1988-1992, there was an experimental longline fishery for makos and blue sharks in the SCB.

The fishery primarily takes juveniles and subadults age 3 or less, the SCB evidentially being an important nursery and feeding area for juveniles (Vojkovich and Barsky 1998, Hanan et al. 1993, Cailliet et al. 1991). Catch localities are like that of the common thresher, but less nearshore.

The mako's distribution is affected by temperature, warmer years being associated with more northward movement. Shortfin mako off Mexico may be of the same stock fished in U.S. waters, and makos tagged in the SCB have been recaptured as far south as Acapulco.

There is not yet consistent evidence for stock reduction from exploitation. CPUE rates are very variable and have been affected by the changes in the fishery and the effects of warm-water years. Abundance changes among exploited juveniles that apparently gather in the SCB may not reflect the status of the whole stock. Presently, stock status in terms of B_{MSY} and F_{MSY} is not available.

Considering the mako's tropical to warm-temperate, ocean-wide range and the low availability of adults to the fishing gear (Cailliet et al. 1991), this species is probably not being depleted off the Pacific Coast. Few mature females are taken and pregnant individuals are rarely seen. Still, the mako's productivity potential is low (r=0.036-0.062), and the SCB is undoubtedly important as a nursery/growing area. A reasonable assumption is that present time-area restrictions on driftnet fishing provide valuable protection for immature fish. The longline experimental fishing program (1988-1992) was terminated in part because of the high catch rate of juveniles.

d. Blue Shark. This is probably the most commonly caught shark, but its catches are poorly known because of low market value. Up to 1500 mt are caught but most is discarded. It is taken in both the driftnet and longline fisheries. Experimental longlining for blue sharks was conducted in California waters in 1979-1980 and in again in 1988-1992 (the latter was the mako-blue shark experiment) in attempts to develop markets. Peak reported landings were 87 and 92 mt in 1980 and 1981 respectively. Since 1985, landings have averaged less than 5 mt (Holts et al. 1998).

The blue shark is extensively distributed from tropic to temperate, coastal to oceanic waters and is probably the most abundant of all large marine, top predators. Its northern reproducing/nursery areas appear to be the subtropic-subarctic transition waters spanning the entire north Pacific, including southerly extensions along eastern and western coasts (Nakano 1994). Comparison of size distributions from the driftnet fishery off California and the longline fishery operating north of Hawaii indicates that subadults move out from west coast waters to join the oceanic, adult portion of their population as they approach maturity. The females leave at younger ages than the males.

There is some evidence for stock decline in the central Pacific (Nakano 1996), but not yet evidence of overexploitation. There is insufficient information from coastal driftnet and longline fisheries to infer local stock status at this time, and how representative the coastal population is of the main oceanic stock is unknown. Constraints on the driftnet fishery afford some protection for these sharks, which are mostly juveniles and subadults. The status of the Pacific-wide blue shark stock was recently assessed by the NMFS SWFSC Honolulu Laboratory, in collaboration with the Western Pacific Fishery Management Council (WPFMC) and Japan's National Research Institute for Far Seas Fisheries (Kleiber et al. 2001). It presents a range of plausible values for MSY and associated fishing mortality at MSY, resulting in estimates of MSY ranging from 1.8 to nearly 4 times the current estimated catch of blue sharks per year, and Fmsy ranging from 2 to 15

times current fishing mortality levels. The indications to date are that under the current fishing regime in the north Pacific, the blue shark population appears to be in no danger of stock collapse.

4. Status of North Pacific Sharks

There is little information on the status of sharks in the north Pacific. Work is underway to develop stock assessment approaches and population models so assessments can be conducted for salmon and sleeper sharks. Some of this work is being done in collaboration with Japanese scientists. While biomass estimates have been made for sharks, smelts and octopi, the NMFS bottom trawl surveys fail to adequately sample their habitats. Sharks are rarely taken during demersal trawl surveys in the Bering Sea. Spiny dogfish is the most common species caught, and the Pacific sleeper shark has been taken on occasion. A stock assessment for Bering Sea/Aleutian Islands (BSAI) "other species" has been prepared annually since 1980 and an ABC and TAC are specified for this assemblage. The assessment is based on abundance estimates from the NMFS annual bottom trawl surveys. B_{MSY} and F_{MSY} have not been estimated for any of the species in this category. In 1999, the Eastern Bering Sea biomass was estimated to be 643,000 mt. The ABC was set at 32,860 mt and the TAC was set equal to the ABC. In 1990, catches totaled 17,000 mt, followed by 33,000 mt in 1992. Since then catches ranged around 22,000 mt, representing ≤ 2 percent of total BSAI groundfish catches (Fritz 1998).

Currently there are no quantitative estimates of biomass for these species in the BSAI, GOA, or Prince William Sound. Given the potential trophic and ecological importance of these predators in Prince William Sound, research is needed to obtain more realistic estimates of biomass, abundance, and diet composition. Basic research is needed on shark biology, feeding ecology, multi-species interactions, and the spatial and temporal variation in shark abundance in Prince William Sound, the GOA, and BSAI to fill a void in our understanding of the trophic importance of these sharks in Alaska's marine ecosystem. The collection of an age-length relationship, growth rates, age at maturity, and maximum age achieved are crucial to understanding the population dynamics and hence to successful management of sharks.

A model using biomass estimates of four thousand mt (0.442 $t.km^2$) for salmon sharks, and one thousand mt (0.11 $t.km^2$) each for spiny dogfish and sleeper sharks has been developed (Okey and Pauly 1999). These estimates provide the few available data for the Ecopath modelling exercise, but the author advises caution when considering the usefulness of these preliminary estimates for other purposes, as some are little more than place holders.

Available information on the principal species may be obtained from the North Pacific Council Review Draft Environmental Assessment/Regulatory Impact Review/Initial Regulatory Flexibility Analysis for Amendments 63/63 to the Fishery Management Plans for the Groundfish Fisheries of the Bering Sea/Aleutian Islands and the Gulf of Alaska to Revise Management of Sharks and Skates (1999).

5. Status of Western Pacific Sharks

The area of the western Pacific comprises waters around the State of Hawaii, the Territories of American Samoa and Guam, the Commonwealth of the Northern Mariana Islands (CNMI), and six other U.S. flag Pacific island groups under military (Wake Island, Johnston Atoll) or Federal control (Howland and Baker Islands, Jarvis Island, Kingman Reef and Palmyra Atoll, Midway Atoll). The WPFMC has developed a Pelagic Fisheries Management Plan for the pelagic fisheries of these areas, commonly referred to as the western Pacific region.

The Fishery Management Plan for the Pelagic Fisheries of the Western Pacific Region (WPPFMP) governing fisheries for tuna, billfish, and oceanic sharks was first completed in 1986 and has been amended on several occasions. The original WPPFMP defines the sharks belonging to the management unit as "oceanic sharks of the families Alopiidae, Carcharinidae, Lamnidae and Sphyrnidae." This rather loose definition means that a considerable number of primarily coastal sharks such as tiger sharks (*Galeocerdo cuvier*), sandbar sharks (*Carcharhinus plumbeus*) and Galapagos sharks (*Carcharhinus galapagensis*), which may venture into the pelagic realm, are also included under the WPPFMP. None of the pelagic fisheries of Hawaii and the Western Pacific Region intentionally target pelagic sharks within Federal waters, but substantial numbers may be taken incidentally as bycatch (Haight and Dalzell 2000).

Table 7 lists the shark species most commonly caught by pelagic fisheries that are included as pelagic management unit species (PMUs) in the WPPFMP:

Table 7 Shark Species Included as Pelagic Management Unit Species
Source: Ito and Machado 1999, cited in NMFS 2000a

Common Name	**Scientific Name**
Blue shark	*Prionace glauca*
Thresher (bigeye)	*Alopias superciliosus*
Mako (short fin)	*Isurus oxyrinchus*
White tip (oceanic)	*Carcharhinus longimanus*
Tiger shark	*Galeocerdo cuvier*
Miscellaneous sharks	*Families Carcharhinidae, Alopiidae, Sphyrnidae, and Lamnidae*

The following sections provide short sketches of stock status for the primary species taken in WCPO pelagic fisheries described in section 3.3 below. A more detailed discussion may be

found in Volume I of the Draft Environmental Impact Statement, Pelagic fisheries of the Western Pacific Region (NMFS 2000b), and Draft Amendment 9 to the WPPFMP (WPFMC 2000).

a. Blue Sharks. Although members of the family Carcharhinidae, blue sharks are addressed separately here because of their predominance in the pelagic fishery catch in the central and western Pacific. Data from the NMFS longline observer program indicate that blue sharks comprise approximately 93 percent of the sharks caught on Hawaii vessels. The most recent stock assessment of blue shark in the Pacific is being conducted by a cooperative project between U.S. scientists from the Honolulu Laboratory of the National Marine Fisheries Service and Japanese scientists of the National Research Institute of Far Seas Fisheries that is still in progress (Kleiber et al. 2001). All scenarios modeled show a significant decline in the blue shark population during the 1980s followed by various degrees of recovery during the 1990s.

As noted in section 3.d., there is some evidence for stock decline in the central Pacific but not yet evidence of overexploitation. The decline in the 1980s coincided with the existence of an extensive small-mesh driftnet fishery in the North Pacific and recovery of the stock occurs following the banning of the driftnet fishery. It is noted that the variability in the stock could also be a result of other factors, such as an environmental regime shift or a combination of natural and anthropogenic factors. However, on the basis of the most pessimistic estimate of stock size, MSY is estimated to be approximately twice the current take (average of annual takes from 1994 through 1998) by all fisheries in the North Pacific. In this scenario, the Fmsy is approximately twice the current level of fishing mortality (average of fishing mortality from 1994 through 1998) by all fisheries in the North Pacific. Other, equally plausible estimates indicate that the stock could support a MSY up to four times current take levels and Fmsy up to 15 times current fishing mortality (Kleiber, et al. 2001).

The scientists undertaking this work are quick to point out that while indications to date are that under the current fishing regime in the North Pacific, the blue shark population appears to be in no danger of annihilation or stock collapse. Further refinements of the assessment will likely revise numbers, perhaps considerably, but it is very unlikely that this central conclusion will change (Kleiber, et al. 2001).

b. Miscellaneous Sharks Caught in WCPO Fisheries. Other sharks caught in the fisheries described in section 3 above are mainly those that are members of the four families *Carcharhinidae, Alopiidae, Sphyrnidae, and Lamnidae*. Within these families, only the thresher sharks, oceanic whitetip and shortfin mako occur as over 1 percent of the shark catch in the Hawaii longline fishery. All other species are taken in extremely low numbers (NMFS 2000b).

Family Carcharhinidae

Two species, the silky (*Carcharhinus falciformis*) and oceanic whitetip (*C. longimanus*) are the two most important species of this family in pelagic fishery catches, other than blue sharks. Although silky sharks represent more of the fisheries catch, oceanic Whitetips are believed to be

more abundant (Strasberg, 1958, cited in NMFS 2000b). It is estimated that 8,200 tons of oceanic whitetips were caught in the area of the South Pacific Community (SPC) in 1989. It is also estimated that 19,900 tons of silky sharks were caught from the SPC area in that year. An estimated 84,000 tons of silky sharks were caught in the international Pacific purse seine, longline and drift net fisheries. (Bonfil 1994, and Stevens 1996, cited in NMFS 2000b). There have been no quantitative assessments of either Pacific oceanic whitetip or silky shark populations published to date.

Family Alopiidae

Three species of thresher shark are caught in Pacific fisheries: bigeye thresher, *Alopias superciliosus*, pelagic thresher, *Alopias pelagicus*, and common thresher, *Alopias vulpinis*. Declines in CPUE in the California driftnet fishery for swordfish indicate a reduction in the thresher shark population (Hill and Holts, uppubl 1997, Holts et. al. 1998 cited in NMFS 2000b). However, the decline in the driftnet CPUE as a measure of the magnitude of the decline of the stock is confounded by the effects of the various area and time closures, the offshore expansion of the fishery, and the changed emphasis from shark to swordfish among most of the fishers. Based on the estimated rate of population increase, the common thresher MSY is estimated to be as little as 4 to 7 percent of the standing population that existed at the beginning of the fishery (NMFS 2000b).

Family Lamnidae

Sharks from this family caught in Pacific fisheries are primarily the two species of mako sharks, with shortfin mako comprising the greatest number. Other species occasionally taken in pelagic fisheries include Crocodile sharks (*Pseudocarcharius kamoharia*) and salmon sharks (*Lamna ditropis*). Mako sharks are the second most valuable shark species taken in the California driftnet fishery, at approximately 80 mt per year. Makos are also taken in smaller amounts (<10 mt/year) by California-based longliners operating beyond the EEZ (Vojkovich and Barsky 1998, as cited in NMFS 2000b). Mako shark distribution is affected by temperature, with warmer years being associated with more northward movement.

B. Protected Species

In both the Atlantic and Pacific Oceans, the principal fishing gear used to target sharks is longline, both bottom and pelagic, although other gear types also catch sharks. The incidental take of sea turtles and sea birds in these fisheries is of considerable concern. Throughout and beyond the EEZ, U.S. fishery management has been the subject of recent consultations under section 7 of the endangered species Act with a focus on sea turtle interactions in both areas and on potential interactions with short-tailed albatross in the Pacific. Several biological opinions have been issued for the west coast fisheries (NMFS 2000c, NMFS 2001F, USFWS 2000) which have resulted in significant restrictions on their operations. A biological opinion for east coast

HMS fisheries issued on June 8, 2001, (revised June 14, 2001) (NMFS 2001D) requires additional restrictions on pelagic longline fisheries.

In the Atlantic, Gulf, and Caribbean HMS fisheries, including pelagic and bottom longline, gillnet, and rod and reel gear, the protected species of concern are:

Endangered	
Blue whale	*Balaenoptera musculus*
Humpback whale	*Megaptera novaeangliae*
Fin whale	*Balaenoptera physalus*
Northern right whale	*Eubalaena glacialis*
Sei whale	*Balaenoptera borealis*
Sperm whale	*Physeter macrocephalus*
Leatherback sea turtle	*Dermochelys coriacea*
Hawksbill sea turtle	*Eretmochelys imbricata*
Green turtle	*Chelonia mydas*
Kemp's ridley sea turtle	*Lepidochelys kempii*
Threatened	
Loggerhead sea turtle	*Caretta caretta*
Critical Habitat Designations	
Right Whale	[western north Atlantic Stock]

In addition, fisheries that operate in the Atlantic and catch sharks have few interactions with sea birds. More information on these species can be found in the Atlantic HMS FMP (NMFS 1999) and the June 14, 2001, Biological Opinion (NMFS 2001D).

Off the West Coast, the principal species of concern are sea turtles (loggerhead, leatherback); marine mammals (California sea lions, humpback whales); and sea birds (albatross).

The Hawaiian archipelago provides habitat to a variety of threatened or endangered species, including the black-footed and Laysan albatrosses, five species of sea turtles, and the Hawaiian monk seal. In addition, the health and vitality of other environmental resources are of interest in the context of pelagic fishery management strategies (WPFMC 2000, cited in NMFS 2000b). Efforts to protect species will impose costs on western Pacific pelagic fisheries participants, but presumably will be of benefit to the species themselves and to the citizens of the United States in terms of the value these people put on the conservation of these species and other resources. Protected species include:

Hawaiian Monk Seal	*Monachus schauinslandi*
Humpback Whale	*Megaptera novaengliae*
Dolphins	*Family Delphinidae*

Green Turtle	*Chelonia mydas*
Olive Ridley turtle	*Lepidochelys olivacea*
Hawksbill turtle	*Eretmochelys imbricata*
Leatherback turtle	*Dermochelys coriacea*
Loggerhead turtle	*Caretta caretta*
Laysan albatross	*Phoebastria immutabilis*
Black-footed albatross	*P. nigripes*
Short-tailed albatross	*P. albatrus*
Brown booby	*Sula leucogaster plotus*
Wedge-tailed shearwater	*Puffinus pacificus*

A more detailed discussion of protected species and interactions with U.S. pelagic fisheries can be found in NMFS 2000b.

C. Description of Shark Fisheries

1. Atlantic Ocean and Gulf of Mexico

The main directed commercial fisheries that catch sharks in Federal waters along the U.S. Atlantic and Gulf of Mexico coasts include the pelagic longline fishery, the bottom longline fishery, the drift gillnet fishery, and the shark handgear fishery (rod and reel, handline, bandit gear or electronic rod and reel). Other commercial fisheries in the Atlantic Federal waters that catch sharks as incidental catch or bycatch include swordfish handgear, tuna purse seine, tuna handgear, tuna harpoon, coastal gillnet, other net (cast, sink, trammel, pound), shrimp trawl, other trawl (bottom, midwater, otter), menhaden purse seine, other seine (common, haul, Scottish), and trap (floating, lobster, blue crab, conch). Authorized gears for directed and incidental fisheries for Atlantic sharks in Federal waters include longline, gillnet, rod and reel, handline, and bandit gear. The following sections discuss the principal gear types and then the fisheries by species group.

a. Pelagic Longline Fishery. The U.S. pelagic longline fishery for Atlantic highly migratory species primarily targets swordfish, yellowfin tuna, or bigeye tuna in various areas and seasons. Secondary target species include dolphin, albacore tuna, pelagic sharks (e.g., mako, thresher, blue and porbeagle sharks) as well as several species of large coastal sharks. Although this gear can be modified (i.e., depth of set, hook type, etc.) to target either swordfish or tuna, like other hook and line fisheries, it is a multi-species fishery. These fisheries are opportunistic, switching gear style and making subtle changes to optimize the net returns of each individual trip (WPFMC 1999).

Pelagic longline gear is composed of several parts. 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 floatline, which connects the mainline to several buoys and periodic markers with radar reflectors and radio beacons. Each individual hook is connected by a leader to the mainline. Lightsticks, which contain chemicals that emit a glowing light, are often used. When targeting swordfish, the lines

generally are deployed at sunset and hauled in at sunrise to take advantage of the nocturnal near-surface feeding habits of the large pelagic species (Berkeley et al. 1981). In general, longlines targeting tuna are set in the morning, deeper in the water column, and hauled in the evening. Fishermen preferentially target swordfish during periods when the moon is full to take advantage of increased densities of pelagic species near the surface.

Reported effort, in terms of number of vessels fishing, has fluctuated in recent years and appears to be decreasing (Cramer and Adams 2001). However, the reported number of hooks set has increased in some areas and decreased in others (Cramer and Adams 2001).

The pelagic longline fishery sector is comprised of five relatively distinct segments with different fishing practices and strategies: 1) the Gulf of Mexico yellowfin tuna fishery; 2) south Atlantic/ Florida east coast to Cape Hatteras swordfish fishery; 3) the Mid-Atlantic and New England swordfish and bigeye tuna fishery; 4) U.S. Atlantic distant water swordfish fishery; and 5) the Caribbean Island tuna and swordfish fishery. Each vessel type has different range capabilities due to fuel capacity, hold capacity, size, and construction. In addition to geographical area, segments differ by percentage of various target and non-target species, gear characteristics, bait, and deployment techniques. Some vessels fish in more than one fishery segment during the course of the year (NMFS 1999).

b. Bottom Longline Fishery. The Atlantic bottom longline fishery targets large coastal sharks, with landings dominated by sandbar and blacktip sharks. Gear characteristics vary slightly by region, but in general, a ten-mile long monofilament bottom longline, containing about 750 hooks, is fished overnight. Skates, sharks, or various finfish are used as bait (Branstetter and Burgess 1997). 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.

Commercial shark fishing effort with bottom longline gear is concentrated in the southeastern United States and Gulf of Mexico. McHugh and Murray (1997) found in a survey of shark fishery participants that the largest concentration of bottom longline fishing vessels is found along the central Gulf coast of Florida, with the John's Pass - Madeira Beach area considered the center of directed shark fishing activities. In 2000, the greatest number of shark permits was issued in Florida (46 percent), New Jersey (10 percent), Louisiana (8 percent) and North Carolina (9 percent). As with all HMS fisheries, some shark fishery participants move from their home ports to active fishing areas as the seasons change.

Between 1994 and 1997, the directed shark observer program observed 5.5 million hook hours of effort that caught more than 26,000 sharks (Branstetter and Burgess 1997). Their observations indicated that average bottom longline sets lasted between 10.1 and 14.9 hours, with longer sets typical of the North Carolina and Florida Gulf fisheries and shorter sets typical of the South Carolina/ Georgia fishery. North Carolina fishermen, on average, set the longest lines (13.7 miles), followed by the Florida Gulf (10.5 miles) and the South Carolina/Georgia fishery (6.9

miles).

Sandbar and blacktip sharks dominated catches of large coastal sharks. Depending on region and year, they constituted 60 to 75 percent of the catch and 75 to 95 percent of the landings during the period 1994 to 1996 (Branstetter and Burgess 1997). Tiger sharks were the third-most common large coastal sharks caught during the three-year period. However, the tiger shark has little market value and is usually discarded; a few were landed, and some small individuals were used as bait. Other species, such as dusky, bull, and lemon sharks were found to be of local importance. Five species (sandbar, blacktip, dusky, bull, and lemon sharks) constituted 95 percent of the landings. Vessels operating in the South Atlantic Bight caught and landed a greater diversity of species than other regions.

c. Drift Gillnet Fishery. The shark drift gillnet fishery developed off the east coast of Florida and Georgia in the late 1980s and early 1990s. Based on Trent et al. (1997) and Carlson and Lee (1999), vessels operating in the fishery are characterized as being from 12.2-19.8 m in length. The nets (both nylon multifilament and monofilament) used are from 275-1,800 m long and 3.2-4.1 m deep, with stretched mesh from 12.7-29.9 cm. In 1993, the number of vessels operating in the fishery was 5, increased to 11 in 1995 but declined to 7 to 9 in 1999. The annual number of vessel trips is estimated between 150-185. Sharks are landed primarily by two types of gillnet gear (Carlson and Lee 1999; Carlson 2000). The most common type is drift gillnet gear, wherein the vessel basically sets a gillnet in a straight line off the stern during the night. The net soaks or fishes at the surface for a period of time, is inspected at various occasions during the soak, and then hauled onto the vessel when the captain/crew feel the catch is adequate. It is usually a nighttime fishery and takes place at least 4.8 km offshore in the EEZ. Mesh size ranges from 12.7-29.9 cm (5-12") stretched. The other type of gear utilized is strike-nets, wherein the vessel takes its gillnet and encircles a school of sharks. This is done usually during daylight hours, using visual sighting of shark schools from the vessel and/or a spotter plane. The gear is encircled around the sharks, but is otherwise hauled back onto the vessel without much soak time.

Based on data from an observer program during 1998-2000, sharks comprised between 89-92 percent of the total observed catch composition (percent of numbers caught). Depending on season, usually the Atlantic sharpnose shark, blacknose shark, blacktip shark, bonnethead (*Sphyrna tiburo*), and Finetooth shark make up 90-95 percent by number of the observed shark catch. The discarded portions of the targeted catch (sharks) also varied by season. From 1998-2000, dead discards included scalloped hammerhead shark (21-41 percent), common thresher shark (62 percent), bonnethead (54 percent), and blacktip shark (29 percent). In most cases, the reason for discarding sharks was the lower quality of flesh and low or no market in the case of the hammerheads and thresher sharks. In the case of the blacktip shark, discards were related to fishing activity that occurred during the large coastal season closure and state size regulations imposed on large coastal species.

Recently a directed fishery for sharks has developed in state waters off the coast of Alabama. Preliminary information indicates that the fishery is operating under 100 percent observer

coverage and two fishermen are using gillnets up to 718 m (2,300 ft) with 8-12” mesh to target blacktip and spinner sharks (Carlson 2001).

d. Recreational Fisheries. U.S. Atlantic recreational shark harvests have declined somewhat from the peak recorded catches in 1983 (NMFS 1999). For pelagic species, some of which are considered prized gamefish (e.g., mako sharks), recreational harvests have fluctuated from a peak of approximately 93,000 fish in 1985 to a low of about 6,000 fish in 1994. Recreational landings of small coastal sharks have fluctuated around 50,000 to 150,000 fish per year since the mid 1980s, with Atlantic sharpnose sharks comprising about 65 percent of the catches (NMFS 1999). Estimated recreational shark harvests (numbers of fish) in the Atlantic Ocean and Gulf of Mexico by management subgroup and species are provided in Table 8.

Table 8 **Estimated Recreational Shark Harvests (Numbers of Fish) in the Atlantic Ocean and Gulf of Mexico by Management Subgroup and Species.**
Source: Cortes 1999; NMFS 1999; Cortes 2000.

Management Subgroup	Species Name	1997	1998	1999
Large Coastal Sharks	Blacktip	68,284	82,310	30,961
	Bull	1,254	1745	2,832
	Dusky	13,278	4,499	5,186
	Hammerhead	618	389	75
	Hammerhead, great	379	494	346
	Hammerhead, scalloped	3,320	2,575	1,329
	Hammerhead, smooth	2,176	375	---
	Lemon	2,354	2,303	131
	Night	90	133	---
	Nurse	7,859	2,455	1,489
	Reef	10	---	---
	Sandbar	40,929	35,766	18,882
	Silky	240	5,376	3,834
	Spinner	3,342	10,836	5,738
	Tiger	70	1,380	146
	Unclassified	16,298	19,139	12,953
Pelagic Sharks	Blue	4,265	6,085	5,218
	Shortfin mako	2,618	5,633	1,383
	Thresher	1,436	36	4,512
Small Coastal Sharks	Atlantic angel	---	109	---
	Atlantic sharpnose	65,530	129,315	40,291
	Blacknose	10,761	10,523	5,957
	Bonnethead	15,730	29,692	36,664
	Finetooth	5,000	139	69

Shark tournament fishing is usually conducted from vessels that vary in size from small outboards to sportfishing yachts of 15 meters or longer. The number of participants and vessels varies: a two-day Long Island, New York, shark tournament has drawn 300 vessels and about 1,500 anglers annually in recent years. More exclusive tournaments charge high entry fees on a first-come, first-served basis, and offer a top prize of $50,000 or more (NMFS 1999). Many tournaments establish minimum sizes for species like shortfin mako and blue sharks, and some tournaments encourage catch and release fishing by offering prize points for released sharks. The

increase in eastern Gulf Coast shark fishing tournaments since 1973 underscores the popularity of this activity among anglers. Then, there were only about a half dozen such tournaments, but by the late 1980s there were about 65 each year (NMFS 1999).

Fisher and Ditton (1992) surveyed Gulf of Mexico shark fishermen and found that they spent an average of $197 per trip, were willing to spend on average an additional $105 rather than stop fishing for sharks, and that 32 percent of those surveyed said that no other species would be an acceptable substitute for sharks.

e. Menhaden Purse Seine Fishery. The Gulf of Mexico menhaden purse seine fishery operates mainly off Louisiana from the beginning of the third week in April through the end of October each year. Trips typically last one week (7 sea days). Based on the description provided by De Silva *et al.* (in press), sets are made when a school of menhaden is located, with two purse boats, each containing half a purse seine, encircling the school along with any associated species. After encircling the school, the purse line is drawn, resulting in the closing of the net, and the net retrieved back into the purse boats mostly with the use of power blocks. The mother boat then comes alongside and secures the net and purse boats to its port side. The entire set generally lasts 25-60 minutes. For the period 1994-1995, observer data indicated that the mortality rate of sharks caught was 75 percent. Large coastal sharks made up 97 percent of the shark bycatch, of which 35.3 percent were blacktip sharks and 1.8 percent were sandbar sharks, while small coastal sharks made up the remaining 3 percent. The total estimated number of sharks caught in this fishery was about 36,000 in 1994 and 33,000 in 1995, or approximately 26,200 and 24,000 large coastal sharks in 1994 and 1995, respectively (Cortes 1999).

f. Large Coastal Sharks. The U.S. Atlantic commercial shark fishery for large coastal sharks is primarily a southern coastal fishery extending from North Carolina to Texas (NMFS 1998). About 90 percent of recent U.S. Atlantic large coastal shark landings came from the southeastern region (NMFS 1998). Although the majority of these sharks are taken by longline gear in the bottom longline fishery, they are also caught in the pelagic longline fishery, the drift gillnet fishery, and the shark handgear fishery. Commercial landings of large coastal sharks in all fisheries (including those in state waters) peaked in 1989 at 351,000 fish or approximately 4,600 mt dressed weight (dw) (NMFS 1998). Pelagic longline dead discards from 1981 to 1998 fluctuated between 900 and 20,900 fish (NMFS 1998; Cortes 1999). Commercial fishermen who target large coastal sharks usually land blacktip (*Carcharhinus limbatus*) and sandbar sharks (*C. plumbeus*) (Table 9). The remainder of the catch is generally comprised of dusky (*C. obscurus*), bull (*C. leucas*), bignose (*C. altimus*), tiger (*Galeocerdo cuvieri*), sand tiger (*Odontaspis taurus*), lemon (*Negaprion brevirostris*), spinner (*C. brevipinna*), scalloped hammerhead (*Sphyrna lewini*), and great hammerhead sharks (*S. mokarran*), with catch composition varying by region. These species are less marketable and often released so that they are reflected in the overall catches but not landings.

The large coastal shark fishery is the primary shark fishery in the Atlantic. In 1999, the average ex-vessel price for large coastal shark meat was approximately $0.75 per lb dressed weight

(NMFS 2001E). The ex-vessel value of the large coastal shark meat fishery was approximately $2,950,102 (NMFS 2001E). While shark meat is usually reported by species, shark fins are not. However, most of the fin landings are believed to be fins from large coastal sharks, particularly sandbar sharks. In 1999, the average ex-vessel price of shark fins was estimated to be $7.42 per lb with a total ex-vessel value for shark fins of $1,854,313 (NMFS 2001E).

g. Pelagic Sharks. Pelagic sharks are typically caught incidentally in the commercial tuna and swordfish pelagic longline fisheries (NMFS, 1993), in a small directed porbeagle fishery off the coast of New England, and in directed recreational fisheries. Shortfin mako (*Isurus oxyrinchus*), porbeagle (*Lamna nasus*), and thresher sharks (*Alopias vulpinus*) are typically landed due to relatively high ex-vessel prices (Table 10), whereas other species are landed as hold space and market prices allow. Some species, particularly blue sharks (*Prionace glauca*), are frequently discarded because of their unpalatable meat. While catches of blue sharks (in numbers) in the Grand Banks and Northeast Coastal areas often approximate or exceed the catch of the targeted swordfish and tuna (Cramer 1996) and are discarded, many of them are released alive. Estimates of blue sharks discarded alive range from approximately 30 to 100 percent during the period 1992 to 1995 (Cramer 1996).

Table 9 **Estimated Large Coastal Shark Commercial Landings (Pounds Dressed Weight) in the Atlantic Ocean and Gulf of Mexico by Species.**
Source: Cortes 1999 and 2000.

Species Name	1997	1998	1999
Bignose	2,132	50	9,035
Blacktip	1,506,182	1,893,805	1,286,979
Bull	40,247	27,389	25,426
Dusky	80,930	81,124	110,950
Hammerhead	79,685	59,802	53,394
Lemon	20,595	23,232	23,604
Night	33	3,289	4,287
Nurse	8,864	2,846	1,168
Reef	3,548	100	---
Sand tiger	8,425	38,791	6,401
Sandbar	890,881	1,077,161	1,299,987
Silky	13,920	13,615	8,649
Spinner	6,039	16,900	629
Tiger	6,603	12,174	30,274
White	1,315	----	82
Large coastal (unknown)	98,726	172,038	67,197
Unclassified (assumed to be large coastal)	1,078,813	1,085,989	911,115
Unclassified fins (assumed to be large coastal)	140,638	76,588	80,393
Total	3,987,576 (1,809 mt)	4,584,893 (2,080 mt)	3,919,570 (1,778 mt)

Estimates of pelagic sharks discarded dead each year in the tuna and swordfish pelagic longline fisheries ranged from approximately 300 to 1,200 mt whole weight (ww) from 1987 to 1995, of which an estimated 60 to 95 percent (by weight) were blue sharks (about 9,000 to 30,000 fish) (Cramer 1996, NMFS 1999). Estimates of pelagic sharks discarded dead in the pelagic longline fisheries in 1996 and 1997 were 839 and 253 mt ww, respectively, of which approximately 73 percent (by weight) were blue sharks (about 19,000 and 8,000 fish) (Cramer *et al.*,1997; Cramer and Adams 1998; NMFS 1999). Estimates of pelagic sharks discarded dead in other fisheries in 1996 and 1997 were 110 and 56 mt ww, respectively, of which 93 and 58 percent were blue sharks (about 3000 and 1400 fish) (see Cramer *et al*. 1997; Cramer and Adams 1998; NMFS 1999).

Thus, when blue sharks are not included, the estimate of pelagic shark dead discards was about 238 and 91 mt wet weight in 1996 and 1997, respectively.

In 1999, the average ex-vessel price for pelagic shark meat was $1.06 per lb dressed weight for a total gross ex-vessel revenue of $424,273 for the fishery (NMFS 2001E).

Table 10 Estimated Pelagic Shark Commercial Landings (Pounds Dressed Weight) in the Atlantic by Species.
Source: Cortes 1999 and 2000.

Species Name	1997	1998	1999
Bigeye thresher	5,308	1,403	17,759
Blue	904	706	1,111
Shortfin mako	224,362	224,421	170,860
Longfin mako	7,867	4,971	4,619
Mako, unclassified	71,371	79,773	58,344
Oceanic whitetip	2,764	22,049	698
Porbeagle	4,222	19,795	5,362
Thresher	145,253	102,531	96,012
Pelagic sharks, unclassified	694	111	---
Shark, unclassified (assumed pelagic)	74,849	49,515	46,056
Total	537,594 (244 mt)	505,275 (229 mt)	400,821 (182 mt)

h. Small Coastal Sharks. Historically, small coastal sharks were incidental catch in commercial fisheries, and commonly used for bait. Observer data indicate that small coastal shark landings represent (by number) 2 percent, 19 percent, and 72 percent of the total observed mortality of the small coastal shark catches in the directed shark bottom longline fishery for the North Carolina, west Florida, and south Atlantic Bight regions, respectively, (Branstetter and Burgess 1997; NMFS 1999). These data indicate that approximately 98 percent, 81 percent, and 28 percent, respectively, of the small coastal shark catch in those regions was not landed, but used for bait. Observer data for the North Carolina and west Florida areas suggest that unreported mortality of small coastal sharks is high; however, the volume of small coastal shark catches in those areas is minor. Nevertheless, small coastal shark landings statistics may considerably underestimate mortality in this fishery. Commercial landings of small coastal sharks increased from 9 mt dw in 1994 to 320 mt dw in 1997 (Table 11), with Atlantic sharpnose (*Rhizoprionodon terraenovae*), blacknose (*C. acronotus*), and finetooth (*C. isodon*) sharks comprising 90 percent of the landings (NMFS 1999; Cortes 1999).

In 1999, the average ex-vessel price for small coastal shark meat was $0.51 per lb dressed weight for a total gross ex-vessel revenue of $340,890 for the fishery (NMFS 2001E).

Table 11 Estimated Small Coastal Shark Commercial Landings (Pounds Dw) in the Atlantic by Species.
Source: Cortes 1999 and 2000.

Species Name	1997	1998	1999
Caribbean sharpnose	—	—	2,039
Atlantic sharpnose	256,562	230,920	239,647
Blacknose	202,781	119,689	130,317
Bonnethead	75,787	13,949	53,702
Finetooth	169,733	267,224	246,404
Shark, unclassified (assumed small coastal sharks)	51	82	136
Total	704,914 (320 mt)	631,864 (287 mt)	672,245 (305 mt)

There is also a small drift gillnet fishery that targets small coastal sharks, particularly when the large coastal shark fishery is closed.

i. Spiny dogfish fisheries. Total commercial landings of spiny dogfish from 1968 through 1974 increased largely due to the foreign fleet harvest, most notably the former Soviet Union. Foreign landings during the period 1965 to 1977 were about 156, 000 mt. With the advent of the EEZ, the foreign harvest dwindled to a low in 1979, but landings by the United States and Canada have been steadily increasing since then, as export markets for dogfish have been developed (MAFMC and NEFMC 1999).

A sharp intensification of the U.S. commercial fishery for spiny dogfish began in 1990. Landings increased six-fold from roughly 4,500 mt in 1989 to 27,000 mt in 1996 (MAFMC and NEFMC 1999). From 1990 to 1997, U.S. commercial landings averaged about 18,000 mt. Cumulative removals during this eight year period were roughly 154,000 mt; in contrast, cumulative U.S. landings for the period 1962 to 1989 were only 54,000 mt. However, although the reported weights of landings were similar, the recent U.S. fishery generated significant discards and the landings were comprised almost exclusively of mature females. In contrast, the foreign fishery was prosecuted on all sizes of spiny dogfish with minimal discarding (MAFMC and NEFMC 1999). Virtually all of the spiny dogfish taken as bycatch in the mixed- and multi-species gillnet and otter trawl fisheries in the northwest Atlantic Ocean were discarded based on sea sample data from 1991 to 1993. The primary reason for the discarding of dogfish taken in these fisheries is the small size or lack of market (MAFMC and NEFMC 1999).

Spiny dogfish are landed in every state from Maine to North Carolina with numerous gear types. However, prior to 1990, Massachusetts was responsible for the vast majority of commercial landings. Beginning in 1989 (as the U.S. fishery expansion began), the states of North Carolina, New Jersey, Maryland, and Maine began to increase in importance. Overall, Massachusetts and

North Carolina recorded the highest landings of spiny dogfish during the period 1988 to 1997, followed by Maryland, Maine, New Jersey, Rhode Island, New Hampshire, and Virginia (MAFMC and NEFMC 1999). Two principal gear types, trawls and gillnets, accounted for roughly equal amounts of spiny dogfish landings from 1988 to 1990. As the fishery expanded in the early 1990s, gillnets increased dramatically in importance. In 1991, gillnets accounted for greater than 60 percent of the dogfish landed, for 75 percent by 1993, and for 80 percent by 1996. Thus, the dramatic increase in spiny dogfish landings in recent years is due largely to an increase in gillnet activity in the fishery (MAFMC and NEFMC 1999).

Most of the catch of spiny dogfish in recreational fisheries appears to be incidental to the targeting of other species. The value of spiny dogfish in recreational fisheries in terms of angler expenditures and revenues derived from those expenditures in the targeting of this species appears to be fairly low. Of the total spiny dogfish caught in 1996, 7 percent was caught from beach, shore, or man-made structure; 40 percent was caught from a party or charter boat; and 53 percent was caught from a private or rental boat (MAFMC and NEFMC 1999). Given the migratory range of spiny dogfish, most were caught in the North Atlantic and Mid-Atlantic regions: 38 percent in the North Atlantic and 61 percent in the Mid-Atlantic regions.

Excluding the recreational estimate for 1981, total recreational catches increased from about 70 mt in 1982-1983 to greater than 408 mt in 1989. Since then the estimates of spiny dogfish recreational catch in weight have declined. The 1993 estimate was about 120 mt. Total catch in weight declined to less than 37 mt in 1996, but increased to 66 mt in 1997 (MAFMC and NEFMC 1999). Total catches in number increased in nearly five fold from 1982 to 1989. In the North Atlantic subregion (Maine to Connecticut), catches peaked in 1988 at nearly 400,000 fish and declined to fewer than 250,000 in 1993. Peak catches of nearly 500,000 fish occurred in the Mid-Atlantic states (New York to Virginia) in 1990; catches declined to about 250,000 in 1993. Catches of spiny dogfish from North Carolina to Florida increased dramatically after 1979, but are an order of magnitude lower than observed in the Mid-Atlantic and New England states. Most dogfish are released after capture, increasing to more than 90 percent in recent years (MAFMC and NEFMC 1999).

2. West Coast

The principal fishery that catches sharks off the West Coast is the drift gillnet fishery. Table 12 presents the history of landed catch of sharks in that fishery. Table 13 presents the reported real ex-vessel value (1999 dollars) of shark landings by the drift gillnet fishery from 1981 through 1999. It is evident that the fishery has varied considerably in response to both regulatory changes and oceanographic conditions.

Longline fishery landings into West Coast ports account for a much smaller portion of total shark landings. This fishery targets swordfish but has incidental catch of sharks. Records are not complete, but observer records indicate that blue sharks are the principal species caught, but very few blue sharks are retained and landed due to their low market value. For example, in 1997-99,

only 6 blue sharks were retained out of a total catch of 7,131 blue sharks caught. Only about 30 percent of the sharks were returned to the sea alive; the rest were in either an unknown condition or dead. The principal landed species are shortfin mako (up to 152 mt in 1988 but less than 10 tons each year since 1994) and common thresher (a peak of 18 mt in 1994 and less than 10 tons in most other years). Some West Coast-based longline vessels land their catch in other areas, e.g., Hawaii. Few data are available for these vessels, in part because it is difficult to differentiate them as either West Coast-based or Hawaii-based as they fish in both areas. Some trips originate in California and end in Hawaii; others originate in Hawaii and end in California. As a general rule, vessels with Hawaii limited entry permits are considered western Pacific vessels while vessels without such permits that land in a West Coast port are considered West Coast-based. In any event, in the 1991-1994 period for which decent data are available, sharks (principally shortfin mako and common thresher) made up a total of about 49 mt of landed catch, out of total longline landings of 881.6 mt in that period. Again, sharks are an incidental catch, and for the most part blue sharks are likely discarded while shortfin mako and threshers are retained. For example, based on logbooks from the State of California and the High Seas Fishing Compliance Act program, in the August 1995-December 1999 period, only 276 blue sharks were retained by high seas fishing longline vessels landing in California out of a total catch of nearly 20,000 blue sharks.

Table 12 **Reported Landings (mt) of Sharks by the West Coast Drift Gillnet Fishery, 1981-1999**
Source: Pacific Fishery Information Network Landings Records

Year	Common Thresher	Pelagic Thresher	Bigeye Thresher	Shortfin Mako
1981	808	neg	neg	91
1982	634	neg	13	125
1983	150	neg	17	38
1984	95	neg	2	11
1985	110	neg	2	15
1986	455	neg	2	21
1987	94	0	1	2
1988	81	neg	neg	neg
1989	0	neg	neg	neg
1990	neg	neg	neg	neg
1991	8	neg	4	2
1992	2	neg	0	2
1993	16	0	7	11
1994	268	0	32	70
1995	200	5	29	73
1996	240	1	19	79
1997	249	34	27	113
1998	249	2	9	78
1999	150	2	4	45

(neg=negligible)

Table 13 Reported Value ($000) of Landings of Sharks by the West Coast Drift Gillnet Fishery, 1981-1999
Source: Pacific Fishery Information Network Landings Records.

Year	Common Thresher	Pelagic Thresher	Bigeye Thresher	Shortfin Mako
1981	1,335	neg	neg	137
1982	1,105	neg	11	191
1983	259	neg	40	59
1984	219	neg	4	21
1985	266	neg	4	28
1986	961	neg	4	42
1987	222	neg	2	5
1988	180	neg	neg	neg
1989	1	neg	neg	neg
1990	neg	neg	neg	neg
1991	14	neg	2	4
1992	3	neg	neg	9
1993	28	neg	6	24
1994	529	neg	31	140
1995	370	9	24	137
1996	471	2	17	144
1997	452	64	26	197
1998	436	2	8	136
1999	274	3	4	79

(neg = negligible)

A variety of sharks also are caught (mostly as incidental catch) in groundfish fisheries, with retention rates varying by species. The principal gear types are bottom trawl and set gillnet. Among the species are leopard, soupfin, angel and spiny dogfish sharks as well as a number of skates and rays.

Recreational fishers catch substantial numbers of sharks, though again relatively few are landed.

The Pacific Council working draft HMS FMP (PFMC 2001) reports that there were an estimated 410,000 angler fishing trips directed at blue and shortfin mako sharks in 1989 and the level of fishing for these species has remained high. The Marine Recreational Fishing Statistics Survey estimates that recreational catches of shortfin mako and thresher sharks have ranged between 1-22 thousand and 0-5 thousand fish respectively in the years 1981-1998 (excluding 1990-92 when the survey was not conducted). While large numbers of blue sharks are caught, very few are retained. There area also shark-directed fishing tournaments in several California ports/marinas with the principal target species being leopard shark.

3. North Pacific

Off Alaska, the harvest of sharks and skates in the EEZ is generally managed through the fishery management plans for groundfish fisheries, where they are included in "other species" categories. Seven shark and twelve skate species are included in the management unit of the Gulf of Alaska FMP as directly observed from NMFS Alaska Fisheries Science Center surveys and fishery observer records (Gaichas et al. 1999). The salmon shark, the Pacific sleeper shark, and the spiny dogfish shark are the most abundant and their numbers appear to be increasing. Spiny dogfish make up about half the catch in this category, with Pacific sleeper sharks, unidentified sharks, and salmon sharks being other principal components. Salmon sharks are taken as rare bycatch in pelagic trawls, while Pacific sleeper and spiny dogfish are taken in bottom trawl and longline fisheries. Dogfish are commonly taken in some salmon gillnet fisheries as well. There is no known finning in this region.

Seven shark and seven skate species are included in the 'other species' category in the Bering Sea and Aleutian Islands Groundfish FMP (BSAI FMP). The predominant shark species is the spiny dogfish, with sleeper sharks occasionally taken. Sharks, skates, octopus, and sculpins are managed together in the "other species" category in the BSAI FMP for Alaska Federal waters. The vast majority of the catch is discarded, although sometimes skates are retained.

In February 1998, the Alaska Board of Fisheries took regulatory action to close the directed commercial fishery for sharks and establish a requirement to obtain a commissioner's permit to commercially fish skates and rays in Alaska state waters. The bycatch of sharks is allowed to continue consistent with general state regulations for the incidental take of fishery resources. The Board also took action to place an annual statewide harvest limit on the sport take of sharks. Given that sport fisheries for sharks and skates are not currently defined in the FMPs or Federal regulations, the Board's sportfish regulations extend through the EEZ.

The Board brought the issue forward at the July 29-30, 1998, meeting of the Joint Committee of the Board of Fisheries/North Pacific Fisheries Management Council. At this meeting, complementary Federal action was discussed and the joint committee recommended that the Council proceed with development of an analysis of the proposed alternatives. Invoking the precautionary approach to management of these long-living, slow-growing, and low fecund fishes and other regional and international efforts to conserve sharks and skates, at its October 1998

meeting the Council initiated analysis of four management alternatives. Those alternatives are now being considered. A specific element may be to prohibit finning, possession of fins without corresponding carcasses, and landing of fins without corresponding carcasses.

4. Western Pacific

a. Overview. None of the pelagic fisheries based in Hawaii or other U.S. jurisdictions in the western and central Pacific Ocean (WCPO) intentionally target pelagic sharks, either within Federal waters or on the high seas; but substantial numbers are taken incidentally. It is important to recognize that U.S. pelagic fisheries represent a relatively small component of commercial fisheries targeting tuna and billfish in the WCPO. Both distant water and locally based vessels operating from various Pacific rim and Pacific island nations all have a significant incidental catch of sharks. For several reasons, including the fact that sharks are not target species, it is difficult to precisely determine shark catches by pelagic fisheries throughout the region. Nonetheless, Stevens (1996) estimates that between 283,000 and 470,400 mt of sharks were landed by all high-seas Pacific fishing in 1994, of which 140,100 mt (30-50 percent of the total) were blue sharks. By comparison, all pelagic fisheries managed under the WPPFMP caught around 3,000 mt of sharks in 1998. The estimated number of active U.S. fishing vessels in the western Pacific in 1998 and their involvement in shark catches and sales revenue are presented in Table 14.

Table 14 Estimated Numbers of Active Central and Western Pacific Domestic Pelagic Fishing Vessels and Estimated Landings of Shark Products (1998).
Note: Federal longline permits are issued to domestic longline vessels Guam and the Northern Marina Islands but these permits are generally inactive.

FLEET	ACTIVE VESSELS	SHARK LANDINGS			
		Number of sharks harvested	Meat	Fins	Revenue ($'000)
Hawaii based longline (finning prohibited in 2000)	114	60,857	774 sharks	60,083 sets	$1,510
Hawaii based small boats	1,900	Not available	28 mt (62,000 pounds)	Not available	$34
American-Samoa based longline	26	Not available	3.2 mt (7,196 pounds)	Not available	Not available
American-Samoa based purse seiners (voluntarily banned finning in 1999)	35	Not available	Not available	9 mt (20,000 pounds)	$196
American-Samoa based small boats	19	Not available	0.09 mt (208 pounds)	Not available	$0
Guam-based small boats	438	0	0	0	$0
N. Mariana Islands-based small boats	89	0	0	0	$0

Sources: McCoy and Ishihara 1999, Coan et al. 2000, WPFMC 1999.

Nearshore fisheries (0 to 3 nautical miles), such as troll and handline, come primarily under the management authority of the state or territorial governments. There is no evidence to suggest that recreational and charter fisheries in U.S. jurisdictions within the WCPO target sharks either as a game fish or for home consumption.

Several foreign fishing fleets use U.S. ports in Hawaii, American Samoa and Guam. Foreign fishing vessels calling at Hawaii are restricted under the Nicholson Act from landing fish and utilize Honolulu harbor mainly for bunkering, resupply, and crew rest. Foreign fleets call at American Samoa to deliver to two tuna canneries in Pago Pago Harbor, and also for some transshipment, and bunkering, resupply, and crew rest. Guam is used by foreign fishing vessels for transshipment, bunkering, resupply, and crew rest.

Sharks are not the target species in any of the U.S. or foreign vessels fishing under U.S. jurisdiction or using U.S. ports or locations described above[2]. Nevertheless, several of these fleets do catch sharks incidentally to fishing for target species of tuna and swordfish. For all species of shark caught by these domestic and foreign fleets, the most valuable portions retained are the fins. Some retention of shark meat does occur, mainly by Taiwanese fleets. The established trade in shark fins has existed for different lengths of time in each of the three locations, and contributes to each of the economies of Hawaii, American Samoa and Guam. There is no significant landing of shark fins in the Northern Mariana Islands, and consequently no trade has developed there.

McCoy and Ishihara (1999) summarized the direct economic contribution of shark fins to Hawaii, Guam and American Samoa for 1998[3]. The summary is shown in Table 14 and addressed in the following sections that also describe fleet activity contributing to those totals.

b. U.S. Longline Vessels Landing in Hawaii. The tuna and swordfish longline fishery operating out of Hawaii is the largest federally regulated domestic fishery in the WCPO. Data collected by the NMFS longline observer program indicate that for those vessels carrying observers, blue sharks comprise approximately 93 percent of the sharks caught on Hawaii longline vessels. The remaining sharks fall into four families, as shown in Table 15. The remaining species are taken in very low numbers, translating into equally small percentages of overall catch.

[2] One vessel in Hawaii operated as a demersal longliner targeting sharks in late 1998 and 1999, however that operation ceased at the end of 1999.

[3] There is negligible landing or sale of shark fins in the Northern Mariana Islands.

Table 15 Direct Economic Contribution of Sharks to the Economies of Hawaii, Guam, and American Samoa in 1998 ($'000)
Source: McCoy and Ishihara (1999)

	Hawaii	Guam	American Samoa	Total
Crew spending from shark fin revenue	$950 - $1,140	$180 - $364	$422- $653	$1,552 - $2,157
Fresh shark meat sales	$42	-0-	-0-	$42
Local transshipment/ export expenses	$235	$53	-0-	288
Trader gross margin	$332 - $399	$54 - $109	$123 - $187	$509 - $695
Direct government revenue	-0-	-0-	$7	$7
TOTAL	$1,559- $1,816	$287 - $526	$552 - $847	$2,398 - $3,189

Table 16 Observed Composition of Sharks Caught in the Hawaii Longline Fishery
Source: NMFS 2000b

SPECIES	NUMBER	PERCENT
Alopiidae		
Pelagic thresher (*Alopias pelagicus*)	19	0.08
Bigeye thresher (*A. superciliosus*)	356	1.46
Common thresher (A. vulpinis)	35	0.14
Unidentified thresher	38	0.16
Subtotal	448	1.84
Lamnidae		
Shortfin mako (*Isurus oxyrinchus*)	312	1.28
Longfin mako (*I. Paucus*)	5	0.021
Unidentified mako	8	0.03
Salmon shark (*lamna ditropis*)	57	0.23
Subtotal	383	1.57

SPECIES	NUMBER	PERCENT
Carcharhinidae		
Bignose shark (*Carcharhinus altimus*)	9	0.04
Silky shark (*C. falciformis*)	56	0.23
Galapagos shark (*C. galapagensis*)	4	0.02
Oceanic whitetip (*C. longimanus*)	629	2.58
Dusky shark (*C. obscurus*)	2	0.01
Sandbar shark (*C. plumbeus*)	27	0.11
Tiger shark (*Galeocerdo cuvier*)	5	0.02
Blue shark (*Prionace glauca*)	21,917	89.90
Subtotal	22,649	92.90
Sphyrnidae		
Scalloped hammerhead (*Sphyrna lewini*)	–	0.01
Smooth hammerhead (*S. zygaena*)	8	0.03
Unidentified hammerhead	--	0.02
Subtotal	15	0.06
Unidentified sharks	885	3.63
Total	24,380	100.00

The Hawaii-based longline fishery that targets both swordfish and tunas accounts for a majority of both total landings and catches of sharks by U.S. vessels in the WCPO. There are 164 permits in this limited access fishery, with between 100 and 125 vessels active in the past few years. The fishery developed and expanded rapidly in the late 1980s and early ‘90s. Between 1987 and 1991 the number of active vessels increased more than four-fold. This rapid expansion was due in part to the entry of vessels from the Atlantic and Gulf coasts of the U.S. mainland. An important part of this growth has come from vessels targeting swordfish, although landings have declined since the first half of the 1990s. Hawaii longliners also target bigeye, yellowfin and albacore tuna and some vessels undertake mixed trips where both swordfish and tuna are targeted. Total ex-vessel value in 1998 was $46.7 million (NMFS 2000b).

The longline fishery provides approximately 75 percent of fresh commercial seafood landings in Hawaii. It also supports a substantial fishery supply sector (fuel, oil, bait, and fishing gear) as well as two fish auction houses and numerous fish wholesaling and retailing operations. The Hawaii longline fishery was valued at $46.7 million in 1998 while it also has a total annualized impact on Hawaii business sales of $113 million (Sharma, et. al. 1999).

Domestic Hawaii longliners utilize ice for the preservation of the catch and many are hold-capacity-constrained. The length of trips as opposed to the short storage life of sharks, particularly blue sharks, precludes retention of most carcasses.

In 1998, 114 vessels undertook 1,141 trips and made 12,087 sets totaling 16.6 million hooks. The total number of sharks caught represents about 30 percent of all pelagic management unit species caught (WPFMC 1999). Preliminary figures for 2000 show that 125 vessels undertook 1,130 trips and made 12,901 sets totaling over 20.2 million hooks. The total number of sharks caught, 79,135, represents 19.7 percent of all pelagic management unit species caught (NMFS 2001G).

While the total number of sharks caught in the longline fishery remained relatively constant over the past five years, the actual numbers landed in the last decade increased substantially, from 2,289 in 1992 to 60,857 (of which 60,083 were finned and 774 retained whole) out of a total 99,919 caught in 1998. (Ito and Machado 1999).

A State of Hawaii law prohibiting landing shark fins without the accompanying carcass went into effect June 2000. This prohibition, along with a court-ordered area closure north of Hawaii, resulted in reduced numbers of sharks finned during the last two quarters of 2000. This prohibition, along with an injunction[4] issued by the U.S. District Court, District of Hawaii, imposing a longline area closure north of Hawaii to protect sea turtles, resulted in reduced numbers of sharks finned during the last two quarters of 2000. In 2000 overall, 29,492 or 37 percent of sharks caught (79,135) were finned. This compares with 60 percent in 1998. By the fourth quarter of 2000, the percentage of sharks caught and finned had dropped to 12 percent, or 2,117 finned out of 17,563 caught. It should be noted that while the reduction in shark finning in the fishery occurred against a background of uncertainty regarding the state's authority to regulate fishing practices in the EEZ (NMFS 2000b).

Anecdotal information indicate that the captain and crew members of a few Hawaii longliners are known to occasionally consume shark fins as part of their bill of fare during a fishing trip and certain crew members engaged in shark finning and accumulate fins solely for home consumption by their individual families. The amount of fins utilized for these purposes is unknown; however it can be surmised that at least the amount of fins landed for home use has

[4]Center for Marine Conservation, Turtle Island Restoration Network v. National Marine Fisheries Service, CV. NO. 99-00152.

been significantly reduced, if not nil, due to the state law prohibiting the landing of any shark fins without the carcass still attached to the fins.

The overall estimated annual value of shark fins produced by Hawaii longliners in 1998 is estimated to be from $950,000 to $1,140,000. With roughly 400 deck crew in the fleet, and assuming that all shark fin revenue would go to the crew, the average annual income from shark fin sales ranged from $2,375 to $2,850 per crew member or about 10 percent to 11 percent of the estimated annual wage. The actual figure may be slightly less, depending on the number of owner-operators who also share in the proceeds from shark fins (McCoy and Ishihara 1999). As shark fin landings have dropped since 1998, the annual value of those landings and the revenue to crew or operators will have dropped proportionately absent any change in prices due to decreased supply. However, the value of shark fin landings in 2000 is not known.

A small number of vessels in the Hawaii longline fleet have supplemented their income by transporting fins from tanker/supply vessels beyond the EEZ to Honolulu, where the fins were placed in containers and placed in bond for shipment. Occurring from 12 to 18 times per year, such trips by Hawaii longliners lasted only from 2 to 3 days in total, and probably represented a very small portion of the gross income for the fleet as a whole. This activity also appears to have been substantially reduced or to have ceased with passage of the State law prohibiting landing of fins without the accompanying carcasses.

c. Small Boats Landing in Hawaii. Fishing activity in Hawaii also occurs from small boats engaged in handline, troll, and charter fisheries. Most trips occur within 25 miles of shore. The charter fishery numbered 199 vessels in 1998, and targeted primarily billfish and tunas. Landings in the charter fishery were about 1.8 million pounds in 1998. Approximately 1800 small boats participated in troll and handline fisheries in 1998, targeting billfish, tunas, wahoo and mahi mahi and operating in both inshore waters and the EEZ. The combined landings of these vessels was approximately 4.6 million pounds. None of the vessels engaged in the handline, troll and charter fisheries target sharks; however, there are infrequent landings of sharks from the night-time ika shibi (squid-tuna handline) fishery for tuna. There are no sportfishing tournaments in Hawaii aimed at catching sharks, nor do the major centers of sportfishing in the State market or encourage fishing for sharks as a trophy catch.

d. U.S. Longline Vessels Landing in American Samoa. Until recently, the domestic longline fleet in American Samoa consisted mainly of small (28-33 ft) “alia” catamarans from which a 300-hook longline is set and retrieved by hand. In 1998, there were 31 such vessels rigged for longline that primarily target albacore, with yellowfin and other pelagics taken incidentally. Their yearly average shark catch is approximately 24,000 pounds (10.9 mt) of total landings of 884,000 pounds in 1998. The shark catch consists of blue, mako, and thresher sharks. Shark landings from the American Samoa longline fishery peaked in 1999 with 510 sharks (all species) caught. Like the shark catch in the Hawaii longline fishery, the majority of sharks caught in this fishery are finned (72 percent), with only a relatively small fraction (14.4 percent) being landed for consumption. Unlike the Hawaii fishery, the American Samoa incidental shark catch is more

varied, with less than 50 percent of the catch comprising blue sharks, with larger contributions by thresher (3 percent) and mako sharks (11 percent). A large proportion of the shark catch (41 percent) in this longline fishery remains to be identified (Haight and Dalzell 2000).

In 1998, there were five larger longline vessels of the size operating in Hawaii based in American Samoa. The target species are albacore for sale to the canneries, and some yellowfin and bigeye for export to Hawaii or the mainland United States In 1998 total landings of albacore represented 318 tons, or less than 1 percent of total landings to the two canneries in Western Samoa (WPFMC 1999).

There is no significant commercial market for shark meat in American Samoa.[5] The small capacity of catamaran alias in general as well as the danger associated with landing sharks are cited as two factors contributing to lack of interest in landing sharks for sale.

e. U.S. Tuna Purse Seine Vessels Landing in American Samoa. The U.S. purse seine fleet in the WCPO targets skipjack and yellowfin tuna for cannery use and is managed under the Treaty on Fisheries Between the Governments of Certain Pacific Island States and the Government of the United States of America, the "South Pacific Multilateral Tuna Treaty" (SPTT). Up to 50 vessels are permitted in the fishery; however there were only 35 vessels holding SPTT licenses in early 2001. This number varies slightly from time to time, owing to the switching of a few vessels to and from the eastern tropical Pacific fishing grounds. Approximately 112,000 tons of skipjack and 41,000 tons of yellowfin are landed in American Samoa for processing at the two canneries located there. This represents about 82 percent of the total tuna landed for processing and almost 100 percent of tuna canned as light meat (WPFMC 1999).

The domestic tuna purse seine vessels are typically operated by small businesses and skippered by U.S. nationals, though some vessels are owned by processing firms. The total number of crew on vessels currently licensed in the fishery is around 700. Table 16 shows the percentage of each nationality crewing U.S. purse seiners from two surveys conducted by the Forum Fisheries Agency. Crew members are paid on the basis of the tonnage of fish caught, usually regardless of other vessel expenses, although in periods of depressed fish prices, crew salaries are often adjusted downwards.

Purse seine fishing operations are undertaken on free-swimming tuna schools, as well as schools associated with drifting objects, including logs, flotsam, and other floating debris, and man-made fish aggregating devices (FADs). Captains are required to report daily catch as well as bycatch and discards in the Regional Purse Seine Logbook. An active observer program is also conducted

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[5] Although the 1997 Annual Report, Pelagic Fisheries of the Western Pacific Region (Anon. 1998) shows an average price of $1.11 per pound for shark in American Samoa, this figure is thought to be an artifact of the manner in which data was entered, and not reflective of an actual commercial market for shark meat there (D. Hamm, pers. comm. cited in McCoy and Ishihara 1999).

in the fishery by the Forum Fisheries Agency with the assistance and cooperation of NMFS.

Table 17 Nationality of Crew on U.S. Flag Tuna Purse Seiners
Source: Forum Fisheries Agency

Nationality of Crew	1994/95 Survey (percent of total crew)	1996/97 Survey (percent of total crew)
United States	26.5	27.6
Philippines	19.7	24.9
Portugal	12.2	11.1
Croatia	11.6	6.4
Latin America	8.9	5.7
Pacific Island	8.5	14.8
Others/unknown	12.6	9.5

Since 1995 there has been a trend toward more purse seine sets on drifting objects, particularly FADs, with a reduction in the sets on free-swimming schools (Coan, et al. 1999). This trend may have an implication for a greater incidence of sharks as bycatch, as observer data show that "along with other large pelagic predators (e.g., billfish) several shark species seem to be more prevalent in the vicinity of logs and other floating objects that have 'aggregated' communities of baitfish and predatory tuna schools, than around schools of tuna that are 'free-swimming' and not associated with floating objects" (Williams 1997).

Port arrivals by purse seiners calling in American Samoa averaged 150 per year from the period 1990-1998. Unlike longliners, there is no discernable trend in vessel arrivals in American Samoa during the decade. During the latter part of 2000 and into 2001 an extended period of low prices resulted in many of the purse seiners remaining in port.

Until 1999, shark fins were sold by the crew upon arrival in port. In 1999 the United States Tuna Foundation, a coalition of vessel owners and tuna processors, implemented a voluntary ban on finning on U.S. purse seine vessels. Until that time, approximately 20 percent of the shark fins sold in American Samoa were landed by U.S. purse seiners.

Unlike the longline fisheries where each shark is brought to the vessel individually, sharks caught in a purse seine net along with the target species (skipjack and yellowfin) are generally brailed onboard with any other incidental catch or bycatch. Most or sometimes all sharks are usually dead at this stage. Factors determining the number of sharks that might be finned include:

- other activities requiring crew attention on the boat, such as immediate repair to the net or machinery
- presence of those in the crew with experience in finning, particularly Asian (including Filipino) crew
- expected fish price in port

Generally it is the Filipinos in the crew who understand best the methods of finning and the importance of cutting fins properly to obtain the best price. Not all crew participate in the finning; when prices in 1998-1999 dropped to around 50 percent of those paid a few years ago many crewmen did not engage in the practice. It is also the Filipinos and some Pacific islanders who are the most intense about finning the sharks brought aboard the seiners. They are usually among the lower paid of the deck hands and are willing to do the extra work after the vessel has completed normal operations and the deck and equipment have been cleaned. The captains of purse seiners are more concerned about catching and preserving the target species in the quickest possible time to minimize spoilage. Unlike some other purse seine fleets where deck crew are paid a basic salary, all crew wages on purse seiners are based on the amount of fish landed and accepted by the cannery. It is thus in the best interest of the crew members to maximize their efforts in taking care of the target species of skipjack and other tuna.

In recent years, the average amount of dried fins produced from purse seine trips is estimated to be about 60 to 70 kg (132 - 154 lbs). If this range is used, the overall annual production of dried shark fins from the U.S. purse seine fleet would have been from 9.1 to 10.6 mt (20,020 - 23,320 lb). The species most commonly caught and finned on purse seiners are oceanic whitetip sharks, *Carcharhinus longimanus*, and silky sharks, *Carcharhinus falciformis*.

Prior to the voluntary cessation of shark finning in 1999, annual salaries for deck crew who engaged in finning of sharks and sharing proceeds on a typical U.S. purse seiner have ranged from $7,500 to $15,000 (McCoy and Ishihara 1999). It is estimated that income from the sale of shark fins in port for these crew has been from $578 to $821 per crew, or approximately 4 percent to 10 percent of their total annual remuneration.

f. Troll and Charter Fishing in Guam and the Commonwealth of the Northern Mariana Islands. In 1998, there were 438 active boats engaged in at least part time trolling and charter fishing in Guam. These vessels landed approximately 371.4 mt (817,000 lbs), almost a third of which was mahimahi. Tuna and wahoo made up the majority of the rest of the catch. During the same year approximately 90 boats were active in CNMI, focusing primarily on skipjack tuna, which accounted for 70 percent of the catch. As with Hawaii, there was no directed fishing for sharks by these boats, although shark predation of catches was reported as serious at times.

g. Foreign Fishing Vessels Visiting Hawaii. In 1988, the State of Hawaii launched the "Port Hawaii" marketing plan to promote the use of Hawaii's commercial ports. The intent was to capture an increased share of the trans-Pacific shipping trade, much of which involves foreign fishing vessels. Although foreign fishing vessels are prohibited by the Nicholson Act from landing fish or fish products in U.S. ports, the opportunity to purchase fuel, provisions and other goods and services makes Honolulu an attractive port. During the three-year period 1986-1988, there were over 2,500 recorded port calls by foreign fishing vessels. Over 95 percent of the vessels were Japanese flag, and over 90 percent were large tuna longliners making port calls to take on fuel and/or water, for repair, medical attention for crew, or to allow crew rest and recreation (Hudgins and Iverson, 1990). These vessels range in size from 400 to 700 gross registered tons, carry up to 30 crew, and operate in the high seas areas of the central and eastern tropical Pacific. As such, they should not be confused with the much smaller Japanese longline vessels operating from Guam described above.

A systematic review of expenditure records for a sample of fishing and support vessels that called at Honolulu from 1986-1988 showed that longliners were apt to spend between $10,758 to $92,588 in port, depending on the level of services and supplies required. Fuel tended to be the greatest expenditure, with provisions and cash advances to crew comprising the bulk of non-fuel expenditures (Hudgins and Iverson, 1990).

In 1998, it was reported that approximately 450 Japanese longliners and 18 tanker/supply vessels called at Honolulu[6]. The tanker/supply vessels, sometimes referred to as "motherships" collect shark fins from foreign fishing vessels on the high seas that were formerly transshipped to Honolulu aboard U.S. fishing vessels. These tankers obtain fuel and supplies in Honolulu and return to the high seas to carry out their primary job: servicing the fishing vessels. Fishing vessels were estimated to spend from $40,000 to $60,000 per port call, and tanker/supply vessels from $750,000 to $1,600,000 (Hatakayama 1999). Overall gross sales for fuel, provisions and services to these vessels are estimated at $40,000,000 to $50,000,000 per annum involving numerous local and out of state vendors (Yoshizawa 1999).

h. Foreign Fishing Vessels Landing in American Samoa. Most foreign longline vessels landing in American Samoa are Taiwanese, consisting of two types: older and smaller vessels that are restricted by their refrigeration systems to delivering only cannery-grade albacore, and larger vessels that are capable of holding both cannery grade albacore and sashimi grade bigeye and yellowfin that are frozen and held at ultra-low temperature (below -50 degrees C.). In 1998 total albacore landings to the two canneries from this fleet are estimated at around 31,000 tons, or about 92 percent of the total 34,145 tons landed (WPFMC 1999 and SPC 1999). Vessels are typically owned by Taiwanese family-based operations in Kaohsiung, with owners usually

[6] The Japanese fleet has since undergone a reduction of 20 percent in the number of active vessels. Taking the most conservative approach that this decrease would fully apply to vessels that visit Honolulu an annual figure in 2000-2001 would be closer to 360 such port calls.

owning or having an interest in more than one vessel. Approximately 80 percent of the shark fins sold in American Samoa are landed by these distant water longliners.

Some vessels, although not all, off-load their bycatch including mako sharks and frozen shark fins to rented freezer space at the canneries in American Samoa. This bycatch, and evidently an undetermined amount of frozen shark fin, are periodically taken to Taiwan by refrigerated bulk carriers.

In the Pacific, there are several fishing ground options depending on the target species and time of the year. When targeting albacore, as was the case in 1998, larger vessels (those over 400 tons and able to stay at sea longer and withstand more extreme weather conditions) developed a pattern of fishing from September to February in international waters to the north and west of Hawaii, and then returning to the South Pacific. Alternative ports to American Samoa in the western Pacific that may be utilized for off-loading catch depend on factors such as proximity to the fishing grounds and fish price. They include Tahiti (where the albacore catch is containerized for transshipment and the sashimi grade tuna is transferred directly to refrigerated transport vessels) and the PAFCO cannery in Levuka, Fiji. There are reportedly shark fin buyers at each of these locations.

As on most Asian longliners targeting tuna, finning is an integral part of fishing operations for these vessels. The Taiwanese obtain the bulk of their crews, sometimes unskilled and inexperienced, from countries other than Taiwan, while retaining their own nationals only as officers. The countries supplying most of the crew are those that can supply labor at relatively low wages: Indonesia, Philippines, and China, as well as some Pacific island countries with very limited employment opportunities such as Vanuatu and Kiribati. The older, smaller Taiwanese vessels have a history of labor problems and disputes with Pacific island crewmen.

The crew is hired on a monthly salary of from $250 to $300 depending on nationality and individual company wage policy. Prospective crew may or may not have certain expectations or receive guarantees regarding the additional money that can be earned from shark fin sales as a part of overall compensation.

The number of port calls by longliners in American Samoa dropped 50 percent during the last decade, from 223 in 1990, to 111 in 1998. Part of this was due to the cessation of fishing by the Korean fleet, most of which was destroyed by hurricanes in 1990-91. These factors would tend to support the contention of shark fin dealers who have indicated that the volume of shark fin landed by longliners had decreased substantially since earlier in the decade (McCoy and Ishihara 1999).

In 1998, the overall estimated annual value of shark fins delivered by Taiwanese longliners to American Samoa (and not just that portion thought to be landed there) was estimated to be between $650,000 and $975,000. With roughly 1,400 non-officer crew in the fleet, the average annual income from shark fin sales would thus range from $464 to $696 per crew member. These

amounts are paid as a "bonus" in addition to normal salary (McCoy and Ishihara 1999). Because of several factors, including crew reluctance to spend money ashore and the absence of duty free sea stores in American Samoa, it is estimated that approximately 50 percent of crew "bonus" is spent in American Samoa.

i. Foreign Fishing Vessels Landing in Guam. There are two distinct groups of foreign longline vessels operating from Guam. The Japanese group consists of mainly small (under 20 gross registered tons) fiberglass vessels from Okinawa or the other southern islands of Japan. The second fleet is comprised of fiberglass Taiwanese vessels, of mainly two size classes: the first is roughly equivalent to the Japanese vessels in overall size, capacity, and horsepower, while the second is somewhat larger. Crews range from seven to nine on Japanese and the smaller Taiwanese vessels, up to ten on the larger Taiwanese vessels. Most crew are from Philippines, Indonesia, or China.

Both the Japanese and Taiwanese fleets target sashimi quality bigeye and yellowfin tunas that are transshipped by air to Japan. There are important differences in bycatch rates among the fleets, with the Taiwanese vessels tending to capture a greater percentage of both sharks and billfish than the Japanese. Work undertaken by the Oceanic Fisheries Program of the SPC (Lawson 1997) used observer data to interpret and refine reported catch data of the Taiwanese and Japanese fleets operating in the western Pacific, many of which are based in Guam from time to time. Preliminary results indicate that the percentage of sharks (by estimated weight) in bycatch of Taiwanese offshore longliners is on the order of 3.75 times greater than that by Japanese longliners. The SPC notes that these results need to be treated with some caution, as the observer coverage in both fleets has not been large and may not adequately cover some incidental species of bycatch. Nevertheless, the results point to what those in the industry understand and accept: that the Taiwanese do catch more sharks, that they make greater use of bycatch, and are more financially dependent upon sharks as a component of that bycatch.

Some of the Japanese longline vessels that transship their catch in Guam via air freight to Japan also operate from time to time out of ports in the Federated States of Micronesia and the Republic of Palau. All are owned by family-run small businesses in Japan that rarely exceed two or three such vessels. In some cases vessels are owner operated. Approximately 50-60 such vessels operate from Guam, and tend to remain in the western Pacific region for up to 2 years or more, returning to Japan only for periodic major refits and dry docking.

In the past, these vessels used only hook leaders or "gangions" made of wire. However, it appears that most, if not all, vessels now use monofilament leaders that presumably reduce shark catches while enhancing catches of the target species. Almost all the vessels employ refrigerated sea water (RSW) for initial cooling and holding of the catch. The few that are not fitted with RSW systems use ice.

Vessels take trips averaging from 14 to 20 days, depending on the distance to fishing grounds, usually in the Federated States of Micronesia or the high-seas areas to the south. Catches can

range from 2 to 15 tons. The vessels typically have only one or two Japanese nationals (a captain and sometimes engineer), while the rest of the crew are recruited mainly from the Philippines and Indonesia.

The limited freezer space on board the vessels and the fact that all tuna are carried in RSW reflect the concentration of Japanese longliners on the target species and relative disdain for handling or concerning themselves with bycatch, including sharks. Japanese vessels will retain some bycatch for the crew's consumption and freeze some economically valuable bycatch species, such as wahoo, for sale in Guam.

Crew compensation is around $300 per month. Increases in wages are reportedly given after the successful completion of a one-year contract and subsequent renewal. Typically, crew members are not paid these wages directly but rather most of the money is sent back to agents in their home country for dispersal to their families and to pay agents' fees (McCoy and Ishihara 1999).

In January 1999, the 50 to 60 vessels actively fishing from Guam employed from 350 to 420 crew. On the basis of shark fin ex-vessel value of $180,000 to $364,000, each crew member could be expected to receive from $409 to $827 per year. At the higher value, this would represent over two months' wages. It is believed that most income from shark fin sales is used by crew for their immediate personal needs in Guam.

The direct contribution from sharks to the economy of Guam from Japanese longline vessels comes from Filipino and Indonesian crews who spend most of the annual total of $180,000 to $364,000 in proceeds from shark fin sales ashore during port calls. Since employment arrangements require most of a crew member's wages to be remitted back to their home country directly, they have little money to spend for the purchase of necessities while living on the vessel (McCoy and Ishihara 1999).

In January 1999, there were approximately 35 Taiwanese longline vessels operating out of Guam delivering fresh sashimi-grade tuna for transshipment to Japan[7]. The overall number of vessels in the Taiwanese fleet in the WCPO is estimated to be over 200, with vessels also operating from time to time from ports in the Federated States of Micronesia, Republic of Palau, the Philippines, the Republic of the Marshall Islands, Bali, and other ports in Indonesia as well as the Indian Ocean. Like the Japanese vessels, they are mostly family owned and, according to one vessel agent in Guam, about 10 percent of the vessels are owner-operated. For most of the fleet (up to 80 percent of the vessels operating in the region) the captain owns a share of the vessel. About 10 percent of the vessels are operated by a hired captain.

The biggest difference between Taiwanese and Japanese longliners in Guam is the Taiwanese

[7] Vessel agents ascribed the small number of vessels to two factors: it was the off-season in the western Pacific region, and high license costs in FSM had driven vessels to base out of Bali, Philippines and elsewhere.

ability and interest in carrying a far greater amount of frozen bycatch on board than the Japanese. This is driven by the market in Taiwan for incidentally caught species, initially a fresh market satisfied by coastal vessels fishing in relative proximity to Taiwan, but now also filled by frozen incidental catch from vessels based overseas. Bycatch shark species whose carcasses are retained include silky and oceanic white tips. Shortfin makos are relatively rare, but are also retained. The carcasses of blue sharks are discarded. All sharks caught are finned with the fins frozen and stored on board in sacks. Most the bycatch, as well as the frozen fins, are either taken back to Taiwan by the vessel or shipped via container if the vessel plans to remain in Guam beyond the time when its freezer hold spaces are full.

Crews are made up of two, three, or four Taiwanese, with the remainder being either Indonesian or mainland Chinese. The wages paid are said to be about the same or a little less than those paid to crew from the Philippines who work aboard Japanese vessels, with $300 per month used as the benchmark figure for wages. As with Japanese vessels, there is most likely a bonus system employed by the Taiwanese.

The total number of port arrivals for all Taiwanese longline vessels averaged 1,065 per annum from October 1995 to September 1998. Although there are seasonal variations in the number of vessels that might call at Guam to offload fish, there has been a continuous downward trend in the number of vessel arrivals, with 886 recorded in 1998. (McCoy and Ishihara 1999).

Only a few species of shark landed as bycatch by Taiwanese vessels operating from Guam are kept for their meat. The most common sharks retained in the tropical western Pacific are shortfin mako, oceanic white tip, and silky sharks. Silky sharks are also kept and utilized for the crew's food on board. Blue sharks are normally finned and discarded. A small data set shows that about half or 48 percent of 555 silky sharks captured were retained as carcasses and fins, as were about 43 percent of 135 oceanic white tips and 84 percent of 43 short fin makos. On the other hand, 95 percent of blue sharks were finned with the trunks discarded (McCoy and Ishihara 1999).

Blue sharks, which have relatively high levels of urea in their flesh, are generally not retained because their price in Taiwan is too low to justify the retention, handling, and shipping costs involved. Space in the fish hold is reserved for higher value species of incidental catch such as wahoo or mahimahi, some of which can be profitably sold ashore in Guam rather than being shipped back to Taiwan. However, if a vessel is on its last trip before returning to Taiwan and has fish hold space available, the crew will take the blue sharks with the expectation of receiving at least some value from them.

The direct contribution to Guam's economy from Taiwanese vessels delivering frozen shark fins and frozen shark for transshipment is mainly in the transfer and shipping of these commodities to Taiwan. The volume of wet fins and frozen shark carcasses estimated to have been landed in Guam and exported to Taiwan in 1998 was from 14 to 18 tons and 38 to 56 tons, respectively. These shipments were included with other bycatch in standard freezer shipping containers. Assuming that each shipment represents one standard 20 foot shipping container, and shipping

and handling costs of $3,500 per container to the Asian destinations, the contribution would be on the order of $53,000 (McCoy and Ishihara 1999).

Tuna purse seiners from Taiwan and Korea have used Guam extensively in the past for resupply and crew rest. The amount of shark finning that is carried out on board these vessels during regular fishing operations in the WCPO is unknown, but is thought to exist to some degree. It is assumed that less finning takes place on purse seiners from these two nations than on U.S. vessels because of lesser effort expended on fishing on FADs and other floating objects.

j. Foreign Fishing Vessels Landing in the Commonwealth of the Northern Mariana Islands. There are no foreign fishing vessels landing fish in CNMI at present. A tuna purse seine transshipment operation existed in Tinian during the early 1990's and involved some shark fins being landed at that port; however, the facility has not been active for at least five years.

D. Foreign Trade in Shark Fins

1. Atlantic

According to U.S. Census Bureau data, approximately 13 to 21 percent of imported shark fins entered U.S. Atlantic ports by cargo vessel in 1999 and 2000 (Tables 17 and 18). Australia exported the majority of dried shark fins delivered to Atlantic ports by vessel in 1999 (Hong Kong also imported some dried shark fins by vessel), although all dried shark fins from Australia were shipped to these ports via air freight in 2000. In 2000, Ecuador, India, and Indonesia were the primary importers of dried shark fins to Atlantic ports by cargo vessel (Hong Kong and Japan also imported some dried shark fins by vessel). However, Ecuador shipped all dried shark fins via air freight in 1999, and India and Indonesia did not import dried shark fins to Atlantic ports in 1999. Imports to Atlantic ports by vessel from Hong Kong were about 10 percent of all imports of dried shark fins to Atlantic ports in 1999 and 2000. Thus, the countries that import dried shark fins to Atlantic ports also import fins via air freight either within the same year or in different years. Accordingly, the impacts of the final action would likely be minimized if those countries shifted to importing dried shark fins entirely via air freight or land transportation. While there would likely be some increased costs associated with changes in shipping arrangements, the fact that many (if not all) of those countries already import dried shark fins via air freight or land transportation should minimize those costs.

Table 18 Dried Shark Fins, Imports for the Year 1999.

Shipments that did not come in on a vessel arrived via air or land transportation.
Source: U.S. Census Bureau, Washington DC 20233.

Country	Port of Entry	Port of unlading	Weight of shipments by vessel (kg)	Value of shipments by vessel (US$)	Weight of all shipments (kg)	Value of all shipments (US$)
Canada	Maine	Maine	--	--	5,283	73,653
Mexico	San Diego	San Diego	--	--	5,820	83,453
Guatemala	New York City	New York City	--	--	2,657	40,782
Nicaragua	New York City	New York City	--	--	2,678	63,407
Panama	New York City	New York City	--	--	379	20,536
Trinidad	New York City	New York City	--	--	1,402	55,199
Guyana	New York City	New York City	--	--	698	35,353
Ecuador	New York City	New York City	--	--	419	5,373
Brazil	San Francisco	Los Angeles	--	--	2,800	131,915
Argentina	Miami	Miami	--	--	10,987	156,055
	Los Angeles	Los Angeles	--	--	4,375	40,725
		Total	--	--	15,362	196,780
Thailand	San Francisco	San Francisco	--	--	60	16,321
Republic of Philippine	Los Angeles	Los Angeles	200	3,450	200	3,450
China	New York City	New York City	--	--	1,115	14,992
	San Francisco	San Francisco	997	40,000	1,168	52,197
	San Francisco	Seattle	623	43,085	623	43,085
		Total	1,620	83,085	2,906	110,274

Country	Port of Entry	Port of unlading	Weight of shipments by vessel (kg)	Value of shipments by vessel (US$)	Weight of all shipments (kg)	Value of all shipments (US$)
Hong Kong	New York City	New York City	710	68,489	6,171	231,853
	San Francisco	San Francisco	673	39,467	673	39,467
		Total	1,383	107,956	6,789	271,320
Japan	New York City	New York City	--	--	10	3,875
	San Francisco	San Francisco	4,844	300,535	4,844	300,535
		Total	4,844	300,535	4,854	304,410
Australia	New York City	Philadelphia	7,565	692,620	7,565	692,620
Total			15,612	1,187,646	59,872	2,104,846

Port of entry is the port where the paperwork is filed
Port of unlading is the port where the product comes into the country off the cargo vessel, train, truck, or airplane.
Custom value is the value of merchandise not including the cost of insurance. This is the value that duty is charged against.

Table 19 Dried Shark Fins, Imports for the Year 2000.

Shipments that did not come in on a vessel arrived via air or land transportation.
Source: U.S. Census Bureau, Washington DC 20233.

Country	Port of Entry	Port of unlading	Weight of shipments by vessel (kg)	Value of shipments by vessel (US$)	Weight of all shipments (kg)	Value of all shipments (US$)
Canada	Maine	Maine	--	--	5,305	259,933
	Detroit	Detroit			2,144	89,165
		Total			7,449	349,098
Mexico	El Paso	El Paso	--	--	270	7,539
	San Diego	San Diego			6,511	97,420
		Total			6,781	104,959
Guatemala	New York City	New York City	--	--	2,097	31,360
Nicaragua	New York City	New York City	--	--	204	11,739
Costa Rica	Miami	Miami	--	--	1,100	25,970

Country	Port of Entry	Port of unlading	Weight of shipments by vessel (kg)	Value of shipments by vessel (US$)	Weight of all shipments (kg)	Value of all shipments (US$)
Panama	New York City	New York City	--	--	204	11,125
Trinidad	San Francisco	Miami	--	--	375	2,081
Ecuador	New York City	New York City	1,400	2,100	1,832	5,700
Brazil	San Francisco	New York City	--	--	500	21,000
	San Francisco	Los Angeles			850	39,000
		Total			1,350	60,000
Argentina	Miami	Miami	--	--	24,527	640,543
		Chicago			157	11,200
		Total			24,684	651,743
Spain	Los Angeles	Los Angeles	--	--	180	4,587
India	Miami	New York City	1,000	7,500	1,000	7,500
		Los Angeles	2,981	16,568	2,981	16,568
		Total	3,981	24,068	3,981	24,068
Indonesia	New York City	New York City	2,500	16,875	2,500	16,875
China	New York City	New York City	261	17,032	261	17,032
	New York City	Los Angeles	187	11,849	187	11,849
	San Francisco	San Francisco	950	38,000	950	38,000
	San Francisco	Hawaii	--	--	216	21,600
		Total	1,398	66,881	1,614	88,481
Hong Kong	New York City	New York City	390	98,899	4,242	530,047
Japan	New York City	New York City	160	2,296	160	2,296
	San Francisco	San Francisco	6,254	421,696	6,254	421,696
		Total	6,414	423,992	6,414	423,992

Country	Port of Entry	Port of unlading	Weight of shipments by vessel (kg)	Value of shipments by vessel (US$)	Weight of all shipments (kg)	Value of all shipments (US$)
Australia	New York City	New York City	--	--	1,100	13,750
Total			16,083	632,815	66,107	2,355,575

Port of entry is the port where the paperwork is filed
Port of unlading is the port where the product comes into the country off the cargo vessel, train, truck, or airplane.
Custom value is the value of merchandise not including the cost of insurance. This is the value that duty is charged against.

2. Hawaii

Foreign trade, with respect to Hawaii, is addressed here as trade that takes place to or from the Honolulu Customs District, which includes all ports of entry throughout the State. Guam, Northern Mariana Islands, and American Samoa are not included under direct U.S. Customs jurisdiction, as each entity is responsible for monitoring exports and imports in their respective jurisdictions. Foreign trade in shark fins is used here to mean the import, export, or re-export of raw material, i.e. shark fins, either dry or wet/frozen. These activities are usually undertaken only by traders who are knowledgeable in the various forms and particular traits of the commodity, as well as other aspects of the trade itself. These same traders also take part in domestic trade in shark fins between Hawaii and the U.S. mainland.

In 2000, the exports of dried shark fins from the U.S. to Asia totaled 365 mt (803,000 lbs), more than three times the 107 exported in 1999, and two and a half times more than the 141 mt (310,200 lbs) exported in 1998. In 2000, the U.S. Customs District recording the most exports was New York with 216 mt (475,200 lbs). Honolulu was second with 48 mt (105,600 lbs), and San Francisco third at 42 mt (92,400 lbs)[8] (NMFS 2001H).

The number of Hawaii-based shark fin traders is not established but is believed to be fewer than five. Most of their activities have been associated with the domestic market for shark fins. Whether purchased for domestic markets or foreign, traders are assumed to be purchasing on their own account and operating on a gross profit margin of 35 percent. Within this margin are direct expenditures for handling and carrying expenses, shrinkage and spoilage loss, shipping, payments to purchasing agents, any primary processing that might be undertaken, and the traders'

[8] The complexity of the shark fin trade does not mean that fins are necessarily produced close to or even in the same country as those from which they are exported. In the U.S., factors such as availability of labor, overseas contacts, and astute trading all can play a role in determining the locale from which exports are sent. See McCoy and Ishihara 1999 for a more complete explanation.

profits.

It is not known if shark fin traders in Hawaii purchase fins and speculate in the market or if they have particular trading arrangements with established buyers. In 1999 one reported importing unstated amounts of frozen shark fins from Spain on a monthly basis and employing five people in drying and processing the product for export to Hong Kong (Wong 1999 cited in McCoy and Ishihara 1999).

In 2000, a total of 26.55 mt (58,410 lbs) was reported imported into Hawaii (from Peru and Trinidad and Tobago) as "shark not specified product form (NSPF) frozen" (NMFS 2001H). Since there is a very limited market for shark meat in Hawaii that is met or exceeded by local landings, it is thought that this amount refers to frozen shark fins brought to Hawaii for processing.

Exports of shark fins in 2000 consisted of a total of 47.99 mt (105,578 lbs) of dried shark fins exported from Hawaii, with a declared value of $822,453. All exported fins went to Hong Kong. This figure represents 24 percent of all reported U.S. exports of dried shark fins to Hong Kong and almost a nine-fold increase in the volume exported from Hawaii to that destination in 1999. The 2000 export volume represents almost a three-fold increase in overall exports of dried shark fins from Hawaii that totaled 17.25 mt (37,950 lbs) in 1999 (NMFS 2001H).

Comparing the declared value of exports in 2000 to total average export sales for the Honolulu metropolitan area during the last half of the last decade of $232 million (McCoy and Ishihara 1999) shows shark fins to be about 0.35 percent of total exports.

The landing of shark fins transshipped from foreign flag vessels beyond the U.S. EEZ and delivered to Honolulu by U.S. flag vessels for onward shipping under NMFS receiving permits occurred approximately 12 to 18 times per year for several years in the past. This activity no longer takes place.

3. Guam

Shark fins purchased in Guam are only those dried fins produced by the Japanese longline vessels that call at Guam to transship high value tuna to Japan via air. There are estimated to be from two to four traders active in Guam. All of them are engaged in other businesses and do not solely rely on shark fin trading as their sole source of income. As in Hawaii, it is assumed that traders in Guam purchase on their own account rather than for others overseas. As such, a gross margin of 30 percent is estimated to represent handling and carrying expenses, payments to purchasing agents, shrinkage and loss, any primary processing that might be undertaken, and the traders' profits. This represents from $54,000 to $109,000 in annual contribution into the economy of Guam.

Guam has no export tax, so no direct government revenue is realized from these outbound

shipments.

4. American Samoa

In 1998, approximately 80 percent of the shark fins sold in American Samoa were landed by distant-water longliners, with the remainder coming from U.S. purse seiners. There are thought to be at least two major traders active in American Samoa. These traders have extensive business interests outside of shark fin trading, and utilize employees from those enterprises in the handling and storage of shark fins purchased from fishing vessels. One trader has a small drying and packaging plant where fins were further dried with mechanical hot air dryers and trimmed before shipment. As with traders in other locations, those in American Samoa must account for handling and carrying expenses, shipping, payments to purchasing agents, shrinkage and loss, as well as the primary processing mentioned. The total annual contribution to the economy was calculated at $123,000 to $187,000 (McCoy and Ishihara 1999).

Income to the American Samoa government from the 5 percent tax on the sale of shark fins has not produced much income. This has been mainly due to the difficulty Customs officers have in monitoring the actual sales of fins which they say are often clandestine and occur at night or at locations away from the vessels. Since June 1997, collections have totaled $6,519 out of a theoretical $34,100 to $50,000 based on estimated fin value.

In 1998, it was reported that approximately 450 Japanese longliners and 18 tanker/supply vessels called at Honolulu. The tanker/supply vessels, sometimes referred to as “motherships” collect shark fins from foreign fishing vessels on the high seas that were formerly transshipped to Honolulu aboard U.S. fishing vessels. These tankers obtain fuel and supplies in Honolulu and return to the high seas to carry out their primary job: servicing the fishing vessels. Fishing vessels were estimated to spend from $40,000 to $60,000 per port call, and tanker/supply vessels from $750,000 to $1,600,000 (Hatakayama 1999). Overall gross sales for fuel, provisions and services to these vessels is estimated at $40,000,000 to $50,000,000 involving numerous local and out of state vendors (Yoshizawa 1999).

V. IMPACTS OF THE ALTERNATIVES

A. Baseline Conditions under Current Management of Shark Fisheries - No Action Alternative (Status Quo)

In order to determine the impacts of the selected action and alternatives, it is necessary to establish the likely future condition in the absence of action. This section summarizes current and prospective future management of shark fisheries and finning and the conditions expected if no action were taken to implement the Act.

B. Current Management

A summary and comparison of the current reporting requirements for fishermen and dealers in the Atlantic and Pacific Oceans is presented in table 20.

Table 20 **A Summary of All Federal Reporting and Recordkeeping Requirements for Commercial Fishermen and Dealers Regarding Sharks.** This is a summary only; for the exact regulations please see the part specified.

Fishery Management Plan	Fishermen		Dealers
	Logbooks	Weighout slips	
HMS FMP	50 CFR 635.5 (a) (1): If selected for logbook reporting in writing by NMFS, an owner of a permitted vessel must maintain and submit a fishing record on a logbook specified by NMFS. Entries are required regarding the vessel's fishing effort and the number of fish landed and discarded. Entries on a day's fishing activities must be entered on the form within 48 hours of completing that day's activities. Completed forms must be submitted within 7 days of offloading.	50 CFR 635.5 (a) (2): If an owner of a permitted vessel is required to maintain and submit logbooks and Atlantic HMS are sold, the owner must obtain and submit copies of weighout slips for those fish with the logbook reports. Each weighout slip must show the dealer to whom the fish were sold, the date they were sold, and the carcass weight of each fish (or group total if not weighed individually). A weighout slip for sharks must record the weights of carcasses and any detached fins.	50 CFR 635.5 (b): Dealers that receive Atlantic sharks must report all Atlantic sharks received from U.S. vessels on a form available from NMFS. The reporting requirement may be satisfied by providing a copy of each appropriate weightout slip or sales slip provided the form includes are required information and identifies each fish by species.
Spiny Dogfish FMP	50 CFR 648.7 (b)(1): The owner of a permitted vessel must maintain on board the vessel and submit an accurate daily fishing log report for all fishing trips, regardless of the species fished for or taken, on the supplied forms. The reports must contain information on the vessel, the date of the trip, the location of the trip, the pounds by species of al species landed or discarded, the dealer permit number and name, and the date sold. Reports must be received within 15 days after the end of the reporting month.	Not applicable.	50 CFR 648.7 (a): Federally permitted dealers must submit a detailed weekly report on the supplied forms. Each report must contain the dealer information, the vessel information, the dates of purchases, pounds by species, price per pound by species or total value of species, port landed, and the signature of dealer. Additionally, all dealers must complete the "employment data" section of the annual processed products report. Reports must be received within 16 days of each reporting week.

State regulations	West Coast: California has a logbook for drift gillnet fishing vessels; no other state logbook requirements at this time for fisheries that take sharks Hawaii: Monthly commercial catch reports are to be filed by all fishermen even for days when no catch is made or retained U.S. Affiliated Entities: None; data are collected by agency staff port sampling or by voluntary submission	West Coast: All commercial landings are recorded on state landings receipts, usually filled out by the buyer; the landings receipt is provided to the fishery agency for processing Hawaii: None U.S. Affiliated Entities: None	West Coast: No formal dealer reporting requirements on purchases or sales Hawaii: None U.S. Affiliated Entities: None
High Seas Fishing Compliance Act	West Coast: Logbooks of catch and effort are required for all fishing on the high seas by any gear unless that vessel is already reporting under some other requirement; longline is only gear used extensively that would take sharks	None	None
International Arrangements	Eastern Pacific: Purse seine vessels must maintain logbooks of catch and effort; if they maintain and submit to IATTC the IATTC log, they have met the U.S. requirement South Pacific: Purse seine vessels must maintain and submit logbooks of catch and effort; logbooks are generally collected and processed by NMFS, and data are then transmitted to Treaty Administrator	None	None
Western Pacific Pelagics FMP	All longline vessels must maintain and submit to NMFS a logbook with catch and effort data	None	None

1. Atlantic Ocean, Gulf of Mexico and Caribbean Sea

Seventy-three species of sharks are known to inhabit the waters along the U.S. Atlantic coast, in the Gulf of Mexico and in the Caribbean Sea. Seventy-two species are managed under the HMS FMP pursuant to Secretarial authority. Spiny dogfish also occur along the U.S. coast, however, management for this species is under the joint authority of the New England and Mid-Atlantic Fishery Management Councils.

Based on a combination of ecology and fishery dynamics, NMFS initially separated 39 shark species into three species groups in the first Secretarial Shark FMP (NMFS, 1993). An additional 34 species (including spiny dogfish) were included in data collection programs but not included in the management unit. In the 1999 HMS FMP, NMFS added two additional species groups (prohibited species and deepwater/other sharks). Also in 1999, NMFS implemented limited access for the Atlantic commercial shark fishery. NMFS has since issued 287 directed permits to target sharks and 585 incidental permits to land shark caught during fishing operations for other species (NMFS 2001E). Although the management unit is split into several species groups, any fisherman with a permit can land any species of shark (except prohibited species), within the appropriate retention limits. Fishermen without a permit are only authorized to land sharks under the recreational limit and cannot sell any sharks they land.

Current commercial regulations for Atlantic sharks include limited access permitting and reporting requirements, quotas for each species group, separate quotas for porbeagle and blue sharks, a trip limit of 4,000 pounds dressed weight (dw) of large coastal sharks for directed permits, a trip limit of 5 large coastal sharks and 16 pelagic and small coastal sharks combined for incidental permits, a ban on finning, prohibited species, and authorized gears.

Current recreational regulations for Atlantic sharks include a bag limit of one shark per vessel per trip with a minimum size of 4.5 feet fork length; an allowance for one Atlantic sharpnose shark per person per trip (no minimum size); a requirement that all landed sharks must have heads, tails, and fins attached; a ban on finning; prohibited species; authorized gears; and a no sale provision.

Shark finning by U.S. vessels is prohibited under Federal regulations implementing the fishery management plan for swordfish, tuna and shark fisheries in the Atlantic, Gulf of Mexico, and Caribbean.

The Spiny Dogfish FMP implemented the following measures: 1) A commercial quota; 2) seasonal (semi-annual) allocation of a commercial quota; 3) a prohibition on finning; 4) a framework adjustment process; 5) the establishment of a Spiny Dogfish Monitoring Committee; 6) annual FMP review; 7) permit and reporting requirements for commercial vessels, operators, and dealers; and 8) other measures regarding sea samplers, foreign fishing, and exempted fishing activities.

The finning prohibitions in these plans are not effective for fishermen who do not hold an Atlantic federal shark or Spiny dogfish permit. This would include fishermen who fish solely in state waters. Currently, 8 (Delaware, Florida, Louisiana, Maryland, New York, North Carolina, South Carolina, and Virginia) out of 19 Atlantic coastal states expressly prohibit shark finning. Generally, the states that usually report the highest number of shark landings expressly prohibit shark finning. Because NMFS does not maintain records of fishermen that fish exclusively in state waters and do not have federal permits, NMFS cannot estimate the number of fishermen who currently fish in the state waters of states that do not prohibit finning . Also, NMFS cannot estimate the number of sharks that are finned by these fishermen. However, NMFS believes that most, if not all, directed shark or spiny dogfish fishermen (those that target sharks for a substantial portion of their gross revenues) hold either an Atlantic shark permit or a spiny dogfish permit. NMFS believes that most of the fishermen who do not hold one of these permits would be those fishermen that catch sharks incidentally to other fishing operations. While the number of fishermen in this situation could be relatively large (given the large number of state fisheries and the susceptibility of sharks to many types of fishing gears), NMFS does not believe the number fishermen who currently fin sharks is large.

2. West Coast

There are no Federal regulations currently limiting finning by vessels in or beyond the EEZ or in state waters off the West Coast or by vessels landing into the West Coast. However, all three West Coast states prohibit waste or destruction of food fish, such as sharks. California specifically prohibits the landing or possession of any shark fin or shark tail of portion thereof that has been removed from the carcass. Washington indirectly prohibits finning by a provision under which "it is unlawful to take, fish for, possess or transport for any purpose food fish, shellfish, or parts thereof, in or from any waters or land over which the state has jurisdiction**."** Oregon indirectly prohibits finning by requiring that fish landings receipts must include the pounds of each species received, with pounds to be determined by taking the actual round weights of the fish unless a conversion from dressed weight has been established in state regulations. No conversion for shark fins has been established in those regulations, and therefore shark fins cannot be landed independent of the carcass.

3. North Pacific

Shark catches are limited by an incidental catch allowance in the Gulf of Alaska groundfish fishery to 5 percent of the combined quotas of all other groundfish. The North Pacific Council has been asked by the State of Alaska to take action to prohibit commercial fishing for sharks and skates in Federal waters. This would match State action to prohibit such fishing, though it would allow an experimental commercial fishery in the future under controlled circumstances. This action is tentatively scheduled for mid-to-late 2001.

4. Western Pacific

There are no Federal regulations prohibiting the finning of sharks in western Pacific, and finning was quite common in the western Pacific longline fisheries until 2000, when the State of Hawaii enacted a law on shark finning (Hawaii Revised Statute 1947.) This law, which took effect on June 22, 2000, stated in part, "No person shall knowingly harvest shark fins from the territorial waters of the State, or land shark fins in the State, unless the fins were taken from a shark landed whole in the State". Some longline operators have raised a question as to whether the State has authority to impose regulations on vessels fishing and shark finning in Federal waters; however, the MSFCMA provides that States have the authority to manage fishing by State-registered vessels in the U.S. EEZ in the absence of conflict with any federal regulations.

Currently, neither the Territory of Guam, the Territory of American Samoa, nor CNMI has passed laws or promulgated regulations that govern shark finning.

5. International Management

At the February 2001 meeting of the Committee on Fisheries of the Food and Agriculture Organization, the United States called for all members to implement fully the International Plan of Action (IPOA) for the Conservation and Management of Sharks. The United States urged the FAO to:

1. Develop technical assistance programs to address specific fishery/species concerns, including pilot programs to explore approaches that are transferrable to other countries/regions with similar issues;
2. Collaborate with regional fishery bodies to facilitate shark research, monitoring and management, possibly through regional shark research groups and training programs/workshops to advise on and standardize species identification, data collection and monitoring, biological studies, fishery-independent surveys and assessments; and
3. Convene an international technical meeting to identify fishing methods that will achieve the goals outlined in the IPOA with an emphasis on minimizing bycatch, waste, discards and discard mortality in fisheries that catch sharks, and establishing biological reference points for shared shark stocks.

It should be noted that the IPOA does not explicitly call for an end to shark finning. It is directed to ensuring fishery monitoring so that the effects of shark fishing mortality can be determined and harvests can be kept at sustainable levels. The IPOA does acknowledge the need to control and minimize waste in the utilization of sharks.

Following the COFI meeting, the Department of State and Department of Commerce held a consultation to discuss the next steps for implementation of Section 5 of the Shark Finning Prohibition Act. The discussion focused on possible bilateral, multilateral and regional agreements with other nations that could further the goals of the Act. There are a number of mechanisms that may be used to urge other governments involved in finning for sharks, or

importing shark products, to collect trade data in order to determine the nature and extent of shark finning worldwide. The collection of biological data, such as stock abundance and bycatch levels, is also a critical part of the effort to gain international cooperation. The Department of State and Department of Commerce are working together to develop a comprehensive plan to promote international adoption of measures for the conservation of sharks.

C. Projected Future Conditions

Section IV.A. provides information about the status of shark stocks taken in U.S. fisheries and potentially subject to finning. Section IV.B. provides information about the species with special protection needs that are occasionally taken in shark fisheries and that have been the subject of consultations under the ESA. Section IV.C. provides information about the fisheries that take sharks and that might be affected by the selected action.

The United States will continue to carry out actions to achieve long-term conservation of shark populations that are affected by U.S. fisheries. Actions through fishery management plans under the Magnuson-Stevens Act will promote sustainable use of these shark populations to the extent this can be achieved by unilateral U.S. actions. However, in view of the widespread distribution of most shark species, unilateral action is not likely to be sufficient to ensure long-term conservation. Therefore, the United States also will pursue cooperation through international arrangements to achieve effective conservation of shark stocks throughout their range. This will include efforts to obtain and analyze additional data to assess the condition of shark stocks and determine management needs. It is not known if shark stocks will be healthy or not in coming years in the absence of this action. However, the abundance of sharks and availability to U.S. fishing vessels will not likely change significantly even if this action is not taken. That is because other efforts are being taken to maintain shark stocks in areas used by U.S. vessels.

Many of the species given special protection under U.S. laws are indeed at low populations and will likely continue to stay at low levels in the immediate future whether or not this action is taken.

Most of the fisheries in the Atlantic, Gulf of Mexico and Carribean, on the West Coast, and in the north Pacific will continue to be carried out as they have been for the foreseeable future in the absence of this action. The U.S. fisheries in the central and western Pacific will be somewhat reduced from levels of the early 1990s for two reasons. First, the restrictions imposed on the longline fishery out of Hawaii in 2000 and 2001 to protect sea turtles will force a change in the primary mode of operation, moving effort away from swordfish targeting and into tuna targeting. This would result in a substantial drop in the catch of swordfish but could result in a substantial increase in tuna catches. Whether there would be a net decrease in revenue to the fleet is not known, although the fishing industry has indicated it will be devastated. There also may be a shift of vessels from Hawaii to other areas. Second, the action by the State of Hawaii to prohibit finning by its vessels led to a sharp drop (though not total termination) in the landings of fins into Honolulu, and this decline in revenue is not yet fully reflected in landings and income information

for the fishery. It is expected that landings and sales of fins would continue to decline in the absence of this action. In another western Pacific area, there has been a recent increase in the level of longline fishing in American Samoa, but information to document the extent of shark finning and sales that has occurred and would continue in the absence of this action is lacking. Records indicate that only 510 sharks were caught by fishermen in American Samoa in 1999, and the total weight of landings of sharks in 1998 was only 24,000 pounds, but this may not be indicative of the shark catches and finning that would occur if no action were taken. It is expected that the recent past level of foreign landings and sales of shark fins, and the business activity associated with those sales, would continue in American Samoa if no action were taken. Similarly, it is expected that the recent level of landings and sales of shark fins by foreign vessels in Guam would continue in the absence of this action.

No changes in international trade in shark fins are expected in the absence of the selected action.

D. Impacts of the Final Action - Alternative A

The final action is not expected to result in major changes in the fisheries which catch sharks. Where sharks are targeted species, U.S. fisheries can continue to catch sharks and land fins along with carcasses as is now done. In U.S. fisheries in which sharks are a non-target species, the fisheries will continue but there will likely be a decrease in finning because the fins harvested from waters seaward of the inner boundary of the U.S. EEZ cannot be landed in U.S. ports unless the corresponding carcass is also landed. In foreign fisheries, whether sharks are targeted or incidentally caught, there is not likely to be a significant change in finning by vessel crew because the crew will likely find places where the fins ultimately can be landed and sold.

The impacts of this alternative will be most direct on the businesses that (a) deal in shark fins and (b) provide goods and services to vessels and crew on vessels that have landed fins into U.S. ports.

These impacts are discussed more fully in the following sections.

1. Biological Impacts

a. Impact on Shark Stocks. This alternative is expected to result in some reduced shark mortality from U.S. fishing and little or no reduction in shark mortality from foreign fishing fleets. This may slightly lower the risk that finning would lead to greater fishing mortality from U.S. and foreign fishing and thus contribute to overfishing of any shark stocks. To the extent there are positive impacts, the final action will have the greatest positive impact on blue sharks, a moderate to small impact on thresher, and the least impact on mako sharks in the central and western Pacific.

It should be noted that measures already in place under the Atlantic HMS FMP for Federal waters

in the Atlantic, Gulf of Mexico, and Caribbean Sea and under state regulations in 8 of the 19 east coast states and on the West Coast effectively preclude or prohibit finning and thus the final action will not have significant impacts in those areas. Further, the recent change in Hawaii law that prohibits landings of fins without carcasses already has resulted in a substantial reduction in shark finning in the Hawaii longline fleet, which accounted for the greatest amount of finning by U.S. vessels in the region. In Alaska, there has been no finning activity and this action would preclude development of finning activities in waters seaward of the inner boundary of the U.S. EEZ. Thus the incremental impacts of the final action will be relatively insignificant in most areas.

The extent of the reduction of shark mortality from implementing these prohibitions as final in the western Pacific cannot be predicted with certainty. First, there are limited data on the total numbers of sharks caught, the percent alive when brought to a vessel, and the number that could have been released alive but were killed to be finned. Second, it is not clear whether or how fishing vessel operators might change their strategies as a result of these regulations or other measures and how this may affect shark catches and mortality.

Eliminating finning will only eliminate some of the shark mortality associated with the U.S. shark fisheries as a high proportion (30 percent or more) of the sharks caught are dead when gear is retrieved. In fact, the fishing practice and attitudes of some Hawaii-based longline fishers towards sharks may still result in some mortality in the Hawaii longline fishery beyond those retained[9]. However, shark mortality will be reduced to the extent that sharks brought to a vessel alive are released without further harm rather then being brought aboard the vessel and killed and finned. Some reduced mortality can be expected from fleets under U.S. jurisdiction, and in absolute numbers the shark mortality from those fisheries will be less than that experienced during the last decade.

Shark fin landings in Hawaii should decrease as the final action prohibits U.S. and foreign fishing vessels from landing fins harvested from waters seaward of the inner boundary of the U.S. EEZ without corresponding carcasses. For Hawaii, the greatest drop in mortality attributable to fishing will be for blue sharks. The longline fishery caught between 71,000 and 90,000 blue sharks each year from 1998 through 2000. Of these, 61 percent, 66 percent, and 37 percent were finned in 1998, 1999, and 2000 respectively. However, many if not most of these sharks were dead prior to being brought on board for finning. Thus, the reduction in mortality due to prohibiting finning can be anticipated to be low or very low for this species. Further, the number of sharks retained and landed in Hawaii has increased steadily over the last three years, from 47 in 1998 to 81 in 1999, and 486 in 2000, a ten-fold increase in three years. Anecdotal evidence suggests that in the two last quarters of 2000, the period since the Hawaii State prohibition on landing shark fins, more sharks are actually being landed than are being reported as landed. In any event, at the

[9] Two of the considerations cited by fishers in Hawaii in determining whether or not to simply release sharks are the potential adverse financial consequences of shark attacks on hooked target species and the loss of gear, mainly hooks.

reported rate of retention, approximately 1,600 blue sharks could be expected to be killed during the first year of these regulations. This is still only about 5 percent of the total shark mortality in 2000 attributed to finning.

Mortality of shortfin mako and thresher sharks (the two species with the highest market value for meat) may drop somewhat, but on a percentage basis, the share of the catch killed will probably remain relatively high. Thresher sharks are the second most numerous sharks caught by the longline fishery in Hawaii, but still were less than 5 percent of the number of blue sharks caught in 2000. Although the number of thresher sharks kept doubled from 142 in 1998 to 302 in 2000, the percentage kept of the total number caught in 2000 is still relatively low at 9.5 percent. Although there is a small market for thresher shark meat, several reasons mitigate against retention in significantly higher numbers: (1) thresher sharks dress out much smaller than mako, the other saleable shark, so returns are less for a given amount of labor, and (2) thresher shark fins are worth less than mako fins.

The absolute number of mako sharks caught in the fishery compared to blue sharks caught is also quite small with about one mako for every 60 blue sharks. A market in Hawaii (although small and apparently inelastic) does exist for mako sharks, so there could be greater mortality of mako sharks than blue sharks on a percentage basis. This is indicated by the fact that although the percentage of shortfin mako caught that were finned in the past three years has been dropping steadily, from 43 percent in 1998 to 38 percent in 1999 and 27 percent in 2000, the number kept has risen from 36 percent in 1998 to 44 percent in 1999 and 45 percent in 2000. Mako sharks dress out larger than thresher sharks and their fins are, in general, more valuable than either thresher or blue sharks.

The impact of the final action on mortality in stocks of oceanic white tip and silky sharks may also be somewhat positive, as these are the two most commonly caught sharks by U.S. tuna purse seine vessels in the central and western Pacific. There are not enough reliable data, however, to determine the extent of the reduction in this mortality from the 35 U.S. purse seiners active in the WCPO. These vessels represent 18 percent of the 201 purse seine vessels from 13 countries that operated in 1999. Because most sharks caught by purse seiners are already dead when brailed on board with the target species of tuna, it is doubtful that any reduced mortality in sharks due to killing sharks to allow finning will approach the overall number of sharks caught and killed in the fishery. It is also extremely unlikely that fishers will attempt to save sharks caught in purse seine nets by freeing the animals in the water, as is done for dolphins in the eastern tropical Pacific by U.S. fishers there.

The final action is not expected to affect the level of fishing mortality from or the risk of overfishing associated with international fisheries on stocks distributed on the high seas. Those fleets can be expected to continue fishing as in the past and finning sharks, even though the fins would likely not be landed on Guam or American Samoa in any large volume.

b. Impact on Other Fish Stocks. The final action is not expected to affect the status of other

fish stocks. Sharks are generally an incidental catch in most areas where finning has historically occurred. The target stocks are typically tunas and related large pelagic fishes. Restricting finning or prohibiting the landing of fins harvested from waters seaward of the inner boundary of the U.S. EEZ (or harvested by fishermen with Atlantic shark commercial or spiny dogfish permits) without corresponding carcasses is not expected to substantially affect the fishing behavior of the vessels targeting these other species. Thus fishing mortality is expected to remain at levels that would occur even if this action were not taken.

c. Impact on Protected Resources. Fishing activities by vessels that have typically engaged in finning are not expected to change significantly as a result of this alternative. Therefore, there should not be any impacts on sea turtles or other protected resources different from the impacts analyzed in past Section 7 consultations for fisheries that catch and fin sharks in waters seaward of the inner boundary of the U.S. EEZ. These impacts have been discussed at length in biological opinions and environmental analyses associated with Federal fishery conservation and management measures under the HMS FMP for the Atlantic, Gulf of Mexico, and Caribbean Sea (NMFS 1999); under regulations for the drift gillnet fishery off California and Oregon; and under the WPPFMP for the central and western Pacific (WPFMC 2000).

Similarly, the impacts of fisheries interactions with sea birds will not change as a result of this action. Sea bird interactions are common in Pacific longline fisheries and are being addressed in other management programs. As fishing activities (level of fishing, areas fished, gear used, etc.) are not expected to change due to this action, the impacts of those fisheries on sea birds are not expected to change.

2. Economic Impacts

a. Atlantic, Gulf of Mexico, and Caribbean Sea. In this area, this alternative would not impact Federal Atlantic commercial shark limited access permit holders, federally permitted spiny dogfish fishermen, or recreational fishermen who fish in Federal waters because the prohibition on finning is already in force.

Most, if not all, directed shark fishermen (those that target sharks for a substantial portion of their gross revenues) hold Federal shark limited access permits or Federal spiny dogfish permits and would not be impacted by the final action, and the dealers that purchase shark fins from them would also not be impacted.

This alternative would likely have negligible impacts because no foreign fishing vessels are authorized to fish for or land sharks under the HMS or Spiny Dogfish FMPs and few foreign fishing vessels enter U.S. Atlantic ports for port calls. For those few foreign fishing vessels that enter U.S. Atlantic ports, the final action does not prohibit possession of shark fins without the corresponding carcass so that no changes in operations would be required.

NMFS does not anticipate any impacts of the final action on government agencies in the Atlantic,

Gulf of Mexico, or Caribbean areas.

b. West Coast. There will be little or no impact on fishers operating out of the West Coast. Shark finning by these fishers has been prohibited in the past and the final action would not add to those prohibitions. Likewise, there will be no impacts on shoreside businesses that support shark fishers; nor will businesses that engage in international trade in shark products (including fins) be affected in this region.

c. North Pacific. There will be little or no impact on fishers operating in the North Pacific region. While shark finning by these fishers has not been prohibited in the past, there has been very little shark fishing. Further, under Alaska regulations (and possibly soon Federal regulations), shark fishing will be even more tightly controlled. To the extent that shark fishing occurs, shark finning in waters seaward of the inner boundary of the U.S. EEZ will be prohibited by the final action, but since such finning does not now occur, the final action does not have adverse impacts on existing businesses. Likewise, there will be no impacts on shoreside businesses that support shark fishers; nor will businesses that engage in international trade in shark products (including fins) be affected in this region.

d. Western Pacific.

Impact on U.S. Fishing Vessels and Associated Businesses

Hawaii

While the recent reduction in finning activity due to the new prohibitions by the State of Hawaii has no doubt had a marked impact on finning and resultant income to fishers, possible changes in ex-vessel shark fin prices and the lack of data make quantitative estimates of the impacts of the final action difficult. Using an estimate of the overall reduction in finning in the Hawaii longline fishery, from approximately 60,000 sharks finned in 1998 to about 30,000 finned in 2000, a conservative estimate of the reduction in income from shark fins to crew, due to State action, could be estimated at about 50 percent[10]. In the fourth quarter of 2000, both the number of sharks caught and the number of sharks finned dropped even further in comparison to the same period in 1998. However, part of this is no doubt due to a lack of fishing in traditional swordfish fishing areas brought about by an earlier court order.

These figures point to the strong possibility that the percentage of sharks caught which might be finned under a no action scenario could be expected to remain low for Hawaii. It should also be noted that for the Hawaii longline fishery at least, it is believed that while fishermen are still

[10] Use of this figure or other estimates is complicated by (1) lack of data for current Hawaii ex-vessel shark fin prices and (2) apparent increases in world prices for shark fins to pre-1997 levels during the latter half of 2000 (see McCoy and Ishihara 1999 for discussion of Infofish shark fin prices).

adjusting to the State prohibition, some major impacts have already been felt. Nevertheless, the short time period that has elapsed since the introduction of the Hawaii State ban on landing shark fins means there is currently a paucity of available data, both economic and biological, on which to base quantitative analysis of this new development in comparison to the baseline scenario. For this reason it is noted here but has not been used exclusively to develop the baseline from which impacts are measured in Hawaii.

Under the final action, the prohibitions against finning seaward of the inner boundary of the U.S. EEZ, possession of fins harvested seaward of the inner boundary of the U.S. EEZ, and landing of fins harvested seaward of the inner boundary of the U.S. EEZ would apply to persons on domestic fishing vessels. In addition, persons on foreign fishing vessels would be prohibited from finning in the U.S. EEZ, and from landing fins without the corresponding carcass in all U.S. ports[11]. Persons on foreign vessels in the U.S. EEZ or in U.S. ports could, however, possess fins without the associated carcass but could not land them. Because any vessel that has obtained shark fins from a foreign fishing vessel at sea is considered "in support of fishing" and is considered a fishing vessel, foreign vessels that might obtain shark fins from foreign fishing vessels at sea also could not land them in U.S. ports.

Using the "no action" conditions as the baseline, the final action will likely result in a further reduction in the landing of shark fins in the State of Hawaii from U.S. fishing vessels and a larger reduction in landings by U.S. fishing vessels and foreign fishing vessels in American Samoa, with somewhat less of an impact in Guam due to the lower amount of activity there. CNMI will be relatively unaffected, since little or no landing of shark fins currently takes place there.

In addition to the operational and vessel configuration constraints that do not allow large numbers of shark carcasses to be retained, variables that will determine the extent of landings of shark fins with the corresponding carcass will include the length of individual trips, the catch of target species (tuna or swordfish) of such trips, market conditions for marketable shark species (shortfin mako and thresher), the expected ex-vessel prices for shark fins, and the amount of time and energy anticipated to comply with administrative requirements associated with landing fins and carcasses.

The prohibitions against finning, and the requirements related to possession and landing of shark fins as described above will not result in changes to fishing patterns or fishing grounds utilized by the longline fleet based in Hawaii. They will, however, preclude any involvement in the transshipping of shark fins from foreign vessels on the high seas that has taken place in the past under "receiver permits" issued by NMFS. These activities, occurring 12 to 18 times per year in the past, assisted financially a very small number of owners of longline fishing vessels in Hawaii. The impact on the fleet's overall gross revenue by the elimination of the ability to transport fins from foreign vessels located beyond the EEZ to Honolulu for onward shipment described earlier

[11] Since foreign fishing vessels are already prohibited from landing fish in Hawaii, in practical terms this prohibition principally affects only Guam, American Samoa and CNMI.

would be very small. The cessation of such activity would reduce total fleet revenue by perhaps $50,000 to $75,000. The number of vessels affected would be less than five.

Since the fleet's ability to remain competitive in catching and marketing the target species of tuna and swordfish depend on economic and operational factors other than their ability to land and sell shark fins, the final action should also not have an effect on the competitiveness of the Hawaii-based longline fleet.

The impact of the final action on the development of utilization of shark skins will probably be negative. All meat must be removed from the skin for proper use, and the resultant skinless carcass would then be difficult to handle and store on board.

The ex-vessel price for shark fins may rise initially as the commodity becomes more scarce. The reduction in the total overall volume of shark fins available from the fleet will also make it difficult for traders to command higher prices in the market, and may lead to lower prices in the long run. In an extreme case, some traders may drop out of the market entirely resulting in a potential monopoly and further reduction in ex-vessel price.

The only market that currently exists for shark meat delivered by the fleet is that for thresher and mako shark in Honolulu. The ex-vessel value of shark absorbed by the market is estimated in 1998 to be about $42,000 per year, with little elasticity.

Because almost all direct revenue from the ex-vessel sale of shark fins are divided among crew members, the economic impacts of prohibiting shark finning and prohibiting the landing of fins without the associated carcass will be most felt in Hawaii by longline fishing vessel crews. Since the last decade the ethnic composition of these crews has been diverse, including U.S. citizens as well as immigrants or others from Vietnam, Korea, Philippines, and the Pacific islands including Tonga and the Federated States of Micronesia. It is estimated that fleet-wide, shark fins have contributed from $2,300 to $2,800 per crew in the past; or from eight to ten percent of total compensation[12]. With the total value of industry labor income estimated at $22.53 million, the income from shark fins for crew and any others that may share in the proceeds of ex-vessel sales has represented about $1.6 million, or 6-7 percent of the total.

While some vessel owners characterize the income as "beer money," there is really no way to determine how or where the recipients dispose of this income. It is recognized that some crew members from the U.S. mainland or elsewhere may send money out of the state; however, there is no information available that might indicate the amounts, if any. Crew shares from both the sale of the catch and shark fins are paid directly to the crew and are thus assumed to be spent or retained in the state.

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[12] On some vessels, these figures may represent the compensation for an average crew position that might be filled by two or more crew during the course of the year.

It is difficult to accurately estimate the reduction in such income for longline vessel crews linked to the fleet's inability to land most sharks caught. The total number of trips taken by all vessels in the fishery has averaged about 1,100 per year from 1998-2000, and the number of sharks kept has slowly increased. Preliminary data for 2000 showed 1,387 sharks or 1.7 percent of the 79,135 sharks of all species caught were kept, i.e. landed carcasses. This is an increase over the 983 sharks or 1.1 percent kept in 1999 and almost double the 774 or .7 percent kept in 1998. It is estimated that even if trends in landing shark fins and associated carcasses continue, income to crews from shark fins will still drop significantly, probably by as much as 85 to 95 percent or more in the short term.

Although small boats landing in Hawaii would be prohibited from possessing and landing of shark fins without the corresponding carcass, finning is thought to have occurred only rarely on these vessels. The final action thus would not have any demonstrable impact on their operations. Shark fin traders are the second largest group that will be directly affected. Shark fin buyers are engaged in other businesses as well as the shark fin trade. Shark fin traders in Hawaii are assumed to be purchasing on their own account and operating on a gross profit margin of 35 percent. Within this margin are direct expenditures for handling and carrying expenses, shrinkage and spoilage loss, shipping, payments to purchasing agents, any primary processing that might be undertaken, and the traders' profits. This increase in the value of the product means that when fins leave the state, their value has increased $332,000-$399,000 for a total product value of $1,282,000 to $1,539,000[13]. The most immediate impact of this alternative will be to reduce these gross profits of shark fin traders. At most, this could be in the same percentage range as that applied to crew income, 85 to 95 percent but more likely would be somewhat less given the greater opportunity for traders to profit from the commodity in the market, even with greatly reduced supplies.

American Samoa

There are two distinct classes of domestic longline vessels landing in American Samoa. The first is the 31 "alia" catamarans that are used generally within 20 nautical miles of shore. The second is the five longliners that range from 50 to 90 or more feet in length, and which fish throughout the available area of the EEZ.

Although they have landed some sharks in the past, because of the relatively small vessel size and limited fish holding capacity, the alias will not be able to land large numbers of sharks or shark carcasses. The lack of a defined market for sharks in American Samoa will also mitigate against the landing of shark carcasses.

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[13] Although technically not entering international commerce since fins are mostly destined for the U.S. mainland, comparing this amount to total export sales for the Honolulu metropolitan area during the last five years of $232 million would show shark fins to be about 0.6-0.7percent of exports.

The same vessel configuration restraints that restrict the ability of Hawaii-based longliners to land carcasses apply to the larger domestic longliners operating from American Samoa. The domestic market constraints in American Samoa, and their distance from potential markets for pelagic sharks such as thresher and mako also restrict options for landing even the potentially marketable carcasses. There are no data available for shark fin landings or value by this small segment of the fleet. Given the small number of vessels currently active aggregate shark fin income for owners or fishers on these vessels could be expected to be less than $20,000.

Because purse seiners will most likely not carry shark carcasses back to American Samoa, it is not expected that there will be landings of shark fins from these vessels. In addition, as noted in section 3.3.4, a voluntary ban on shark finning has been in effect on U.S. purse seine vessels since 1999. Without any data to corroborate the effects of this ban, however, it is assumed here that activities affected on U.S. purse seine vessels will be those practiced prior to any such voluntary ban.

The major impact will thus be a reduction in income for crew of U.S. purse seine vessels landing in American Samoa from a cessation of shark fin sales. This sale of shark fins is estimated to represent from four to ten percent of total crew compensation[14] or from $578 to $821 per annum. Crews aboard U.S. purse seiners are known to spend large amounts of money ashore in American Samoa. The degree, however, to which those most likely to be the recipients of shark fin revenue (who are also the lowest paid crew on these vessels) participate in such expenditures is not fully known. For many of the Filipinos working on U.S. purse seiners, the bulk of their salary is remitted directly back to the Philippines, so large amounts of money are not available to them for spending in port. Shark fin money probably plays an important role in providing such crew with funds to purchase needed personal supplies ashore.

It is thus realistic to assume that most or all of the $162,000 to $230,000 in total shark fin sale revenue received by the crews from all U.S. purse seiners is spent in American Samoa, and that merchants and vendors could see a reduction in sales to these customers. The impact on the economy of American Samoa would be quite small, however. The amount of crew income attributable to shark fin sales represents about .35 percent to .4 percent of estimated direct expenditures by purse seine vessels in American Samoa. It should be noted, however, that the expenditures by crews are mostly in retail establishments such as restaurants, stores and hotels. It thus represents lost revenue to a different segment of the American Samoa business community than the oil companies, vessel repair facilities and ship chandlers that receive the bulk of purse seine vessel expenditures in the territory.

[14] Only the lower paid crew (and not captains or other officers) participate in the sharing of revenue from shark fin sales.

In contrast to longline vessels, the practice of finning sharks is a fairly recent introduction to the purse seine fleet, having begun in the last decade. Owners of U.S. purse seine vessels would not be expected to alter crew recruiting or hiring practices as a result of the elimination of any potential for crew to earn extra income from shark fins.

For American Samoa, the combined impacts of a prohibition against landing of fins without a corresponding carcass for U.S. vessels and allowing landing of fins by foreign fishing vessels only would be to reduce the amount of fins landed in the Territory. Traders in American Samoa would be faced with a reduction in volume of from 17 to 22 percent, the estimated volume of fins produced and landed there by U.S. purse seine vessels in the past. The remaining volume (from foreign vessels) would likely be sufficient to allow them to remain in business, but the reduction due to the final action could adversely affect that business by reducing the leverage in the market that a greater volume can provide.

Guam and CNMI

As with small boats landing in Hawaii, the prohibition of possession and landing of shark fins without the corresponding carcass, would have no demonstrable impact on operations of U.S. troll and charter vessels fishing in Guam and CNMI.

The impact on direct government revenue from the shark fin business in Hawaii, Guam and American Samoa can be expected to be negligible. Only American Samoa has a tax (5 percent) levied on shark fin sales, however poor collecting practices resulted in little revenue collected. The income from tax collections totals about $7,000 in 1997, out of a theoretical $34,100 to $50,00 based on estimated fin value at that time.

U.S. vessels that are not fishing vessels or acting in support of fishing vessels would be able to possess and transport shark fins without the corresponding carcass between U.S. ports and between U.S. ports and foreign ports.

e. Impacts on Foreign Fishing Vessels. There is no legal foreign fishing in the U.S. EEZ so the prohibition of finning by all vessels in the EEZ under the final action will not have any impacts on foreign fishing vessels in the EEZ. Because foreign vessels would be allowed to carry fins without carcasses in the EEZ or in a U.S. port so long as the fins are not landed, there also would be no impacts from the final action. Foreign fishing vessels visiting Hawaii are mainly Japanese longliners calling for supplies, bunkering, and crew rest. Since these vessels are currently prohibited from landing fish or fish products in U.S. ports, the final action should have no significant impact on their activities while in Hawaii.

Applying the prohibition of landing of shark fins without the corresponding carcass to all fishing vessels would result in impacts on U.S. and foreign fleets that visit or deliver to American Samoa and Guam. The prohibition on finning will have a negative effect on any desire of foreign longline operators to pursue a Pacific Islands Area Fishing Agreement, or PIAFA, with Guam, American Samoa or CNMI.

Impacts on Foreign Fishing Vessels Landing in American Samoa

It is estimated that longline crews from Taiwanese vessels landing in American Samoa spend from $260,000 to $390,000 in "bonus money" from shark fin sales in the Territory. This represents from one percent to seven percent of estimated direct shore expenditures by longliners in American Samoa. The impact of the final action on the economy in American Samoa would be relatively small in relation to overall expenditures by longliners in the Territory. Spending by crews, however, affects more businesses in American Samoa than just those associated with bunkering, ship repair and ship chandlery services. Thus, while the impact of such spending may be small in the total economy, it may disproportionally affect retail establishments such as stores, restaurants and bars where it is thought most crew spending is concentrated.

The actual impact could be less than the reduction in crew revenue if all fin sales were to cease. Some shark carcasses may be landed and placed in cold stores for future transshipment, thus allowing some fins to be sold. However, capacity constraints on many of the vessels coupled with low expected prices for fins of species other than mako shark argue against this occurring to any large extent. Some high grading would likely occur, with the greatest number of shark carcasses and fins delivered coming from longline vessels that experience poor fishing for the target species of albacore or sashimi-grade tuna. The impacts of the final action would be felt the most by the smaller sizes of Taiwanese vessels targeting cannery grade albacore. For these vessels, the economics of which are becoming more marginal with time, shark fin bonus money represents up to 17 percent of crew salary. Reductions in crew compensation due to an inability to market fins in American Samoa will most likely result in greater difficulties in obtaining and/or retaining crew, particularly those from the Pacific Islands and the Philippines.

It can be expected that Taiwanese longliners operating from American Samoa will continue to practice finning. Alternative ports in the Pacific, such as Papeete or Levuka, are sometimes used by the vessels and all have active shark fin traders. In addition, fishing in the high seas areas to the north and west of Hawaii that are frequented by the larger vessels places an increased reliance on at sea transshipment and resupply that offer additional opportunities for transshipment of shark fins. Vessels which intend to offload in American Samoa may also opt to first stop in Apia, Samoa, to offload shark fins there for transshipment by refrigerated container to export markets.

Impacts on Foreign Fishing Vessels Landing in Guam

The final action is expected to result in a reduction in the landing of shark fins in the Territory of Guam. Foreign fishing vessels landing in Guam are primarily smaller 20 to 60 gross ton Japanese

and Taiwanese longliners fishing in the western Pacific. For Japanese vessels, the major impact will be an estimated reduction in total foreign crew income between $180,000 to $364,000, or approximately $409 to $827 per crew. This amounts to between 9 percent and 21 percent of total annual wages.

It is assumed that most of crew income from the sale of shark fins is spent on Guam for personal goods and services during port calls, and merchants and vendors in Guam (including those located in the commercial port area) will see a reduction in their sales to Japanese longline vessel crew of from $180,000 to $364,000. This is about 1.5 percent to 1.8 percent of estimated direct expenditures by longline vessels in Guam.

It is highly likely that Taiwanese longliners will continue to fin sharks and retain some carcasses for markets in Taiwan. As a fleet, they are estimated to transship 14 to 18 mt of frozen shark fins and 38 to 56 mt of frozen shark annually from Guam via refrigerated container. The value of fins of all species and carcasses of some will mean that some fins will still be landed for convenience to be transshipped. The final action will reduce significantly the amount of frozen shark fins transshipped. It is estimated that roughly 3 to 7 mt of fins will still be landed and transshipped, reducing overall refrigerated freight by about 11 mt or the equivalent of one container per annum.

f. Impacts on Foreign Trade in Sharks and Fins. The final action is not expected to have a major impact on the worldwide prices for shark fin that are directly related to the volumes and prices found in Hong Kong, the world's largest shark fin market and price setter. Indicative world prices for fins from pelagic species have been rising steadily since May and June 2000 and are now at levels seen during the end of 1997/early 1998 prior to the "Asian financial crisis" (Infofish 2000).

In the Atlantic, the final action would likely have negligible impacts because no foreign fishing vessels are authorized to fish for or land sharks under the HMS or Spiny Dogfish FMPs and few foreign fishing vessels enter U.S. Atlantic ports for port calls. For those few foreign fishing vessels that enter U.S. Atlantic ports, the final action does not prohibit possession of shark fins without the corresponding carcass so that no changes in operations would be required.

Exports of dried shark fins from Honolulu to Hong Kong were about 48 mt in 2000 (NMFS, Fisheries Statistics and Economics Division, pers. comm.), or about 1.3 percent of Hong Kong's total imports. Although exports will also drop from American Samoa and Guam, those vessels are likely to find other locations from which to transship fins to available markets.

The impact of the final action on shark fin prices may be greatest in North America, historically the final destination for much of the shark fin supply originating in Hawaii. The level and duration of this impact will depend on the availability of supplies from other sources, including Mexico and Central and South America.

The expected reduction in the landing of shark fins in Hawaii will mean a large reduction but not necessarily elimination of shark fin income for some locally-based traders. Their ability to stay in business will depend on their adjustments to much lower levels of supply. Shark fin traders will have to store fins longer in order to enable a sufficiently large shipment and will have to carry those costs. The reduced sizes of even those shipments will greatly limit their impact in the market and result in potentially lower returns to traders. This may also result in lower prices to fishers that may not reflect levels of world prices. It is noted, however, that the Hawaii prohibition of finning has already resulted in a large decrease in trade in shark fins and the incremental effect of the final action should be relatively slight.

In Guam, traders deal almost exclusively with the fins from Japanese longline vessels targeting tuna that transship there. It is likely that the impact of the final action will be to eliminate profits for local traders in shark fins from this fleet estimated at $54,000 to $109,000 per annum. Elimination of the trade in these fins will reduce the value of Guam exports from $180,000 to $364,000.

In American Samoa, traders deal with fins produced by the foreign longline fleet. Under the final action, this fleet can be expected to refrain from retaining fins with the corresponding carcasses or at the least would land few of those fins in American Samoa. Foreign longliners may continue to deliver some fins with corresponding carcasses, mainly mako shark that are placed in cold storage for transshipment to Taiwan. Overall, the impact of the final action will be to lessen the value and volume of fin exports from American Samoa from 85 to 90 percent.

There is no directed shark fishery in CNMI. While there have been some discussions about developing a shark fishery to boost exports and reduce predation on currently utilized commercial species, the final action would preclude development of a fishery allowing landing of fins from either U.S. or foreign vessels unless corresponding carcasses were also landed.

g. Administrative and Management Impacts. There are not expected to be substantial impacts in terms of management and administrative costs on the mainland of the United States.

The greatest impact on management and regulation will be in the western Pacific, where informing fishermen and related businesses about these regulations and enforcing the prohibitions will be a new burden. NMFS will need the capability to monitor and inspect landings and ensure that any landings of fins and carcasses comply with these regulatory provisions. Landed fins will be in one of three states: dried, frozen, or iced, and (at present in Hawaii) carcasses will probably be frozen or partially frozen in the vessel's bait freezer. Inspectors will have to be trained to be able to identify source species of fins[15] and be able to match with the corresponding carcasses. This may be difficult if carcasses are prepared for sale in the usual manner, i.e. headless and finless with

[15] Instruction in fin identification for the major species landed may be required but should not be difficult to obtain, since fin identification by species is the basis of valuation in shark fin trading worldwide.

belly flaps on or off, depending on market requirement. It is possible that a marking or tagging system will have to be devised and employed in conjunction with trained inspectors in the future. This requirement may be lessened if any of the carcasses are not intended for sale and are returned to port only to enable fins to be sold.

It is possible that to conserve space for target species or minimize handling requirements, some fishers may attempt to substitute smaller shark carcasses for those from which fins have been obtained. Enforcing the 5 percent limit of fin weight to carcass weight for all landings will most likely require a greater workload for inspectors and will still be subject to variables such as size and species of shark, method of carcass butchering, manner of fin storage (wet/dry) and moisture content. This will require field assessments of actual weights of fins and carcasses, the manner in which each is prepared for marketing, and the appropriate ratios of fin weight (both wet and dry) to carcass weight for the major species landed.

The projected impacts for management in Guam will be minimal as compared to current conditions because U.S. vessels do not land shark fins in any significant quantity. In American Samoa, the inability of U.S. purse seiners to return carcasses to port will minimize the need for inspection of landings. The local longline fleet, however, may require greater scrutiny.

Effective enforcement of the final action will require greater interaction between inspectors and foreign fishers with no or little English language ability in the offloading ports of Guam, American Samoa, and perhaps the Northern Mariana Islands in the future.

Effective enforcement of the final action will require greater monitoring of landings from foreign vessels in the ports of Guam, American Samoa (and in CNMI should it become a landing port for foreign vessels) to ensure that all fins are landed with a corresponding carcass. In Guam, the largest number of landings that will require monitoring are those of the Japanese and Taiwanese longliners, with the former requiring greater monitoring as they are the vessels that have historically landed and sold shark fins but have not retained carcasses. While the estimated number of port calls at Guam for these vessels has been around 800 to 900 per annum, the amount of monitoring required will be dependent on the degree to which vessels continue to utilize Guam for transshipment and resupply.

Depending on the financial health of the fleet, an inability to land shark fins in Guam may result in attempts to land fins in ports of the Federated States of Micronesia or the Republic of Palau prior to entry into Guam. Since a relatively small amount of fins (20 to 30 kg) is produced per trip, vessels might retain fins on board for several trips before landing them elsewhere.

Inspectors may have to monitor each port call or landing for Taiwanese longline vessels landing in Guam. The number of port visits is roughly the same number as those of Japanese vessels. In addition, individual Taiwanese vessels transship frozen incidental catch, shark carcasses and

shark fins once or twice per year to Taiwan from Guam. This may present a special problem for inspectors because of the volumes involved.

Carcasses retained are only those from sharks marketable in Taiwan, which do not include blue sharks. Fins landed are from a range of pelagic sharks, representing most or all sharks caught. It is doubtful that a pre-arranged system for marking fins with corresponding carcasses would be practical with this fleet. There would thus have to be a determination of carcass and fin weight at the point of offloading, with the same implications for workload and research cited above for Hawaii.

Monitoring of landings from foreign vessels will also be needed in American Samoa. There is already evidence to suggest that foreign fishers landing in American Samoa attempt to circumvent local requirements, primarily the Territory's 5 percent tax on shark fin landings.

Although the trend in the number of landings from foreign (mostly Taiwanese) longliners landing in American Samoa has been consistently downward from about 225 per year in the early 1990's, they still number around 100 or so.

There is little that would be added to observer tasks on longliners based in Hawaii, which already include the documentation of shark species composition and catch discard/retention.

Development of a directed shark fishery with foreign vessels as has been discussed in CNMI would most likely require onboard observers to ensure that no finning takes place in the U.S. EEZ, and that any fins on board that don't have a corresponding carcass can be accounted for as originating outside the U.S. EEZ. It would also require close inspection of any transshipment in CNMI to ensure that fins are landed with corresponding carcasses.

E. Impacts of Limited Application of Prohibitions - Alternative B

Under this alternative, the Act is construed to apply only to persons on U.S. fishing vessels[16] and not to other vessels. Persons on U.S. fishing vessels would be prohibited from finning in waters seaward of the inner boundary of the U.S. EEZ and in all U.S. ports; from possessing fins harvested from waters seaward of the inner boundary of the U.S. EEZ without the corresponding carcass; and from landing fins harvested from waters seaward of the inner boundary of the U.S. EEZ without the corresponding carcass[17].

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[16] This definition includes non-fishing vessels that aid or assist one or more vessels at sea in the performance of any activity relating to fishing, including, but not limited to, preparation, supply, storage, refrigeration, transportation, or processing.

[17] See Table 3 for a summary of application of the Act under the final action.

For all other domestic vessels, e.g. cargo vessels, persons on these vessels would be prohibited from finning[18], however, they would not be prohibited from possessing fins harvested from waters seaward of the inner boundary of the U.S. EEZ or landing fins harvested from waters seaward of the inner boundary of the U.S. EEZ without a corresponding carcass.

In the Atlantic, this alternative would not extend the finning prohibition to foreign fishing vessels fishing in the U.S. EEZ or landing shark fins in U.S. ports.

On the West Coast and in the north Pacific, this alternative would not have substantial impacts as state restrictions would remain in place that effectively prohibit shark finning.

In practical terms foreign fishing vessels would not be engaged in finning sharks in the U.S. EEZ, as no such vessels are permitted to fish legally in the U.S. EEZ. The transshipment of fins from a vessel on the high seas to a U.S. port by foreign vessels would still not be legal in most ports because under Federal law such vessels may not land fish in most states. However, under this alternative, foreign fishing vessels could land shark fins without corresponding carcasses in Guam, American Samoa and potentially CNMI (these are exempt from the general prohibition of foreign fishing vessels making landings into a U.S. port) while U.S. fishers would be prohibited from doing so.

Because the market for shark fins worldwide has been growing over the past decade and accepts all marketable shark fins from practically any source, there would be no intrinsic advantage gained by foreign vessels from the prohibitions of alternative A placed only on U.S. fishing vessels. Nevertheless, since foreign vessels landing in American Samoa and Guam would be able to continue finning operations, including landing at U.S. ports while U.S. fishing vessels would be prohibited from these practices, there would most likely be objections raised by U.S. fishers in these ports. While American Samoa currently has much more domestic longline and artisanal activity than Guam, both territories may perceive such restrictions as disadvantageous and/or discriminatory to U.S. fishers. The situation would appear not to have application in CNMI, as no foreign fishers land shark fins there.

1. Biological Impacts

a. Impacts on Shark Stocks. Overall, this alternative would result in the same reduction of shark mortality from the fleets under U.S. jurisdiction as the final action. There would likely be no reduction in shark mortality associated with foreign fishing.

b. Impacts on Protected Resources. This alternative would not be expected to have differential impacts on protected resources compared to the final action.

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[18] Although it may appear that any finning would take place only on fishing vessels, there is the potential for persons on non-fishing vessels to catch and fin sharks, such as while at anchor in a roadstead or alongside a dock or quay.

2. Economic Impacts

a. Impacts on U.S. Fleets and Associated Businesses. This alternative will have the same impact on U.S. vessels' fishing patterns and on associated businesses as the final action. However, U.S. businesses that support foreign longline vessels' landings and trade in shark fins in American Samoa and Guam will be affected less than under the final action. That is, these businesses will be permitted to operate as they have been in the past. There would be no changes in the volume of fins handled, the prices and expenses to buy fins, the revenues from the sale of fins, crew shares from shark sales, and the revenue to U.S. businesses in the Pacific from crew members' purchases of goods and services in those ports.

b. Impacts on Foreign Fleets and Associated Businesses. This alternative would be less restrictive than the final action and would thus have a lesser adverse effect on foreign fishing vessels' landings and revenues. While there is no legal foreign fishing in the EEZ, foreign vessels would be permitted to conduct their activities as in the past, including landing fins without corresponding carcass in Guam and American Samoa. Thus the impacts described in those categories for the final action would be avoided and foreign vessels and associated businesses would benefit compared to the proposed alternative.

F. Impacts of Broader Application of the Prohibitions - Alternative C

Under this alternative, the prohibitions against possession and landing of fins harvested from waters seaward of the inner boundary of the U.S. EEZ without the corresponding carcass would apply to persons on foreign fishing vessels when they are in a U.S. port. This would be more restrictive for foreign vessels than the final action.

1. Biological Impacts

a. Impacts on Shark Stocks. Overall, this alternative would result in the same reduction of shark mortality from the fleets under U.S. jurisdiction as the final action. There would likely be no reduction in shark mortality associated with foreign fishing.

b. Impacts on Protected Resources. This alternative would not be expected to have differential impacts on protected resources compared to the final action.

2. Economic Impacts

a. Impacts on U.S. Fleets and Associated Businesses. This alternative will have the same impact on U.S. vessels' fishing patterns and on associated businesses as the final action.

b. Impacts on Foreign Fleets and Associated Businesses. U.S. businesses that support foreign longline vessels' activities in U.S. ports could be seriously affected if the prohibition of possession of fins is applied to foreign fishing vessels anywhere in the EEZ or in U.S. ports. That is, foreign

vessels might choose to avoid U.S. ports altogether rather than be subject to prosecution for possessing shark fins without carcasses. The sales of goods and services (fuel, supplies, shipping) to these vessels would then be lost. Further, if foreign vessels avoided U.S. ports, any sales to crew on shore leave (even if no shark fin sales occur, foreign crew will still make shore visits and purchases) will be lost. Table 14 is indicative of the scale of impacts that could be felt.

In addition, the prohibition of possession of fins on board foreign fishing vessels in the U.S. EEZ could result in significant increases in transit costs for those vessels that now routinely transit the EEZ to and from fishing grounds. Fuel is a major cost component for these fleets, and the impact could be quite severe given the large and spread out areas of U.S. EEZ in the western Pacific.

G. Impacts of Broadest Application of the Prohibitions - Alternative D

This alternative would apply the prohibitions against finning in waters seaward of the inner boundary of the U.S. EEZ, possession of fins harvested from waters seaward of the inner boundary of the U.S. EEZ without the corresponding carcass, and landing of fins harvested from waters seaward of the inner boundary of the U.S. EEZ without the corresponding carcass to all vessels that might fall under U.S. jurisdiction in any waters or ports. This would include prohibiting landing of fins without carcasses by cargo vessels. The impacts of both options on all but U.S. fishing vessels are addressed in the following sections, and identified separately where necessary. The impacts on U.S. vessels would remain the same as described for the final action.

1. Biological Impacts

a. Impacts on Shark Stocks. The impacts on mortality of shark stocks from both U.S. fishing vessels and foreign fleets described for the previous two alternatives would likely remain about the same under this alternative. There are no indications that fishing practices and resultant shark finning and mortality caused by activities of foreign fleets would be modified or cease, with the exception of perhaps an unknown percentage of the smaller Japanese longline vessels operating from Guam as discussed below.

b. Impacts on Protected Resources. Under either option, this alternative would not likely result in impacts on protected resources that are different from the final action.

2. Economic Impacts

a. Impact on U.S. Fleets and Associated Businesses. In addition to the impacts discussed above, this alternative would restrict domestic non-fishing vessels from possessing and landing shark fins harvested from waters seaward of the inner boundary of the U.S. EEZ without the corresponding carcasses (finning is not an issue because such vessels would have to engage in fishing to catch sharks to fin them, which is prohibited under the current regulations). NMFS does not collect data on modes of shipment of fish products beyond the point of offloading from vessels and cannot estimate the impacts on domestic cargo vessels. However, NMFS does not

believe that shark fins are generally transported domestically via cargo vessels. While the United States is both an important producer and point of trans-shipment, NMFS believes that shipments of shark fins are primarily sent via air freight or via land transport (truck, train) and not domestic cargo vessels. Therefore, in the Atlantic, this alternative would likely have only a marginally increased impact than that described under final action.

On the West Coast and in Alaska, this option would not have impacts substantially different from the impacts of the final action.

In the western Pacific, the impacts on U.S. fleets and businesses that buy and sell their catches or provide goods and services to those vessels would be the same as under the final action. Those impacts would generally not be large.

b. Impacts on Foreign Fleets and Associated Businesses. The impacts of applying the prohibitions on possession of fins without the corresponding carcass and landing of fins without the corresponding carcass to all foreign fishing vessels when in a U.S. port (the first option under this alternative) would be large and far-ranging. In Hawaii, it would discourage port calls made by Japanese longliners for supplies and crew rest that are estimated to number 360 or so per year. These vessels would likely shift their activity to other ports where this restriction would not apply, such as Majuro in the Republic of the Marshall Islands and Callao, Peru. Over the years this has proven to be a resilient fishing fleet, adapting operational patterns to changes in the fishery, and there is no reason to believe that such adaptations could not also be made in this instance.

The impacts on the Japanese longline vessels that utilize Guam for transshipment of sashimi-grade tuna by air to Japan are not clear. The prohibition on possession of shark fins without the corresponding carcass in a U.S. port would impact both the crew and vessel owners directly. For example, the elimination of potential crew income from shark fin sales for any vessel calling at Guam could put pressure on owners to increase crew salaries. Again, these vessels might seek alternative ports for goods and services. In addition to the commercial considerations involved, the Japanese fleet might be expected to receive support from the government of Japan in protesting the application of the Act to their flag vessels while in port. The government of Japan has been consistent in supporting their vessels , both formally and informally, against what it feels are repressive or even illegal actions by port authorities in the WCPO[19]. While it is not possible to completely predict how Japanese policy may develop if this alternative were adopted, its application to Japanese vessels could be expected to exacerbate and complicate efforts of the United States to involve Japan in ongoing efforts to create a comprehensive management regime for highly migratory species in the WCPO.

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[19] An example is a recent refusal to allow port samplers from the Federated States of Micronesia to sample and monitor landings from Japanese vessels in Guam that held FSM fishing permits on the basis of their lack of authority in a U.S. territory, even though such data collection was purely biological in nature.

While some port calls by Japanese longliners in Hawaii could still be expected to take place (e.g., in situations involving emergency ship repairs or in medical emergencies), significant reductions in port calls could result under this alternative. A 75 percent reduction in the number of port calls would result in losses to direct contributions to the Hawaii economy of from $11 million to $16 million from spending by those vessels.

The Taiwanese fleet utilizing Guam may be willing to continue using that area even without the ability to land fins without a corresponding carcass as would be required by the final action. However, a prohibition on possession of fins without the corresponding carcass as required by this alternative would be much more problematic, since these products can provide significant income directly to vessel owners when ultimately sold outside Guam. In making a decision whether or not to relocate landing and resupply activities away from Guam, vessel owners would consider the prohibitions in this alternative to be a major factor. There could also be other economic considerations taken into account by Taiwanese vessel owners including:

- increased catch rates in fishing grounds of the Federated States of Micronesia (FSM) and high seas areas outside the U.S. EEZ near Guam;
- a large reduction in the cost of fishery access to the FSM and Palau EEZs
- reductions in operational costs linked to Guam such as air freight, fuel, supplies, and agency fees.

Given the current fishing and economic conditions in the central and western Pacific, it is unlikely that any of these three conditions will eventuate in the near term, so this alternative would likely result in shifting activity from Guam. Should the decision by Taiwanese longline vessel owners be to avoid Guam entirely, the loss in the direct contribution to the economy there from longliners would be in the range of $6 million to $11 million. A large secondary effect is the potential impact on Guam's tourist-based economy. These impacts include the loss of air freight revenue from exported tuna that contributes to the financial viability of air service to and from Guam, and support of businesses directly involved in providing fresh fish to local markets including hotels that are landed as incidental catch from the longliners.

In American Samoa, it is possible that the Taiwanese longline fleet delivering albacore to canneries there could also adjust its operational practices to partially or totally avoid that U.S. port. It is estimated that direct shore expenditures by this fleet range from $6 million to $26 million. The impact of this alternative could be to shift all or a portion of that expenditure elsewhere. Options include transshipping the target catch at sea or in other ports to carriers for delivery to American Samoa. As with the Taiwanese fleet operating from Guam, other operational and financial factors will also help determine the degree to which vessels avoid American Samoa. One further possibility is the landing of shark fins in neighboring Samoa prior to arrival in American Samoa.

The tanker/supply vessels operate from Hawaii in the support of foreign longliners fishing on the high seas in the WCPO east of about 165° East longitude. While the collection of shark fins from these vessels has been an integral part of the activities of these vessels, it is concluded that the

imposition of prohibitions under this broader alternative would not deter these vessels from calling at Honolulu. The main attractions for these vessels to utilize Honolulu as a supply port are the availability of refinery-priced fuel, the relative proximity of Hawaii to the fishing grounds when compared to other sources of fuel supply, and the availability of other needed supplies that can be transferred to fishing vessels at sea. It is possible, and even likely, that these tanker/supply vessels will continue to collect shark fins from foreign longliners on the high seas and find alternative means of transferring fins to foreign ports where onward shipment would not be a problem.

Applying the prohibitions in the broadest possible manner to foreign fishing vessels would make it extremely difficult for these foreign fishing vessels to comply with the prohibitions against possession in the EEZ and still maintain the current fishing patterns and practices that contribute to financial viability. More than 600 Japanese longline vessels fish in the WCPO and they must often transit through the U.S. EEZ when en route to or from the high seas or to other EEZs where they hold fishing licenses. Major transit areas within the U.S. EEZ for these vessels traveling to or from Japan or in the course of normal fishing operations include:

- the waters around Howland and Baker Islands, Kingman Reef and Palmyra Island, Johnston Atoll, and Jarvis Island for longliners fishing in the high seas areas east of the dateline;
- the waters near Guam and CNMI for vessels that fish in the EEZ of the Federated States of Micronesia and Palau;
- waters near Wake Island for vessels fishing in the EEZ of the Republic of the Marshall Islands, Kiribati, Nauru and Tuvalu.

The more than 350 Taiwanese longline vessels in the WCPO would also be affected:

- those that deliver to the canneries in the WCPO would have to go around the EEZ around American Samoa when going to or from the cannery in Fiji for offloading;
- an undetermined number of the vessels that offload at the canneries in American Samoa fish in high seas areas north of Hawaii during a portion of the year and would have to avoid the U.S. EEZ near Howland and Baker Islands, Jarvis Island, Kingman Reef and Palmyra Island, and Johnston Atoll;
- vessels traveling to or from Taiwan to fishing grounds in the Federated States of Micronesia or the Republic of the Marshall Islands would have to avoid the EEZ around Guam.

The prohibition against possession of fins without the corresponding carcass would also impact the more than 180 Korean longliners that fish in the WCPO in that they would have to:

- avoid the EEZ areas near Howland and Baker Islands, Jarvis Island, Kingman Reef and Palmyra and Johnston Atoll when traveling to or from fishing grounds on the high seas or in the Republic of Kiribati or the Cook Islands.
- avoid the EEZ areas near Guam, CNMI, or Wake Island when traveling to or from Korea and fishing grounds in the WCPO.

In addition to the large number of foreign longliners that are active, the international purse seine fleet also operates in these areas on occasion, with their activities taking them as far east as 155°W longitude during El Nino years. In the normal course of fishing operations, these vessels would have to avoid the EEZ around Howland and Baker Islands, Jarvis Island, and to a lesser extent Kingman Reef and Palmyra Island. There are more than 120 purse seiners from Taiwan, Korea, Japan, Spain, and several Pacific Island countries presently active that might fish in these areas. These vessels are thought to carry on at least some shark finning, although the degree to which this occurs is unknown.

c. Impacts on Foreign Trade in Sharks and Fins. This alternative would apply the prohibitions to foreign fishing vessels fishing in the EEZ or landing shark fins in U.S. ports, to all other domestic vessels, and to all other foreign vessels. In addition to the impacts discussed above on foreign fishing vessels, this alternative would restrict foreign cargo vessels from possessing and landing shark fins without the corresponding carcasses thereby impacting imports of shark fins and international trade. This could have substantial impacts in the Atlantic. According to U.S. Census Bureau data, approximately 13 to 21 percent of imported shark fins entered U.S. Atlantic ports by cargo vessel in 1999 and 2000 (Tables 18 and 19). Australia imported the majority of dried shark fins to U.S. Atlantic ports by vessel in 1999 (Hong Kong also imported some dried shark fins by vessel), although all dried shark fins from Australia were shipped to U.S. Atlantic ports via air freight in 2000. In 2000, Ecuador, India, and Indonesia were the primary importers of dried shark fins to U.S. Atlantic ports by cargo vessel (Hong Kong and Japan also imported some dried shark fins by vessel). However, Ecuador shipped all dried shark fins to U.S. Atlantic ports via air freight in 1999 and India and Indonesia did not import dried shark fins to U.S. Atlantic ports in 1999. Imports to U.S. Atlantic ports by vessel from Hong Kong were about 10 percent of all imports of dried shark fins to U.S. Atlantic ports in 1999 and 2000. Thus, the countries that import dried shark fins to U.S. Atlantic ports also import fins via air freight either within the same year or in different years. Accordingly, the impacts of this alternative would likely be minimized as those countries shifted to importing dried shark fins entirely via air freight or land transportation. While there would likely be some increased costs associated with changes in shipping arrangements, the fact that many (if not all) of those countries already import dried shark fins via air freight or land transportation should minimize those costs.

This alternative would extend further the negative impacts on shark fin traders and exports in American Samoa and Guam, and the practical result would be to eliminate most of the trade in shark fins in these ports. The estimated impact of the cessation of trade in all three areas would be elimination of about $2 million to $3 million in direct economic contributions to the U.S. economies concerned.

The broadest application of the landings prohibition would be to restrict international shipments of shark fins, whether landed legally or not, into or out of U.S. ports. Whether this would greatly affect the volume of trade is not known, though there would likely be some reduction. However, shipments could still move on alternate means of transportation such as trucks and aircraft. This

would likely increase the costs of shipments but might not be a serious impediment to trade. Not enough is known about the costs of alternatives to be definitive on this issue.

d. Administrative and Management Impacts. The broadest application of the prohibitions would result in an increased enforcement burden compared to the status quo baseline and the costs of the final action. There would likely be more inspections of foreign longline vessels in port to determine if shark fins were on board. There is normally some amount of inspection of these vessels but the amount of inspection would increase relative to the status quo, at least initially.

It is possible that a system that would certify certain shark fins as having been landed in compliance with the Act could be established, but this would require additional reporting and administrative requirements for vessel operators, dealers, and NMFS, most likely resulting in additional manpower needs. For Hawaii, given current vessel configuration and practice, if fins are landed, it will be done with corresponding carcasses from numerous trips in small quantities. Dealers and buyers would have to be involved, and a means devised to identify and track shipments. Since there are financial disadvantages in the trade in marketing small volumes, a means would also have to be found to identify stored quantities prior to shipment as well.

To be successful, this broadest alternative would result in an increased need for at sea monitoring of vessels to be sure that none are illegally transporting shark fins without shark carcasses through the U.S. EEZ. Air and sea patrols are very limited, especially with the recent increases in fuel costs and the likelihood of detecting violations and prosecuting violators is very low.

If the broadest application were adopted, the monitoring and enforcement burdens would also have to be increased to inspect occasional cargo shipments to determine if any shark fins were on a vessel without corresponding shark carcasses. It is likely that additional cargo certification documentation requirements would be needed to support an effective inspection program.

H. Using Whole Weight or Dressed Weight in Application of the 5 Percent Limit in the Rebuttable Presumption

The issue is whether the 5 percent limit on weight of shark fins relative to corresponding carcasses is applied using the whole weight (or equivalent) of the carcass or (as is done in the Atlantic, Gulf of Mexico, and the Caribbean) using the dressed weight of the carcass.

Using a whole weight standard would effectively allow a larger amount (in weight) of shark fins to be landed per shark carcass landed. For example, if a whole shark weighs 200 pounds, then the rebuttable presumption would be that any landing larger than 10 pounds of fins would exceed the 5 percent limit. However, if the dressed carcass of that shark weighs 100 pounds, then the 5 percent limit would suggest a violation of the shark fins landed were greater than 5 pounds.

Using the whole weight (or whole weight equivalent for dressed shark carcasses) would create a

greater potential for finning that is disproportionate to the number of shark carcasses retained than if the dressed carcass weight were used as the standard. That is, with the whole weight, the fisher could take fins from more or larger sharks while retaining a given number of carcasses. The fisher also could retain a select number of very large sharks and take fins from a large number of smaller sharks while staying within the 5 percent limit.

NMFS proposes to use the dressed weight as the standard. The use of the dressed weight standard should decrease the potential for finning in excess of intended levels. The impact would be to lessen the risk of overfishing of sharks and reduce the likelihood of noncompliance.

I. Cumulative Effects

Cumulative effects occur when direct and indirect impact(s) of the alternatives combine with effects of factors exogenous to the Shark Finning Act to produce a *net effect* greater than the separate impacts of either the fishery induced or other factors (e.g., anthropomorphic, environmental, climatological etc.). Although, it is beyond the scope of this analysis to go into every potential factor, as identified or recommended by the Council on Environmental Quality, in detail, rather the major factors are qualitatively reviewed with reference to the final action or other relevant alternative(s).

1. Fluctuations in the Ocean Environment

Large scale environmental fluctuations are characteristic of all oceanic ecosystems and have significant effect on the distribution, movement, and habitat of all shark species. Significant sources of inter-annual physical and biological variation are *El Nino and La Nina* events in the Pacific– with apparent secondary impact on the Atlantic and other world oceans. Regime shifts (e.g., in the North Pacific) have also been identified as having meso-scale impacts on both the physical and biological systems – with concurrent impact on the distribution of oceanic species. There is no evidence to suggest that oceanic shark populations are immune to these shifts. Major ocean currents and fronts such as the Gulf Stream in the Atlantic or the river plume of the Mississippi River into the Gulf of Mexico may also impact shark species. Emerging evidence appears to suggest that these environmental and climatological perturbations have greater influence on the relative abundance of sharks than any of the alternatives reviewed here.

2. Food Webs and Ecosystems

The role of sharks in the structure of oceanic ecosystems and the potential ecological effects of their removal is an area of particular concern. In some instances, sharks have been identified as "keystone predators". These are creatures that, if removed from an ecosystem in significant numbers, may cause existing tropic relationships to be upset, affecting other species' stock abundance or viability. The removal of some species of large pelagic and coastal sharks, by fisheries have been identified as an area of particular concern (c.f. Kitchel et al. 1999), while others suggest that a reduction in shark harvests may have a negative impact on certain protected

species populations e.g., sea turtles (IATTC 1999 as cited in NMFS 2000b).

The development of fishery activities on the prey of sharks may have significant implications for pelagic and coastal sharks. For instance, the now outlawed North Pacific high seas drift net fishery harvested between 300,000 and 340,000 mt of neon flying squid at its peak (Huppert and Mittleman 1993). These squid are a key prey species of the North Pacific ecosystem in which blue sharks thrive and it is unclear what effect these harvest levels had on shark populations. Future development of currently minimally harvested squid or small pelagics fisheries could have significant impact on pelagic shark populations.

3. Coastal Development

Coastal development activities such as urban, suburban, commercial, and industrial construction, may result in erosion and sedimentation, dredging and filling, point and non-point source discharges of nutrients, chemicals, and cooling water into streams, rivers, estuaries, and ocean waters. These factors ultimately serve to degrade water quality to some degree in terms of dissolved oxygen levels, salinity concentrations, and contaminants. Because many shark species have been found to utilize specific estuaries and shallow coastal areas during pupping (e.g. Chesapeake Bay and Delaware Bay) and because these pups typically remain in these same areas through their early life stages, coastal development may degrade the pupping areas and have an impact on sharks.

4. Essential Fish Habitat

Identifying Essential Fish Habitat (EFH) for shark species is challenging because they are primarily found in the open water, are highly migratory, use diverse habitats, and use different habitats at different times of the year or life stage. These fish are often associated with physiographic structures of the water column (fronts, river plumes, current boundaries, shelf edges.) To some extent, these physicochemical properties may be used to define the boundaries of EFH in a broad sense, however, the distribution of these characteristics vary over space and time. The Atlantic HMS FMP has defined EFH for individual Atlantic sharks and different life stages as the data allowed (NMFS 1999).

5. Current and Future Regulatory Regimes

There are a variety of evolving national and international legal instruments in force for the conservation and management of coastal and pelagic species, including sharks. To a great extent these regulatory regimes are representative of species-directed fisheries management policies which, more recently, are being questioned as effective at preventing undesirable changes in the marine ecosystem structure and function. General principles for oceanic ecosystem management tend to be theoretical at this juncture. The extent to which they can be practically implemented is unclear. Regardless, Federal fisheries management in the United States is implemented via the MSFCMA fishery management plan process. The evolving nature of these FMPs can have

significant impact on a variety of species, including sharks. Also, requirements of other applicable law, such as the Endangered Species Act, may have equally significant impacts. Additionally, more and more court imposed actions and remedies are having significant impact on current fishery conservation and management regimes. For example, in the WCPO, a recent case (CMC vs NMFS) is driving force for significant modifications to the western Pacific Pelagics FMP. One of these impacts include essentially the cessation of longline fishing targeting swordfish. While the cessation of longline fishing has been focused on marine turtle bycatch mitigation, it is anticipated this action will have some impact on blue sharks. Ito and Machado (1999) report that the blue shark catch rate for vessels that target swordfish (which is being terminated) is ten times as high as the catch rate for vessels that exclusively target tunas (which will largely continue). On the other hand, the crews of the tuna vessels more frequently engage in shark finning (WPFMC 2000). Although it is unclear to what degree the cessation of swordfish fishing on reducing the fishery induced mortality of sharks (particularly blue sharks), this action combined with the final action is expected to have positive benefits to Pacific pelagic shark populations.

VI. PREPARERS

This document and the final rule was prepared by a team from NMFS and NOAA, including representatives of the Highly Migratory Species Management Division, Office of Sustainable Fisheries (F/SF1); Southwest Region Office and Pacific Islands Area Office; and NOAA General Counsel. Comments received from interested parties during the public comment period also helped to develop these regulations. Individuals contributing include:
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VII. REFERENCES

Anon. 1998. Pelagic fisheries of the western Pacific region:1997 annual report, draft 10/15/98, prepared by the Pelagics Plan Team and Council staff, Western Pacific Regional Fishery Management Council, Honolulu, HI.

Berkely, S. A., E. W. Irby, Jr., and J. W. Jolley, Jr. 1981. Florida's Commerical Swordfish Fishery: longline gear and methods, MAP-14, Marine Advisory Bulletin, FL sea grant college in cooperation/University of Miami, Rosenstiel School of Marine and Atmopheric Science and FL Dept. of Natural Resources, FL Cooperative Extension Service, University of FL, Gainsville, FL, 23 p.

Bonfil, R. 1994. Overview of world elasmobranch fisheries. FAO Fisheries technical paper 341. Food and Agriculture Organization of the United Nations, Rome. 118 p.

Branstetter, S. and G. Burgess. 1997. Commercial Shark Fishery Observer Program 1997-1998. Gulf and South Atlantic Fisheries Development Foundation and University of Florida.

Calliet, G. M., D. B. Holts, and D Bedford. 1991. A Review of the Commercial Fisheries for Sharks on the WEst Coast of the United States. In J. Pepperel, J. West, and P. Woon, eds. Shark Conservation, Proceedings of an International Workshop on the Conservation of Elasmobranchs held at Taronga Zoo, Sydey, Australia. February 24, 1991. p. 13-29.

Carlson, J. and D. Lee. 1999. Catch and Bycatch in the Shark Drift Gillnet Fishery off East Florida during the Critical Right Whale Season, 1999. NOAA, NMFS, Southeast Fisheries Science Center, Panama City, FL. SFD-98/99-64.

Carlson, J.K. 2000. Progress report on the directed shark gillnet fishery: right whale season, 2000. NOAA, NMFS, Southeast Fisheries Science Center, Panama City, FL. SFD-99/00-90. 12p.

Carleson, J., NMFS. 2001. Personal communication w/W. Ingram, Alabama Dept. of Coastal Natural Resources.

Coan, A.L., G. Sakagawa, D. Prescott, P. Williams, and G. Yamasaki. 1999. The 1998 U.S. tropical tuna purse seine fishery in the central-western Pacific ocean. Document prepared for the annual meeting of parties to the South Pacific Regional Tuna Treaty, 24-30 March, 1999. Southwest Region, NMFS La Jolla, CA.

Coan, A.L., G. Sakagawa, D. Prescott, P. Williams, and G. Yamasaki. 2000. The 1999 U.S. tropical tuna purse seine fishery in the central-western Pacific ocean. Document prepared for the annual meeting of parties to the South Pacific Regional Tuna Treaty, 3-10 March, 2000. Southwest Region, NMFS La Jolla, CA.

Cortes, E. 1999. 1999 Shark Evaluation Report. NOAA, Southeast Fisheries Science Center, Panama City, FL. SFD-98/99-64. 10 p.

Cortes, E. 2000. 2000 Shark Evaluation Report. NOAA, Southeast Fisheries Science Center, Panama City, FL. SFD-00/01-119. 23 p.

Cramer, J. 1996. Species reported caught in the U.S. Commercial pelagic longline, gillnet, and pair trawl fisheries from 1987 to 1995. Miami Lab. Contribution MIA - 95/96-38. 91 p.

Cramer, J., A. R. Bertolino, and G. P. Scott. 1997. Estimate of Recent Shark Bycatch by U.S. Vessels Fishing for Atlantic Tuna and Tuna-Like Species. ICCAT Working Document SCRS/97/58.

Cramer, J. and H. Adams. 1998. Large Pelagic Logbook Newsletter - 1996. NOAA TEch. Memo NMFS-SEFSC-407. 61 p.

Cramer, J. and H. Adams. 2001. Large Pelagic Logbook Newsletter - 1999. NOAA TEch. Memo NMFS-SEFSC-452. September 6, 2001

De Silva, J. A., R. E. Condrey, and B. A. Thompson. In press. Profile of sharks associated with the U.S. Gulf menhaden fishery. North American Journal of Fisheries Management.

Fisher, M.R. and R. B. Ditton. 1992. A Social and Economic Characterization of the U.S. Gulf of Mexico Recreational Shark Fishery. Marine Fisheries Review 55(3): 21-27.

Forum Fisheries Agency. Unpublished data. Honiara, Solomon Islands

Fritz, L.W. 1998. "Squid and other species." Stock Assessment and Fishery Evaluation Report for the Groundfish Resources for the Bering Sea/Aleutian Islands Region, Bering Sea and Aleutian Islands Groundfish Plan Team, eds., North Pacific Fishery Management Council, Anchorage, AK. 29 p.

Gaichas, S., L.W. Fritz, and J.N. Ianelli. 1999. Appendix D: Other species considerations for th Gulf of Alaska. Appendix to Appendix B to the Gulf of Alaska Stock Assessment and Fishery Evaluation Report for 1999. Alaska Fisheries Science Center, NMFS. Seattle, WA. 59 pp.

Haight, Wayne R. and P. Dalzell. 2000. Catch and management of sharks in pelagic fisheries in Hawaii and the western Pacific region. Paper prepared for the International Pelagic Shark Workshop, Pacific Grove, CA. February 14-17, 2000.

Hanan, D.A., Holts D.B. and Al Coan Jr. 1993. The California drift gillnet fishery for sharks and swordfish, 1981-1982 through 1990-1991. Fish Bulletin 175. Cal Dept of Fish and Game. Long Beach, CA. 95 p.

Hatakayama, C. 1999. Written testimony to the Committee on Water, Land Hawaiian Affairs, Hawaii State Legislature. April 5, 1999. Honolulu, HI.

Hill, K. T., and D. B. Holts. Unpubl. presentation. Amer. Fish. Soc. 127th Ann. Mtg., 24-28 Aug., 1997, Monterey, CA [Abstract].

Holts, D.B. A. Julian, O. Sosa-Nishizaki, N. Bartoo. 1998. Pelagic sharks fisheries along the weat coast of the United States and Baja California, Mexico. Fisheries Research Journal 39(1998) p. 115-125.

Hudgins, L. and R. Iverson. 1990. Foreign flag fishing vessel expenditures in the port of Honolulu 1986-1988. Report prepared for the Hawaii State Department of Business, Economic Development and Tourism. Honolulu, HI.

Huppert, D. and T. Mittleman. 1993. Economic effects of the United Nations moratorium on high seas drift fishing. NOAA-TM-NMFS-SWFSC-194, NMFS Honolulu Laboratory. Honolulu, HI.

IATTC. 1999. The quarterly report of the Inter-American Tropical Tuna Commission, April-June 1999. Inter-American Tropical Tuna Commission, La Jolla, CA. 66 p.

Infofish. 2000. Infofish market reports. Bi-weekly shark fin indicative prices. Kuala Lumpur.

Ito, R.Y. and W.A. Machado. 1999. Annual report of the Hawai'i based longline fishery for 1998. Honolulu Laboratory, Southwest Fisheries Science Center, Administrative Report H-99-06.

Kitchel, J., C. Boggs, X. He, and C. Walters. 1999. Keystone predators in the Central Pacific. Pages 665-683 in Ecosystem Approaches For Fisheries Management. Alaska Sea Grant College Program, AK-SG-99-01.

Kleiber, Pierre, Y. Takeuchi, and H. Nakano. 2001. Calculation of plausible maximum sustainable yield (MSY) for blue sharks (Prionace glauca) in the North Pacific. Honolulu Laboratory, Southwest Fisheries Science Center, Administrative Report H-01-02.

Lawson, T.A. 1997. Estimation of bycatch and discards in central and western Pacific tuna fisheries: preliminary results. Oceanic Fisheries Programme Internal Report No. 33, South Pacific Commission, Noumea.

McCoy, M.A., and H. Ishihara. 1999. The socioeconomic importance of sharks in the U.S. flag areas of the western and central Pacific. Southwest Region Administrative Report AR-SWR-99-01, Honolulu, HI.

McHugh, R.J. and T.J. Murray. 1997. An analysis of the demand for, and supply of shark.

MARFIN grant no. NA57FF0052. University of South Florida and Georgia State University, December 1997.

Mid-Atlantic Fishery Management Council (MAFMC) and the New England Fishery Management Council (NEFMC). 1999. Spiny Dogfish Fishery Management Plan, MAFMC, Dover, DE, February 1999.

Nakano, H. 1994. Age, reproduction, and migration of blue shark in the North Pacific Ocean. Bull. Nat. Res. Inst. Far Seas 31:141-256.

Nakano, H. 1996. Historical CPUE of shark caught by Japanese longline fishery in the world. Information Paper submitted to the 13th CITES Committee. Doc. AC13.6.1 Annex, 7p.

NMFS. 1993. The Atlantic Shark Fishery Management Plan. NOAA, Silver Spring, MD.

NMFS. 1998. The report of the Shark Evaluation Workshop - June 1998. NOAA, Southeast Fisheries Science Center, Panama City, FL. 109 p.

NMFS. 1999. The Fishery Management Plan for Atlantic tunas, swordfish, and sharks. Dept. of Commerce. NOAA. Silver Spring, MD. 3 volumes.

NMFS. 2000a. Environmental assessment for the pelagic fisheries of the western Pacific region for an interim period. Pacific Island Area Office, Honolulu, HI. August 2000.

NMFS. 2000b. Draft environmental impact statement, pelagic fisheries of the western Pacific region, volume I. Pacific Islands Area Office, Honolulu, HI.

NMFS. 2000c. Biological Opinion on Issuance of Permit under section 101(a)(5)(E) of the Marine Mammal Protection Act (MMPA) to the California/Oregon Drift Gillnet Fishery for the Taking of Listed Species under the Endangered Species Act (ESA) and the Continued Implementation of the Pacifid Offshore Cetacean Take Reduction Plan (Plan). October 23, 2000. 135 pp.

NMFS. 2001A. United States National Plan of Action for the conservation and management of sharks. NMFS, Silver Spring, MD.

NMFS. 2001B. Preliminary longline logbook summary report, October-December 2000. Honolulu Laboratory, Southwest Fisheries Science Center, Honolulu, HI.

NMFS. 2001C. Final Environmental Impact Statement for the Fishery Management Plan for the Pelagic Fisheries of the Western Pacific Region. March 30, 2001.

NMFS. 2001D. Endangered Species Act Section 7 Consultation on the Atlantic Pelagic Fisheries

for Swordfish, Tuna, Shark, and Billfish in the U.S. EEZ. Biological Opinion, June 14, 2001.

NMFS. 2001E. Stock Assessment and Fishery Evaluation for Atlantic Highly Migratory Species. Dept. of Commerce, NOAA, Silver Spring, MD.

NMFS. 2001F. Biological Opinion on Authorization of Pelagic Fisheries under the Fishery Management Plan for the Pelagic Fisheries of the Western Pacific Region. March 29, 2001. 196 pp.

NMFS. 2001G. Preliminary longline logbook summary report, October-December 2000. NMFS Southwest Fisheries Science Center, Honolulu Laboratory Report. Honolulu, HI. 16 pp.

NMFS. 2001H. http://www.st.nmfs.gov./st1. NMFS, Fisheries Statistics and Economics Division, Silver Spring, MD.

NPFMC. 1999. North Pacific Council Review Draft Environmental Assessment/Regulatory Impact Review/Initial Regulatory Flexibility Analysis for Amendments 63/63 to the Fishery Management Plans for the Groundfish Fisheries of the Bering Sea/Aleutian Islands and the Gulf of Alaska to Revise Management of Sharks and Skates. North Pacific Fishery Management Council, Anchorage, AK.

Okey, T.A. and D. Pauly (eds.). 1999. A trophic mass balance model of Alaska's Prince William Sound ecosystem, for the post-spill period 1994-1996. Exxon Valdez Oil Spill Restoration Project Annual Report (Restoration Project 98330-1), Fisheries Centre, University of British Columbia, Vancouver, Canada.

Pacific Fishery Management Council (PFMC). 2001. Working Draft Fishery Management Plan and Environmental Impact Statement for U.S. West Coast Fisheries for Highly Migratory Species. October 2001. Chapter 2, p. 26

Ricker, W. E. 1975. Computation and Interpretation of Biological Statistics of Fish Populations. Bull. Fish. Res. Board Can. 191:382 pp.

Sharma, K.R., A. Peterson, S.G. Pooley, S.T. Nakamoto, P.S. Leung. 1999. Economic Contributions of Hawaii's Fisheries. SOEST 99-08. JIMAR Contribution 99-327. Honolulu Laboratory, Southwest Fisheries Science Center, Honolulu, HI.

SPC 1999. Secretariat of the Pacific Community tuna fishery yearbook 1999. Noumea.

Stevens, J. 1996. The population status of highly migratory oceanic sharks in the Pacific Ocean. Symposium on Managing Highly Migratory Fish of the Pacific Ocean, Monterey, CA.

Strasberg, D. 1958. Distribution, abundance and habits of pelagic sharks in the central Pacific

Ocean. Fish Bull 138. 335-361.

Trent, L., D.E. Parshley, and J.K. Carlson. 1997. Catch and Bycatch in the Shark Drift Gillnet Fishery off Georgia and East Florida. Marine Fisheries Review 59(1): 19-28.

U.S. Fish and Wildlife Service (USFWS). 2000. Biological Opinion of the Effects of the Hawaii-Based Domestic Longline Fleet on the Short-Tailed Albatross. November 28, 2000.

Vojkovich, M., and K. Barsky. 1998. The California-based longline fishery for swordfish, *Xiphias gladius*, beyond the U.S. Exclusive Economic Zone. *In* (I. Barrett, O. Sosa-Nishizaki, and N. Bartoo, eds), Biology and Fisheries of Swordfish, *Xiphias gladius*, p. 147-152. U.S. Dept. of Commerce, NOAA Tech. Rep. NMFS 142.

Williams, P.G. 1997. Shark and related species catch in tuna fisheries of the tropical western and central Pacific Ocean. Paper produced for FAO meeting of the Technical Working group on Sharks, Tokyo, 23-27 April 1998. South Pacific Commission, Noumea.

Wong, C. 1999. Written testimony to the Committee on Water, Land, and Hawaiian Affairs regarding legislative bill HB 1706 HD3 SD1, April 1999. Honolulu, HI.

WPFMC. 1999. Pelagic Fisheries of the Western Pacific Region. November 5, 1999. 1998 Annual Report (Draft).

WPFMC. 2000. Draft Amendment 9 to the Fishery Management Plan for the Pelagic Fisheries of the Western Pacific Region. February 2000.

Yoshizawa, S. 1999. Written testimony to the Committee on Water, Land Hawaiian Affairs, Hawaii State Legislature, April 5 1999. Honolulu, HI.

FINDING OF NO SIGNIFICANT IMPACT

Action Agency: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Department of Commerce

The Environmental Assessment (EA) for this action can be obtained from the Southwest Region, NMFS, 501 W. Ocean Boulevard, Suite 4200, Long Beach, CA 90801

Dates: The final rule will be in effect 30 days after publication in the Federal Register.

Proposed Action: NMFS proposes to promulgate regulations to implement the Shark Finning Prohibition Act, the purpose of which is "to eliminate shark finning by addressing the problem comprehensively at both the national and international levels" (Pub. L. No. 106-557). The rules would apply to persons engaging in shark finning when under U.S. jurisdiction seaward of the inner boundary of the U.S. exclusive economic zone (EEZ) or in U.S. ports. Finning (removing fins or tail from a shark and discarding the carcass at sea) and the possession and/or landing of shark fins by a person who was fishing on a U.S. vessel outside state waters would be prohibited. The rules would not apply to persons fishing in state waters under jurisdiction of a state as the Act which this rule implements does not expressly provide for the extension of its prohibitions into state waters. The rules would prohibit foreign fishing vessels from landing shark fins without corresponding shark carcasses into a U.S. port or transshipping such fins without corresponding carcasses to another vessel in U.S. waters. Alternatives that were more and less restrictive were considered and rejected. An alternative that would have deferred action to fishery management councils to eliminate finning through fishery management plans was rejected because the control measures could not be implemented in time to meet the deadlines set in the Act. An alternative that would have established broader controls (through more restrictive measures applicable to foreign vessels in the U.S. EEZ and in U.S. ports) was rejected because it would go beyond the apparent intent of the Act, would likely result in greater adverse economic impacts on U.S. businesses in the western Pacific, and would not achieve greater control over shark finning and associated shark mortality.

The information and analyses presented in this EA indicate that the proposed action would affect fisheries that operate in the U.S. EEZ and that fin sharks and land shark fins without corresponding carcasses. In most areas of the United States, Federal and/or state regulations are already in place that control this activity. However, shark finning has not been regulated in U.S.-flag affiliated islands in the western Pacific. This is the area where the action will have immediate effects. The principal effects are economic. The U.S. fisheries involved in shark finning in the western Pacific do not generally rely on shark catches and the sale of shark fins; the fisheries are targeting tuna and tuna-like fishes, and elimination of finning will not significantly affect these vessels' operations. The regulations also will prohibit foreign fishing vessels from landing shark fins without corresponding carcasses into U.S. ports. These foreign fishing vessels have historically landed more shark fins than U.S. vessels. However, these foreign vessels also target tuna and tuna-like fishes and their fishing strategies and effort are not expected to change as a

result of the regulations. Shark catches will continue incidental to catches of tuna and tuna-like fishes. Whether there will be any reduction is shark finning by foreign fishing vessels is unknown.

Thus, the regulations will have minimal effect on overall fishing effort by U.S. and foreign fishing vessels, and the catch and mortality of sharks or other fish species or on other marine resources will likely continue at historic levels. The mortality of sharks may decrease to some degree as many of the sharks that have been finned could conceivably be released alive, especially by U.S. fishing vessels. However, foreign fishing vessels account for the great majority of all fishing that results in shark finning, and the regulations cannot control foreign fishing on the high seas. There is no requirement that foreign fishing vessels cease finning, only that they not land fins into U.S. ports. Thus foreign activities will likely continue with the exception that landings of shark fins into U.S. ports will cease. Catches of target species and non-shark bycatch species will not be affected. No impacts on threatened or endangered species are expected.

Therefore, the proposed action will have minimal biological consequences, either beneficial or detrimental. There are no health or safety impacts or implications. The proposed action will affect U.S. fisheries in all parts of the world in which U.S. fishing vessels operate. This action will reinforce Federal controls in place in some areas (e.g., Atlantic, Gulf of Mexico and Caribbean) and state controls in other areas (e.g., West Coast, Hawaii) that conserve shark species. No unique geographic, ecological, historic or cultural resources will be affected. The action is controversial because some other nations with which the Unites States cooperates on international fisheries issues do not believe that unilateral action by the United States to control shark finning is appropriate or that elimination of shark finning is justified in the absence of information demonstrating that shark species need special conservation measures. However, Congress declared otherwise and the proposed action is consistent with the requirements of the Act. There are no unknown or unusual risks associated with this action nor is there substantial uncertainty that causes special concern about the effects or effectiveness of the proposed action. When viewed in combination with international efforts by the United States, the proposed action may contribute to long-term progress in achieving shark conservation and management.

Therefore, it has been determined that implementing these regulations would not significantly affect the quality of the human environment with specific reference to the criteria contained in 40 CFR, Chapter V, Part 1508, implementing the National Environmental Policy Act. Accordingly, the preparation of an environmental impact statement on this action is not necessary.

//s// Rebecca Lent for 1/16/02

William T. Hogarth, Ph.D. Date
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