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Catch and Management of Sharks in Pelagic Fisheries in Hawaii and the Western Pacific Region

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Abstract

The shark catch component of pelagic fisheries in Hawaii and the Western Pacific Region (WPR) is summarized for both large industrial scale and small-scale artisanal fisheries. Small-scale fisheries in the region include trolling, pelagic handlining and hand-deployed longline gear. The total catches of small-scale pelagic gears amounts to 5% of the pelagic catch in the WPR. All gears take some sharks incidentally; however, reporting of shark catches is poor in most fisheries. In Hawaii the most commonly caught pelagic sharks by small-scale gear are the makos (*Isurus* spp) and threshers (*Alopias* spp). In American Samoa makos and threshers are also a common component of longline shark catch, but the predominant species in the catch is the blue shark (*Prionace glauca*). In the Mariana Islands (Guam), silky (*Carcharhinus falciformes*) and Galapagos (*C. galapagensis*) sharks comprise the majority of shark catches, with a mix of other pelagics and coastal species making up the balance.

Limited fishing effort data makes estimating abundance and population trends difficult. Recent landings of sharks caught by pelagic gears have increased to six fold since the late 1980s. The increase in landings reflects the increased market for shark fins in Hawaii, as the market for shark meat in Hawaii is relatively small and static. Landings were worth on average $0.42/kg in 1998. By contrast shark fins landed in Hawaii in 1998 were worth $7.2/kg. Pelagic sharks and some coastal sharks are managed under the Pelagics Fishery Management Plan (PFMP) by the Western Pacific Regional Fishery Management Council (WPRFMC). Any coastal species not included as management unit species (MUS) in the PFMP will be included in the future under the Council's Coral Reef Ecosystem Fishery Management Plan. Finning activity for all sharks caught within State waters may be regulated in the future. In 1999 in response to concerns about the level of exploitation of blue shark in the EEZ, the WPRFMC implemented a quota of 50,000 for all Hawaii

longline caught sharks. Elsewhere, particularly the Guam and the Northern Mariana Islands, there is interest in utilizing incidentally caught shark species, primarily for their fins.

I. Introduction

The Western Pacific Region stretches in a great arc across the Micronesia and Polynesia and contains the Exclusive Economic Zones (EEZ) waters around the US Flag Pacific Islands (Figure 1). These comprise the State of Hawaii, the Territories of American Samoa and Guam, the Commonwealth of the Northern Marianas, and six other US Flag Pacific Island groups under military (Wake Island, Johnson Atoll) or federal (Howland & Baker, Jarvis, Kingman Reef & Palmyra Atoll, Midway) control. The EEZs around these island comprise half of the EEZ waters managed by the federal government through eight regional fishery management councils. The fisheries managed by the Western Pacific Council are for the most part pelagic fisheries, augmented with catches of deep slope (80-200 m) bottomfish. A small trap fishery for lobsters also operates in the Northwestern Hawaiian Islands (NWHI).

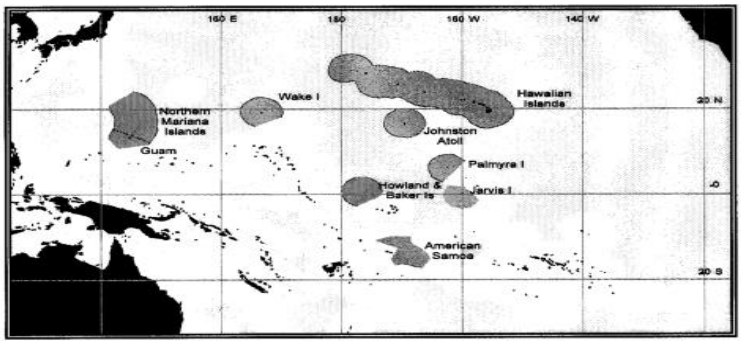


Figure 1. Map of the Western Pacific showingEEZs around US Flag Pacific Islands

Figure 1. Map of the Western Pacific showing EEZs around US Flag Pacific Islands

The fishing methods used in the Western Pacific Region are primarily variations of hook and line fishing, given that gillnetting and trawling in federal waters of the WPR are banned. The largest fishery managed by the Council is the longline fishery operating out of Hawaii, and which fishes in the EEZ waters around Hawaii and on the high seas. A smaller artisanal longline fishery also operates out of Pago Pago in the EEZ waters around American Samoa, and the balance of pelagic fisheries production is generated by small troll and handline vessels and by a small (5-6) skipjack pole-and -line fleet in Hawaii. Nearshore fisheries (0-3 nmi), such as troll and handline come primarily under the management authority of the state or territorial government. These fisheries may venture further offshore into federal waters but they remain primarily the responsibility of the local government for monitoring and management. Also fishing in the Council's is the US purse seine fleet which operates under an international treaty in the Western Pacific which is administered by the Forum Fisheries Agency, based in Honiara, Solomon Islands, and the Secretary of Commerce in the US. This fleet lands fish to two canneries in Pago Pago, and in some years fishes in the EEZ's surrounding Howland and Baker, Jarvis, Kingman Reef and Palmyra Atoll.

Pelagic fisheries in the Western Pacific Region are managed through the Western Pacific Council's Pelagic Fisheries Management Plan (PFMP), which was promulgated in 1986 and has since been amended on several occasions. The original PFMP 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 (*Galocerdo cuvier*), sandbar sharks (*Carcharhinus plumbeus*) and Galapagos sharks (*Carcharhinus galapagensis*), which may venture into the pelagic realm are also included under the FMP. 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. To meet the requirements of the re-authorized Magnuson-Stevens Fisheries Conservation and Management Act (MSFCMA), the PFMP must set definable overfishing thresholds for all species managed under the plan.

Unfortunately, the data required to properly estimate maximum yield and overfishing threshold levels are lacking for most species of pelagic sharks. Additionally, several of these shark species are widely distributed throughout the Pacific Ocean, and their population structure is poorly known.

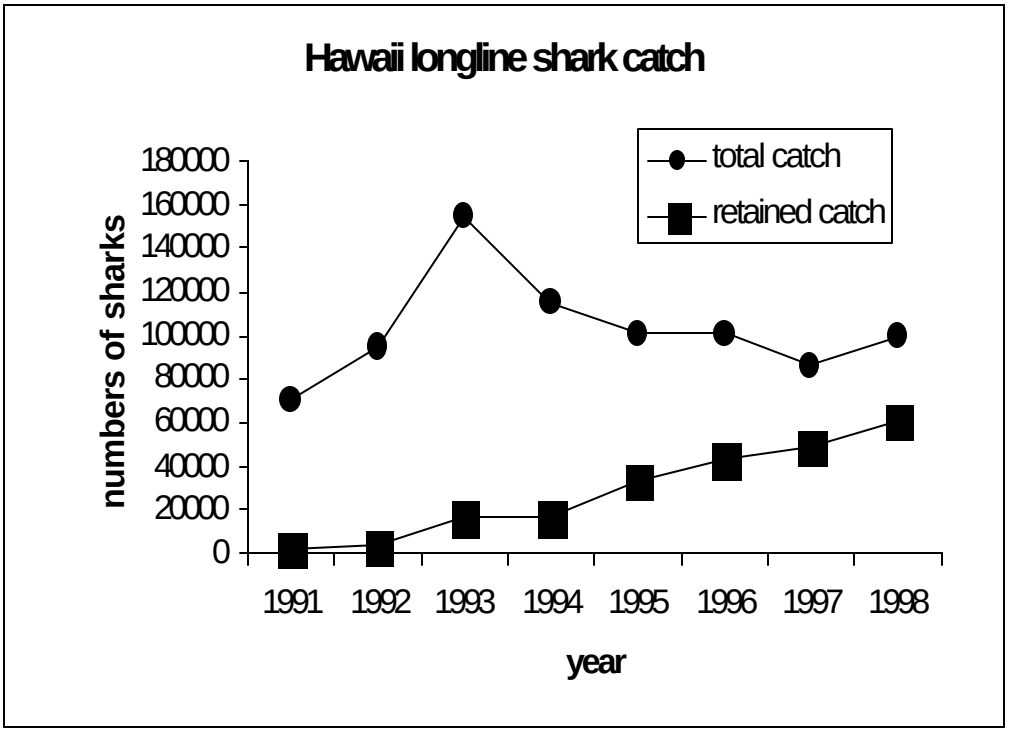
The largest percentage of sharks (87%) taken in the Western Pacific Region are caught by the high-seas longline fleet operating from the Hawaiian Islands. The majority of sharks taken in the high-seas longline fishery are blue sharks *(Prionace glauca*). The performance of the Hawaii longline fishery and the biology and population dynamics of the target and incidental catch, such as blue shark, have been studied in detail by the National Marine Fisheries Service (NMFS) in Honolulu. However, a considerable number other species of sharks are taken by other fisheries in the Western Pacific Region. In this paper we summarize catch data from the Hawaii longline fishery, the US purse seine fleet, American Samoa longline fleet and small-scale troll and handline fleets in the Western Pacific Region. We have also included some data on directed fishing for sharks with demersal longlines in Hawaii, which took mixtures of both coastal and pelagic species.

II. Western Pacific Regional Pelagic Fisheries and Associated Shark Catch

A. Longline (Hawaii)

The Hawaii-based longline fleet currently consists of 115 vessels holding NMFS Hawaii longline limited access permits. These vessels, ranging in size from 50-100 ft, frequently catch oceanic sharks incidental to the target species of tuna and swordfish. Although not the target species in the Hawaii longline fishery, on a numerical basis sharks account for about one-third of the total catch of all species reported by fishermen in NMFS longline logbooks . NMFS statistics show that approximately 95 % of the sharks caught are blue sharks (Laurs 1999). Oceanic whitetip, thresher, mako and various other mainly pelagic sharks species account for the remaining 5 %[1]. Total

[1]. NMFS Observers have recorded in excess of 25 species of sharks and rays taken by the Hawaii longline fishery



shark catch in the Hawaii longline fishery peaked in 1993 at 154,600 sharks, and then showed a downward trend until 1998 when the catch increased slightly (Figure 1). The general decline in shark catch is believed to be due mainly to a shift in target species from swordfish to tuna. Longline vessels targeting tuna set their lines deeper and tend to catch fewer sharks than those targeting swordfish.

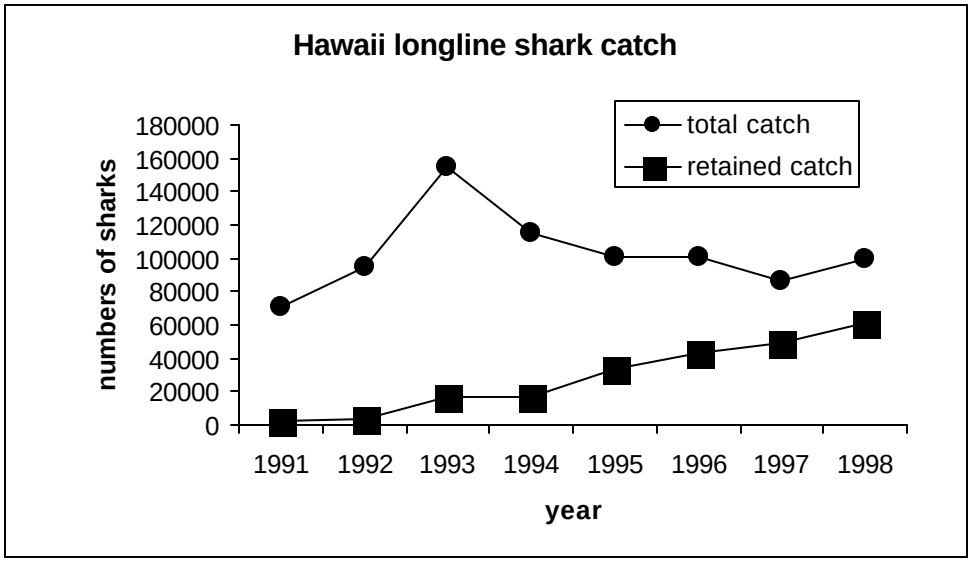


Figure2. Catch and retention of sharks in the Hawaii longline fishery 1991-1998

Much of the fishing effort of the Hawaii-based longline fleet occurs outside of the EEZ. Of the 99,910 sharks caught in 1998 (equivalent to about 2,864 metric tonnes (mt)) (Table 1),
59 % were caught on the high seas (WPRFMC 1999). No longline fishing occurs within State of Hawaii waters, as the Council's PFMP prohibits longline vessels from fishing within 50 to 75 nm of the main Hawaiian Islands (MHI) and within 50 nm of the NWHI. These closed areas are and to provide a buffer zone between longliners and small-scale troll and pelagic handline vessels operating around the coasts of the MHI. and to protect endangered wildlife such as monk seals, turtles and seabirds in the NWHI,

Table 1. Yearly average catch (mt) from Western Pacific Region pelagic fisheries

Fishery	Yearly Average Catch (mt)
Longline (Hawaii)	2864
Purse Seine (Western Pacific Region)	419
Longline (Am. Samoa)	11
Troll (Hawaii-non charter)	4.1
Troll (Guam)	3.6
Troll (Hawaii Charter)	2.5
Handline (Hawaii)	1.3
Bottom Handline (Hawaii)	1.3

NMFS logbook data show that until the early 1990s, only about 3 % of the sharks caught by Hawaii-based longline vessels were retained and utilized because of the low commercial value of sharks relative to the value of target species (Laurs 1999). NMFS observer records indicate that about 85 % of hooked sharks are alive when hauled on board. However, in the mid_1990s the market price of shark fins rose as supplies from more traditional markets were unobtainable due to overfishing of coastal shark stocks or the imposition of stricter management controls. The

increased demand for shark fins in domestic and foreign (Asian) markets led to a rise in the value of blue shark fins and an increase in the number of sharks being retained for finning (removing and retaining the fins from sharks and discarding the remainder of the shark while at sea).

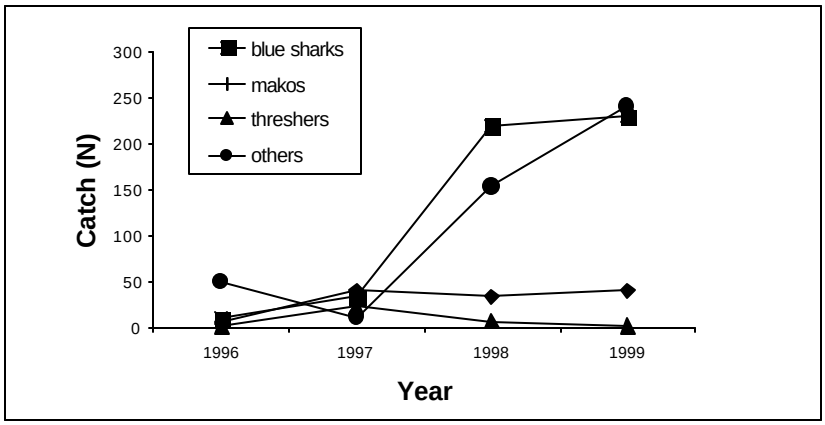
By 1998, 60 % of the sharks caught in the Hawaii longline fishery were retained on board for finning (Laurs 1999). Although the number of sharks caught by the longline fleet decreased by about one-third during the last six years, the fishing-related mortality of sharks increased as a result of the rise in finning. According to NMFS observer reports, approximately only 2% of the sharks retained for finning either are not either killed on-board prior to the removal of fins or dead when brought to the side of the vessel. The percentage of sharks retained for finning is higher for vessels targeting tuna than it is for vessels targeting swordfish or a mixture of swordfish and tuna (Laurs 1999). This may be due to the greater processing time for swordfish versus tuna.

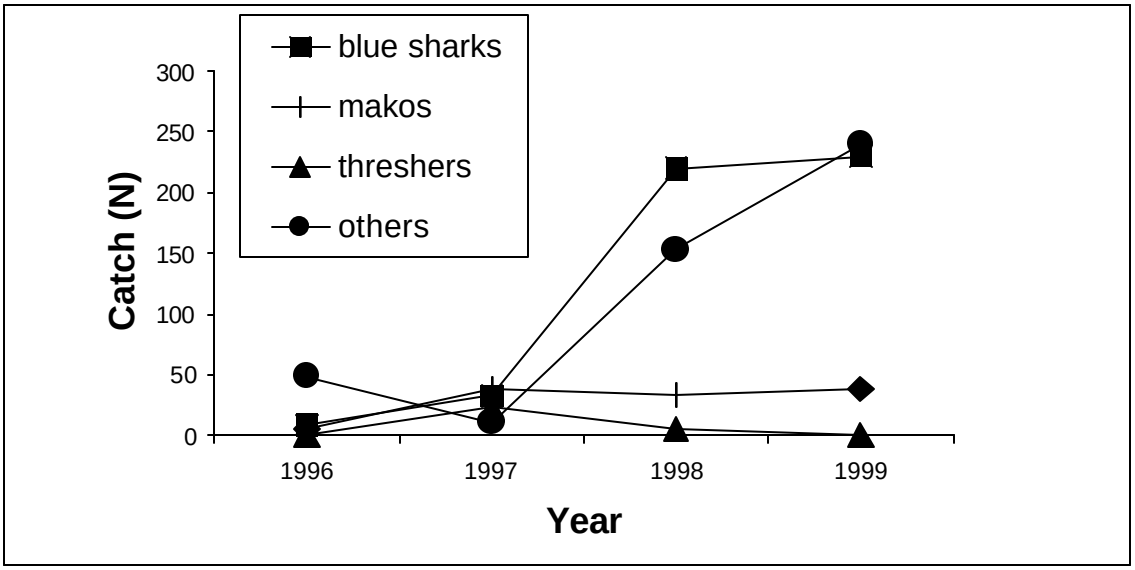
B. American Samoa Longline

In America Samoa the domestic longline fleet mainly consists of small (28-33ft) catamarans from which a 300-hook longline is set and retrieved by hand. The yearly average shark catch is approximately 11 mt (Table 1). The shark catch consist of blues, makos and threshers. Shark landings from the American Samoa longline fishery peaked in 1999 with 510 sharks (all species) caught (Figure 3). Like the shark catch in the Hawaii longline fishery, the majority of sharks caught in this fishery are retained for finning (72%), with only a relatively small fraction (14.4%) being landed for consumption.

Figure 3. Annual shark catch by the American Samoa artisanal longline fleet, 1996-1999

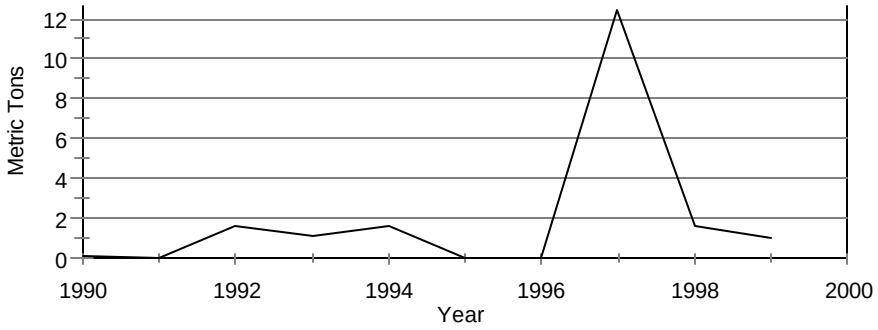
Unlike the Hawaii fishery, the American Samoa incidental shark catch is more varied, with less than 50% of the catch comprising blue sharks, with larger contributions by thresher (3%) and mako sharks (11%). A large proportion of the shark catch (41%) in this longline fishery remains to be identified.





C. Purse seine (Western Pacific Region)

Among the pelagic fisheries of the region, the greatest number of sharks (excluding the Hawaiian longline) are taken in the Western Pacific purse seine fishery. Most of the fishing activity by the purse seine vessels occurs in the EEZ waters of Papua New Guinea, Federated States of Micronesia and other Pacific island nations in the central and western Pacific. However, during some years such as



1997-1998, during an *El Niño*-Southern Oscillation event, a substantial portion of the US purse seine tuna harvest is made in the EEZ around Palmyra Atoll, Jarvis Island, Howland Island and Baker Island. Lawson (1997) estimates that the US purse seine fleet operating in the Pacific catches an average of about 419 mt of sharks per year (Table 1). The most prevalent species found in purse seine sets are the silky shark (*Carcharhinus falciformis*) and oceanic whitetip (*Carcharhinus longimanus*) (Williams 1997).

Although Lawson (1997) estimates that less than 1 % of total purse seine catch consists of sharks, the rate of mortality on sharks caught in purse seine gear approaches 100% (Bonfil 1994). McCoy and Ishihara (1999) report that the crews of US purse seine vessels operating in the Pacific engage in finning and sell the fins to dealers in American Samoa. The average shark catch for US purse seine vessels operating in the US EEZ around American Samoa, Howland and Baker Islands, and Jarvis Island was approximately 1 mt/yr from 1990-1996. However a catch peak occurred in 1997 when 12.5 mt of sharks were taken from Jarvis Island. (Figure.

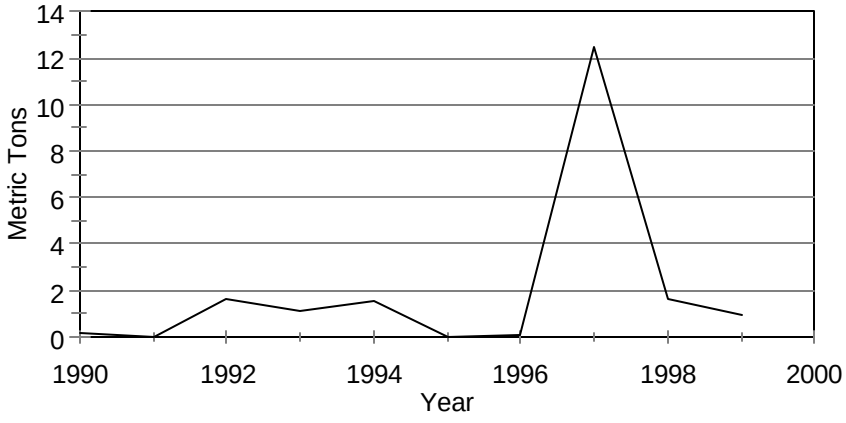
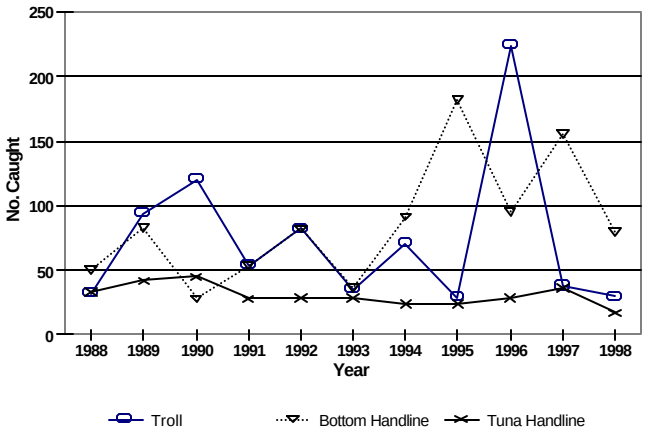


Figure 4. Shark catch from US purse seine fishery in the Western Pacific US EEZ



D. Troll and Handline (Hawaii and Guam)

Hand troll gear is used by commercial, recreational and charter vessels for pelagic species throughout Hawaii and the Western Pacific Region. In American Samoa, Guam and the Northern Mariana Islands trolling with baited hooks and lures is conducted from catamarans and other small commercial, recreational and charter vessels in coastal waters, near seamounts or around fish aggregating devices. According to the Hawaii Division of Aquatic Resources (HDAR), commercial catch reports submitted by fishermen indicate that between 1994 and 1998, the quantity of pelagic and coastal sharks caught by troll gear in the waters around Hawaii varied from a low of 1.8 mt to a high of 6.4 mt, with a yearly average of 4.1 mt (Table 1). In the same time period the tuna handline fishery (which includes the nighttime *ika shibi* and daytime *palu ahi* techniques) caught an average of 1.3 mt of sharks per year and the bottomfish handline fishery caught a similar quantity. The total number of sharks taken by these fisheries averaged approximately 200 per year from 1988-1995 and peaked in 1996-97 at 300 per year (Figure 5).

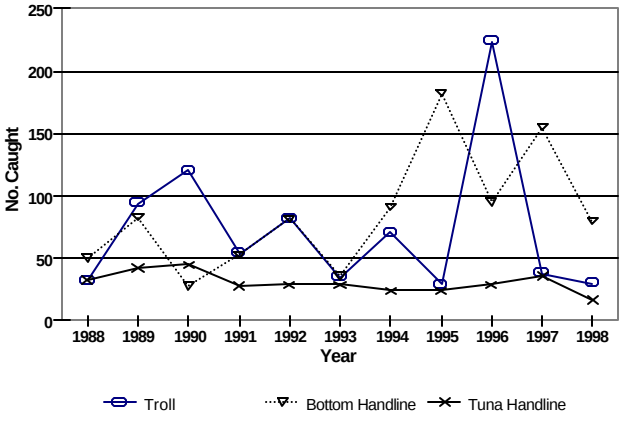


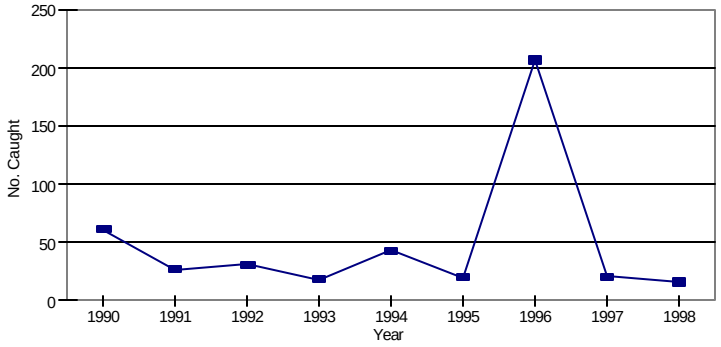
Figure 5. Shark Catches from Commercial Troll and Handline Vessels in Hawaii

These figures do not include sharks caught by the recreational sector, as there are no data collection mechanisms for recreational fisheries in Hawaii. Furthermore, HDAR notes that these figures may underestimate the actual amount of sharks caught commercially due to non-reporting by fishermen. Additionally, the Hawaiian charter troll fleet caught an average of 2.5 mt/yr from 1990 to 1999 (Table 1). The average catch per year of the charter troll fleet (Figure 6) is similar to that of the commercial troll fleet.

Table 2. Shark species caught in the Guam troll fishery

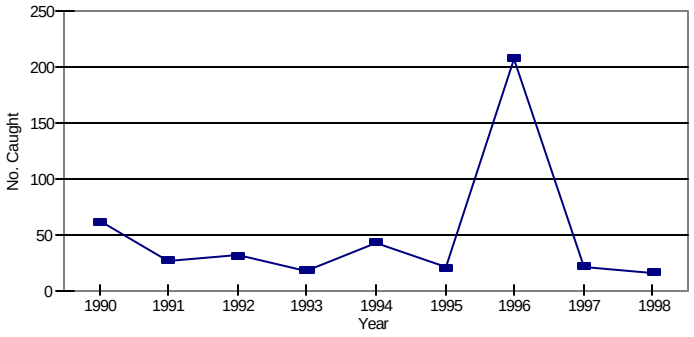
Scientific Name	Common Name	%
Carcharhinus falciformis	Silky shark	35
C. galapagensis	Galapagos	15
C. albimarginatus	White-tip shark	12
C. amblyrhynchos	Grey reef	12
C. longimanus	Oceanic white	8
C. melanopterus	Black-tip reef	8
Galeocerdo cuvier	Tiger shark	8
Hemigaliedae	Weasel sharks	4

Total shark catch (reported), 1986-1998 = 26



In the Mariana Islands small boats using trolling gear also catch relatively low numbers of sharks. In 1998, small commercial and recreational vessels in Guam landed about 3.6 mt of both coastal and oceanic sharks (Table 2) (WPRFMC 1999). There are no reports of

small-scale commercial fishermen in the Mariana Islands selling shark fins.



E. Demersal Longline (Northwestern Hawaiian Islands)

It is likely that the annual total catch of sharks in the waters around Hawaii by vessels using gear other than longline increased as a result of fishing activity between late 1998 and 1999 by a vessel that recently became based in the State. This vessel is specifically targeting sharks in state and federal waters around the MHI and NWHI. Although the gear used by the vessel is commonly referred to as a "bottom longline," NOAA Office of General Counsel determined that the gear does not meet the definition of longline gear in the pelagics FMP. Preliminary data collected by NMFS observers deployed aboard the vessel indicate that the vessel's catch consists mainly of coastal sharks, such as the sandbar (*C. plumbeus*) and Galapagos shark (*C. galapagensis*). Observer reports estimate that over 20 mt of sharks were landed in one trip (September-October 1999). The meat of the majority of sharks caught is sold as are the fins. This fishing vessel ceased operation at the end of 1999 and the Council is currently drafting legislation to prevent this type of operation occurring again in Hawaii

F. State Government Shark Control Programs

From 1959 to 1976 the state of Hawaii implemented six shark control programs ostensibly to reduce the number of attacks on humans. A total of 2,849 sharks were killed during the program. The majority of sharks caught were coastal species such as sandbar (51%), tiger (19%), gray reef (9%), and Galapagos (8%) (Table 3). The tiger shark, which accounted for a large portion of the catch (and reportedly shark attacks) has been considered a primarily coastal

dweller. However, when Polovina and Lau (1993) analyzed commercial catch data from the high-seas longline fishery in Hawaii, tiger shark catches were reported 90 to 670 kilometers from shore. Holland et al. (1999) also found that tiger sharks make extended forays across deep pelagic waters.

It is notable that several offshore and pelagic species were taken by the bottom longline gear used in the shark control program. This gear was fished within 1 kilometer of shore in water depths of 40-60 m, yet caught several mako and a blue shark. Also notable is the catch of two great white sharks, which are thought to be rare in Hawaiian waters.

Shark control programs were implemented in Hawaii on the premise that fishing could reduce the populations to a point where shark attack risk was decreased. Each of the major control programs referred to continual decreases in catch rates for consecutive fishing circuits as evidence that shark populations had been reduced and that these programs had been successful (Wetherbee et al 1994). It was estimated that nearshore shark populations were reduced by as much as 50-90% following the moderate fishing effort of the sharks control programs. There was also some evidence that the average size of some sharks, such as sandbars, declined during successive circuits of one of the control programs in the mid-1960s. Wetherbee et al. (1994), however, suggested that seasonal migrations by sharks between different depths, depending on size and other factors, such as weather and bait, may also have had an influence on catch rates and average size of sharks taken by these control programs

Table 3. Total Shark Catch by Species from State of Hawaii Shark Control Programs 1959-1976

Species	Common Name	Total
Galeocerdo cuvier	Tiger	554
Carcharhinus plumbeus	Sandbar	1,455
C. amblyrhynchos	Gray Reef	277
C. galapagensis	Galapagos	237
C. limbatus	Blacktip	154
Carcharhinus sp	Unidentified Gray	67
Sphyrna lewini	Hammerhead (Scalloped)	22

Sphyrna sp	Unidentified Hammerhead	21
Heaxacanthus griseus	Six-gill	20
Echinorhinus cookei	Prickly	12
Sphyrna zygaena	Hammerhead (Smooth)	10
Carcharhinus altimus	Bignose	9
Isurus sp	Mako	5
Pseudotriakis microdon	False Cat	2
Carcharadon carcharias	Great White	2
Carcharhinus falciformis	Silky	1
Prionace glauca	Blue	1
	Total	**2,849**

III Economic Importance

The oceanic shark species that have a relatively high market value, such as thresher and mako shark, are retained and landed by Hawaii-based longline vessels. If properly dressed, these sharks can be sold fresh, and they command prices similar to swordfish in US markets. However the percentage of the total number sharks caught in the Hawaii longline fishery that were landed whole was only about 3 % at its peak in 1991, and in 1998 it was less than 1 %. It is estimated that the total dressed weight of mako and thresher sharks landed in 1998 was about 31,500 kg. The average wholesale price of sharks in Hawaii in 1998 was $0.42/kg, and thus the total value of the shark meat landed was about $13,280. In addition, the HDAR reports that about 1,500 kg of mako, thresher and other types sharks caught by troll or handline gear were sold in Hawaii in 1998 at a total value of about $630.

Blue sharks are seldom, if ever, retained in fisheries of the Western Pacific because the on-board handling requirements for these species are particularly burdensome and the meat has a comparatively low value. Often, blue shark flesh is unmarketable because of the rapid breakdown of urea in the muscle tissue into ammonia soon after death and the subsequent tainting of the meat (Nakano and Seki in review). Furthermore, on-board storage of improperly processed blue sharks may reduce the value of higher priced fish due to urea contamination. However, the fins of most of the larger sharks have high market value and are usually retained. It is estimated that in 1998, 34 mt of shark fins with an ex-vessel value of about $1 million were landed by Hawaii-based vessels using

longline gear. A further 132 mt of shark fins from Korean longliners were also transhipped through Hawaii, worth between $2.4 million-2.6 million. These fins are collected at sea by service vessels, which then tranship to a licensed US vessel beyond the 200 nm EEZ and thus landed in Hawaii (McCoy and Ishihara 1999)

In American Samoa 32 to 43 mt of fins are landed by foreign vessels, worth between $455,000 and $705,000. In addition, it is estimated that US purse seine vessels annually land in American Samoa between 8 and 9 mt of shark fins, worth $162,000 to $230,000. Unprocessed fins landed in Guam and American Samoa are mainly exported to Asia markets. Assuming that the average dried fin to body weight ratio is 1.44% and an average weight of 45 kg per shark, the total tonnage of fins offloaded in American Samoa and Guam represents a harvest of between 94,000 and 128,000 sharks. It is likely that the volume of shark fins landed in American Samoa and Guam is declining with the decrease in the number of port calls made in Pago Pago and Apia by foreign longline vessels. As in the Hawaii longline fishery, it is the crew of the fishing vessels who often acquire the revenue from the shark fin sales that occur in American Samoa and Guam. On US purse seine vessels it is generally the lower paid crew that augment their wages with income derived from finning.

Shark fin dealers in Hawaii indicate that the majority of the fins landed by Hawaii-based longline vessels are shipped to the continental US for processing, although no production figures are available. Once processed, some or all of these fins are sold in markets for shark fins in the US. Rose (1998) states that there is a significant and apparently growing domestic consumption of shark fins, particularly in urban areas with large populations of ethnic Chinese, such as New York, San Francisco and Los Angeles.

Status and Management of Pelagic Sharks

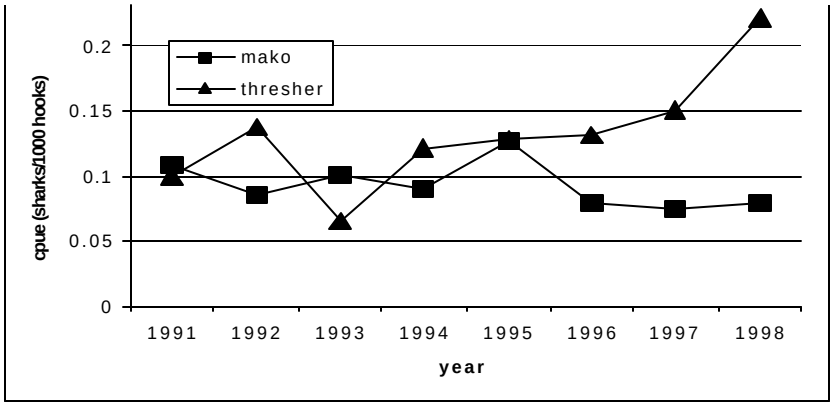
The PFMP implemented in 1986, covers those species (targeted and bycatch) that are taken by the pelagic fisheries in the US EEZ of the Central and Western Pacific. The FMP initially included billfish, wahoo and mahimahi as well as sharks in the management unit, while tuna was added in 1992. As a requirement of National Standard 1 under the MSFCMA, the PFMP set a level of

overfishing for all stocks managed under the FMP. Originally stock status was determined using the spawning potential ratio (SPR), the ratio of reproductive capacity of a stock in the exploited phase to the unexploited virgin stock. The Council acknowledging the greater potential to overfish shark stocks, nominated an SPR value of 35% as opposed to 20% for tunas, billfish, etc.

With re-authorization of the MSFCMA in 1986, Regional Fishery Management Councils were obliged to generate standing stock estimates for management unit species, the Maximum Sustainable Yield (MSY), standing stock at MSY, and fishing effort generating MSY. While this may be possible for some of the tunas and billfish, where there are sufficient volumes of data required for these computations, information on most pelagic sharks falls woefully short to generate these parameters. The exception is the blue shark for which a stock assessment is expected in mid-2000 for the North Pacific, as a result of a collaborative effort between the NMFS Honolulu Laboratory and the Japanese Far Seas Fisheries Laboratory.

The available fishery statistics suggest that the blue shark stock in the North Pacific is not currently being overfished. The fishing pressure on this stock decreased by nearly half with the closure of the high seas driftnet fisheries in 1992, although the increase in value of blue shark fins is likely to have increased fishing mortality later in the decade if retention and finning rates in foreign longline fisheries in the Pacific match those of the Hawaii fishery. However, studies of catch-per-unit-effort (CPUE) data over several decades reveal no evidence that the blue shark stock in the North Pacific is currently in a critical condition (Nakano and Seki in review). Similarly, an analysis of blue shark CPUE in the Hawaii longline fishery conducted by NMFS gives no indication of a decline in abundance (Bigelow et al. 1999).

NMFS Honolulu Laboratory notes that there is an insufficient understanding of blue shark population dynamics and biology to support a meaningful analysis of fishery impacts on these sharks (Laurs 1999). Similar concerns about the lack of knowledge of blue shark stock structure and population sizes have been expressed by Bonfil (1994) and Stevens (1996). However, Walker (1998) suggests



that the stabilizing CPUE trends for blue sharks in longline fisheries is an indication that blue shark stocks can be harvested on a sustainable basis. With respect to other pelagic sharks taken in the Hawaii-based longline fishing there are no indications of any serious problems in abundance. The nominal catch rates of other sharks in the Hawaii longline fishery are either stable (makos) or increasing (threshers) (Figure 7).

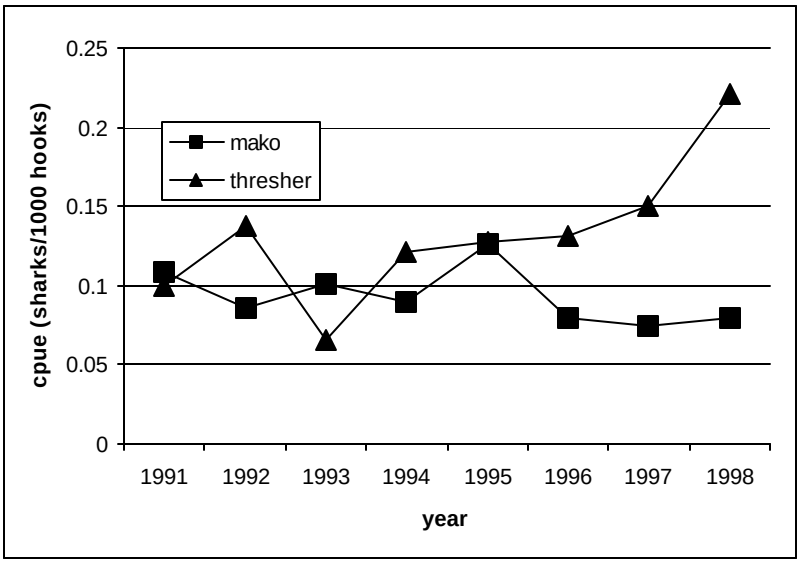


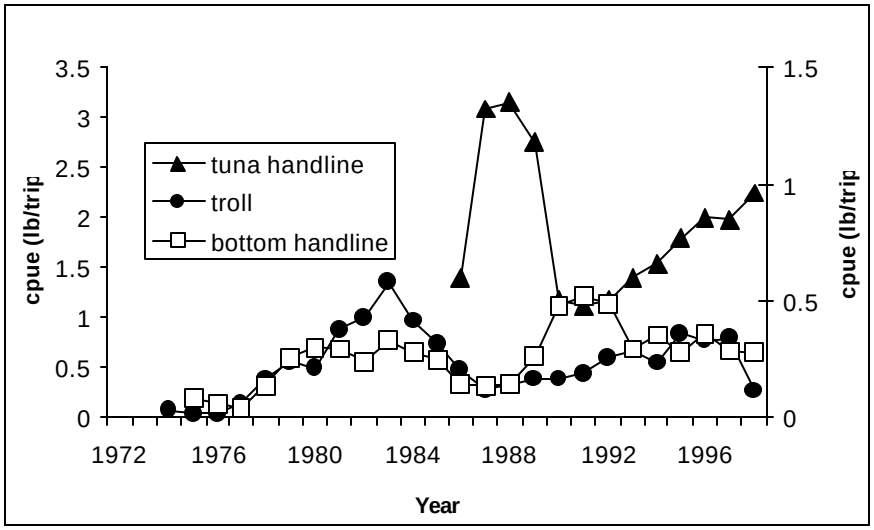
Figure 7. Catch rates for mako and thresher sharks in the Hawaii longline fishery 1991-1998

It is possible to generate a crude index of catch rate for troll and handline fishing in Hawaii in terms of catch per trip (Figure 8) but under-reporting of shark catch, the lack of species differentiation, lack of information on trip length, numbers of gear deployed and location serve only to confound this data. Catch per trip for all sharks in the Hawaii troll fishery has varied between 0.01-0.24 kg/trip, with an average of 0.12 kg/trip, while tuna handlining varied between 0.6 -1.6 kg/trip with an average of 0.9 kg/trip. Tuna handlining would appear to catch proportionately more sharks, but this may due to the inclusion of a fleet of handline vessels which fish up to 150 nautical mile from shore on seamounts and NOAA weather buoys and have a

trip length of about five days as opposed to a daily trip for other handline fishing and trolling.

Figure 8. Time series of nominal CPUE for Hawaii troll, pelagic handline and bottom handline catches of sharks

The rise in pelagic handline shark CPUE may be indicative of changes in targeting as shark fin prices have increased during the decade. However, even accounting for non-reporting of catch, the catch rates for troll and handline fishing are very low and these fisheries in the Hawaii EEZ probably do not represent a serious threat to pelagic sharks stocks. Further, as stated earlier, longline fishing is not allowed within 50-75 nm around the MHI and within 50 nm of the NWHI. This creates, in effect, a partial marine protected area for pelagic fish, even though many small troll and handline vessels fish up to 20-30 nm offshore. Elsewhere in the WPR , the current scale of pelagic and coastal shark catches does not represent a serious threat to these populations. Indeed fishermen in Guam and the Mariana



Islands have noted the high abundance of coastal sharks in their region and are concerned that in some seamount areas sharks have become so abundant that they have become a serious hazard for troll fishing. Unlike in Hawaii, where there was a general consensus to ban demersal longlining, the fishermen of the Mariana Islands indicated their desire to maintain this option for fishing, particularly if sharks represent an economic opportunity through marketing their fins

The current list of species managed under the PFMP is extensive since the term oceanic can be construed to mean “in the ocean”, which in effect includes all sharks within the four families specified under the FMP (Alopiidae, Carcharinidae, Lamnidae and Sphyrnidae). Recently, the Council reviewed the shark in the management unit and concluded that ultimately it would limit the species included therein to silky shark (*Carcharhinus falciformis*), oceanic whitetip shark (*Carcharhinus longimannus)* blue shark (*Prionace glauca*), pelagic thresher shark (*Alopias pelagicus*), bigeye thresher shark (*Alopias superciliosus*), common thresher shark (*Alopias vulpinus*), shortfin mako shark (*Isurus oxyrinchus*), longfin mako shark (*Isurus paucus*), salmon shark (*Lamna distropis*). All coastal and reef shark species will be included under the Council’s coral reef ecosystem FMP. The Council has not effected this change as yet since the inclusion of species targeted by demersal longlining are included under the PFMP and through this mechanism can be regulated in Hawaii.

In an effort to implement a precautionary approach until the stock assessment of blue shark in the North Pacific is completed, the Council voted to implement a fleet quota of 50,000 sharks that can be retained and killed, based on the average retention volume between 1996 and 1998. This represents a 15% reduction in the volume of blue sharks retained in 1998 and will probably be an even greater reduction on the volume retained in 1999.

The utilization of only the fins of the blue shark appears wasteful, but rightfully the remaining portion of the shark is an economic discard, since there is no market for it in Hawaii. Further, the carcasses are recycled within their natural environment instead of jeopardizing high quality fish only so the shark carcass can be later being dumped on land. There is a small steady market demand for quality shark meat in Hawaii, but annual sales range from between 25 mt to 58 mt, with an average of about 40 mt, and worth in the 1990s on average $0.42/kg. By contrast, shark fins landed in Hawaii in 1998 were worth $7.3/lb and had commanded even higher prices in 1997 before the Asian economic recession.

A Maui-based seafood company has expressed interest in processing blue sharks and has applied for a government grant to test market

various blue shark products[2]. The company, Maui Diamond Bay Seafood would like to imitate Australian processors that profitably use similar low value sharks and make a profit by making maximum use of the fish, recovering flesh, skin, fins, jaws, cartilage and liver oil. Even with a successful processing operation in Hawaii, the style of fishing with ice rather than freezers will mean that probably only a portion of the blue shark catch would be landed whole given the short storage time for fresh blue shark.

Conclusions

1. Shark catches and retention rates are in general poorly documented in pelagic fisheries in the Western Pacific Region. Only the Hawaii longline fishery with NMFS logbook and observer programs has sufficient data to analyze CPUE trends and conduct stock assessments.

2. Blue sharks form almost all the Hawaii longline shark catch but is regarded as a low quality fish with only the fins being of any economic value, while the remainder of the carcass is regarded as an economic discard.

3.As a precautionary measure the Western Pacific Regional Fishery Management Council will constrain retention of blue sharks by the imposition of a quota of 50,000 sharks, adjustable through a framework mechanism dependant on the outcome of a stock assessment expected in mid-2000.

4. There appears to be little prospect of shark landings for fresh shark meat increasing in Hawaii, but the establishment of a processing plant in Hawaii, through government support, may encourage some greater utilization of blue sharks. Targeting sharks in the Mariana Islands may be attempted in the Mariana Archipelago.

5. Shark catches appear to be a very minor item for trollers but may comprise a larger share of tuna handline catches. However, there is substantial under-reporting of shark catches in these small boast fisheries making any interpretation circumspect.

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[2]. Unfortunately, the company was not successful in its application for grant funding.

6. Three of the Western Pacific Region's ports (Honolulu, Apra in Guam and Pago Pago in American Samoa are major conduits for transhipment of sharks fins from foreign vessels. Shark finning is an important supplement to lower paid fishermen in domestic and foreign longline and purse seine fisheries.

7. There does not appear to be any serious problems with Pacific pelagic shark catches, given the level of fishing activity in the Western Pacific Region, but more data are needed from the small troll and handline fisheries to generate better catch data and track catch rate trends for sharks in these fisheries.

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