Statement of
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Chairwoman Bordallo and distinguished members of the Subcommittee, thank you for this opportunity to speak to you about shark conservation and IUU fishing. My name is Shelley Clarke and I am an independent fisheries scientist based in Japan and Hong Kong. In addition to holding a visiting researcher appointment at Imperial College London, I work for a variety of government and non-governmental clients and serve as a member of the Executive Committee of the IUCN Shark Specialists Group. I was the first scientist to offer a statistically-based estimate of the number of sharks utilized by the shark fin trade worldwide. Some of my other research projects have included studies of shark catches and handling practices in Japan; utilization of shark products in Southeast Asia; estimation of IUU fishing off Russia; and investigation of China's role in the global fisheries and fish processing industries.

Using Shark Fins to Understand the Status of Sharks

My testimony will describe my perspective on what science can tell us about the impacts of the shark fin trade on sharks. In fact, researchers like myself have been driven to studying the markets for shark products because there is so little recording of shark catches at sea. Although some countries now require shark catches to be recorded, many still do not, and most countries which do record sharks only record a handful of species. The lack of long-term data by species heavily constrains our ability to conduct stock assessments for most populations and to conclude with high certainty that these populations are declining due to overfishing. Lacking stock assessment results documenting resource depletion, it is very difficult to build consensus for management of sharks in regional fisheries management organizations (RFMOs). This is particularly true for the many fisheries in which sharks are caught alongside valuable species like tuna. In such cases, it is likely to be technically challenging to reduce shark catches without reducing catches of target species.

One of the key problems contributing to the lack of data on shark catches is the huge difference between the value of shark fins and shark meat. It is common for shark fins to sell for $250 or more per pound and I've calculated that the minimum annual value of the global shark fin trade is on the order of $500 million. In contrast, shark meat can usually be sold for no more than a couple of dollars per pound, if a market currently exists in the port of landing at all. It is these market dynamics that cause fishermen to fin sharks, keeping the valuable dorsals, pectorals and caudals and discarding the low value carcasses to retain room for more profitable catches. In previous years profits from fins served as a kind of informal bonus to the crew and thus there was no need to formally record the number of fins gathered. Even though

fin profits are now generally split between the company and crew, recordkeeping for shark fins onboard and in port landings data remains minimal. For these reasons, it is the activity of trading shark fins, rather than the activities of catching and landing sharks which currently provides the best opportunity for understanding the status of shark populations.

Species Composition of the Shark Fin Trade

One of my studies of the shark fin trade was designed to document what species of sharks are commonly used. This task was complicated by the fact that although there are more than 400 species of sharks, traders recognize and name only about 50 types. Several of these types contain more than one species, and it is likely that rare species are mixed into the closest resembling group. Since the molecular DNA technique I used, which was developed by Dr. Mahmood Shivji at Nova Southeastern University, is capable of identifying a large number of shark species, and sequencing could be used to identify the remainder, technology is not the limiting factor. However, obtaining access to trade stocks and acquiring representative samples of fins imported to Hong Kong from over 80 countries are serious obstacles.

I was ultimately able to use a combination of trader records, fin tissue samples and DNA techniques to identify that 40% of the fins sold through auctions in Hong Kong were comprised of only 14 species. These species included blue (*Prionace glauca*), shortfin mako (*Isurus oxyrinchus*), silky (*Carcharhinus falciformis*), dusky (*C. obscurus*), sandbar (*C. plumbeus*), tiger (*Galeocerdo cuvier*), bull (*C. leucas*), oceanic whitetip (*C. longimanus*), great hammerhead (*Sphyrna mokarran*), scalloped hammerhead (*S. lewini*) and smooth hammerhead (*S. zygaena*) sharks, and the three species of thresher shark (*Alopias* spp.). While most of these species are widely-distributed and relatively abundant sharks, at least eight of these species will be listed on the 2008 IUCN Red List as vulnerable or endangered over at least some part of their range. In addition, based on my observations at Hong Kong auctions, fins from two Convention on International Trade in Endangered Species (CITES)-listed sharks (i.e. basking shark and whale shark) are used in the fin trade.

Since there is no particular premium attached to an individual species other than the quality of the fin rays it produces, there is little branding of shark fin products by species. I believe that dwindling supplies of species which have already been depleted are likely to be masked by substitution of other more prolific species. Therefore, even though some species may be in severe decline, we will not necessarily see a drop in the overall levels of the trade.

Number and Weight of Sharks Utilized in the Shark Fin Trade

Another aspect of my shark fin studies was designed to estimate how many sharks are utilized each year in the shark fin trade. Using a number of different data sources and probabilistic modelling techniques, I estimated that the total number of sharks traded annually worldwide ranged from 26 to 73 million per year (95% probability interval), with an overall median of 38 million per year. The corresponding shark weight or biomass represented by the global fin trade was estimated at between 1.21 and 2.29 million tonnes per year (95% probability interval) with a median of 1.70 million tonnes per year. These figures are three to four times higher than the catch recorded in the United Nations Food and Agriculture Organization's capture production statistics, the only global database of shark catches.

The blue shark is an abundant and prolific shark which was found to comprise 17% of the Hong Kong auction market. I estimated that the number of blue sharks represented in the global shark fin trade is 10.7 million (95% probability interval of 4.6-12.6 million) individuals per year, or 360,000 mt (95% probability interval of 200,000-620,000 mt) of biomass per year. When I compared these estimates to maximum sustainable yield (MSY) reference points derived from blue shark stock assessments in the Atlantic and North Pacific, the results suggested that blue sharks globally are being harvested at levels close to or possibly exceeding MSY. Given that the MSY reference point is the highest possible catch that could theoretically be sustainable, any catch that approaches or exceeds this level is of concern. Conclusions regarding the sustainable or unsustainable use of other species, and thus the shark fin trade as a whole, cannot be inferred from this blue shark example. This is because other species common in the fin trade are generally of lower productivity and it is quite likely that sustainable catch levels may have already been exceeded for some of them.

Recent Trends in the Shark Fin Trade in China and Hong Kong

Shark fins have been a traditional element of Chinese haute cuisine for centuries but since the founding of the People's Republic of China in 1949 consumption was either discouraged by policies of cultural reform or priced beyond the reach of all but the wealthiest consumers. As the historical hub of the entrepôt trade for China, as well as the heart of Cantonese culture, Hong Kong has long been the world's largest shark fin trading center, handling at least half of the global trade. Since China's entry to the World Trade Organization in 2001, however, shark fin trading activity has shifted from centralized channels in Hong Kong to a diversified Mainland China network.

Today, shark fin is available in most, if not all, major cities in China, and with population growth between 2000 and 2005 of 9.5 million persons per year, a large number of consumers are sampling shark fin for the first time. Older people are more likely to adhere to traditional beliefs about shark fin's tonic properties, and are also more likely to insist on the traditional practice of serving shark fins at weddings and other celebratory events. Younger consumers are thought to be more motivated by shark fin's taste and status than by its purported health benefits, and may also be more attuned to recent health and conservation warnings about shark fin consumption.

All observers of the shark fin trade to whom I have spoken agree that it is being driven by demand in Mainland China. Unfortunately, due to the customs commodity codes applied to shark fin by Mainland Chinese authorities it is not possible to accurately track trade levels in recent years. Since May 2000 China has required that all fresh, chilled and frozen (i.e. not dried) shark fins to be recorded under commodity codes designated for fresh and chilled or frozen shark meat. In fact, beginning in 2000, China's recorded imports of frozen shark meat increased considerably from about 1,000 mt in 1999 to approximately 5,000 mt in 2005 and 2006 (Figure 1).

Given the ambiguity in the new commodity coding system, the observed increase in quantity traded could be due to either shark meat or fins. Two clues to the underlying pattern are provided by recorded trade in shark products between China, Hong Kong and Spain. First, since 2000 Spain has contributed 22-39% of Hong Kong's total shark fin imports, and 97-99% of these have been in frozen form. Therefore, starting

in 2000 we would expect to suddenly see, and indeed do see, a large increase in the share of frozen shark "meat" imported to Mainland China from Spain (Figure 1). Second, since Spain's exports of shark fins are usually in frozen form, we would expect the contribution of Spain to China's shark fin imports after 2000, i.e. after which time this category was restricted to dried fins only, to drop noticeably. As shown in Figure 2, this is indeed the case.

Since it is not possible to determine what percentage of China's frozen shark meat trade is frozen fins, it is not possible to draw firm conclusions regarding the overall growth in the fin trade in the primary markets, Hong Kong and Mainland China. However, if it is assumed for the sake of argument, that the 5,000 mt of frozen shark meat imported to China in 2005-2006 consists only of frozen fins, this would equate, after adjustment for water content, to an additional 1,250 mt of fins in the global market in these years. When this quantity is added to the amounts of dried fins recorded as imported by the Mainland and Hong Kong, the total amounts traded in 2005 and 2006 would be on the order of 10,500 to 9,200 mt, respectively, versus a level of about 12,300 mt in 2000. Therefore, even under this conservative assumption the trend in the fin trade appears to be downward since 2000.

Despite the shift in the trade to Mainland China, it is still useful to examine long-term trends in Hong Kong as they may still be representative of the global market. After increasing at a rate of 6% per annum, shark fin imports to Hong Kong have levelled and then declined since 2000. It would seem plausible to attribute this trend to competition from the Mainland market, however, this trend could also be explained by limited shark fin supplies suppressing both markets. Figure 3 compares annual chondrichthyan (sharks, skates, rays and chimaeras) catches reported to FAO and shark fin imports reported by Hong Kong. The rate of increase in the amount of fins traded was higher than the rate of increase of reported catches until 2000. These data suggest that year-by-year fisheries began more fully utilizing the fins on the sharks they caught, as was documented in the Hawaiian longline fishery. However, in the six years following 2000, the trends in the shark fin trade very closely parallel trends in catches suggesting that all sharks' fins were being utilized already and the only way traders could obtain more fins would be if catches increased. It is not known whether the observed decline in global shark catches since 2000 is due to over-exploitation of sharks, a reduction in fishing effort due to higher fuel prices, or a combination of these or other factors. Nevertheless, the downturn in catches in combination with similar trends in the fin trade, despite indications that demand for fins is growing, is worrying. Given what now appears to be a strong linkage between shark catches and the volume of the fin trade, urgent consideration of effective fisheries management measures is called for.

The Effect of Finning Regulations

Shark finning is prohibited by national bans in several countries besides the United States including most Australian states and Australian federal waters, Brazil, Canada, Cape Verde, Costa Rica, Ecuador, El Salvador, Egypt, the European Union, Mexico, Namibia, Nicaragua, Oman, Palau, Panama, Seychelles, and South Africa. It is also contrary to recommendations or resolutions agreed by eight regional fisheries management organizations. Despite several successful prosecutions for violations in the United States recently, in my view, global enforcement of finning restrictions

remains minimal and finning, both within and outside regulated areas, undoubtedly continues.

This is not to say that finning bans have no effect. Shark fin imports to Hong Kong from European Union (EU) countries dropped by 30% (from 785 to 550 mt) between 2003 and 2004, the first year after implementation of the EU finning regulations, and remained below 600 mt in 2005 (Figure 4). Since that time, however, imports to Hong Kong from EU countries have grown to nearly pre-ban levels. Trends in US imports seem to have been driven primarily by enactment of the State of Hawaii shark finning prohibition in the summer of 2000 which coincided with a steep decline (54%, from 374 to 171 mt) in imports by Hong Kong from the US in 2001. Hawaii's prohibition not only banned finning by Hawaii's own longline fleet, but it also required all shark fins to be landed with their carcasses, thus effectively foreclosing the continued use of Hawaii as a fin trading center for other international fisheries which had been finning in the Central Pacific. When the US banned finning in 2002 it thus did not appear to have any further effect on US exports to Hong Kong.

The effect of finning regulations on the shark fin trade as a whole is less clear. Total imports of shark fin to Hong Kong plummeted by nearly 50% between 2006 to 2007. This might suggest that finning resolutions implemented in 2007 are the cause of this decrease in trade. However, considering that most finning regulations were already in effect by 2006, and there has been no apparent change in enforcement levels in 2007, I consider it most likely that the reduction in imports to Hong Kong is due to other factors.

Comments on the Shark Conservation Act of 2008

I would like to comment on the amendments proposed to the Magnuson-Stevens Fishery Conservation and Management Act by the bill as currently drafted. My comments are organized into headings pertaining to transport of shark fins on cargo vessels; fin to carcass ratios; and reporting of nations without comparable shark conservation plans.

Transport of Shark Fins on Cargo Vessels

First, as the decision of the U.S. Ninth Circuit Court of Appeals last month has revealed, vessels which purchase shark fins at sea from fishing vessels without the corresponding carcasses are considered excluded from the prohibitions on fin possession which apply to fishing vessels by means of their definition as cargo vessels. I do not seek to comment on the legal merits of the case; I would simply like to explain that operations such as those described for the King Diamond II are a common feature of the supply chain of shark fins to China. Ever since the opening of the Mainland China economy to unfettered external trade in recent years, the traditional mode of shark fin supply through established Hong Kong and Singapore shark fin traders has been upset. Whereas in the past these traders would face competition from each other when buying and selling fins, they managed these risks through trade associations and close proximity of shops in self-designated districts. Competition for fins, now that the number of Mainland Chinese traders has expanded, and particularly now that supplies appear more limited than ever, is fierce. Hiring cargo ships to tranship shark fins at sea is simply a tactic to "scoop" the competition by buying the fins before they are available to shore-based operatives, and is likely to become more and more common. While such a practice does not necessarily facilitate

finning (i.e. the fishing vessels might fin sharks whether or not at-sea purchasers are available), it certainly ensures that any finning which does occur cannot be detected by local authorities upon landing, and for this reason transhipment of fins at sea should be curbed.

I would like to note, however, that it appears that by striking the word "fishing" from the current text, the prohibition against possession of fins would apply to any vessel, thereby rendering it illegal to transport a shark fin without its carcass at any time. In the case of the King Diamond II, a cargo vessel receiving fins at sea from a fishing vessel, it seems clear from the Ninth Circuit Court's decision that such a cargo vessel would not be allowed to land these fins. In as far as receipt at sea from a fishing vessel is a precursor to landing, and given that such transhipment hides finning activities from local authorities, I believe such transhipment activities should be prohibited in light of the spirit of the law. I suggest, however, that if a fishing vessel were to legally land shark fins with the corresponding carcasses, and these fins and carcasses were to be separated in port for different uses, and the fins were sold to a trader for transport to China for processing, that such fins could be legally transported on a container ship (or other cargo vessel). In this sense, I would recommend the Committee consider ways in which the amendment could be worded to prohibit activities such as the King Diamond II's, which seem to facilitate at-sea shark finning, yet allow transport of shark fins as a commodity assuming such fins were landed in compliance with the existing provisions of the law.

Fin to Carcass Ratios

Second, I would like to comment on the proposal to strike the rebuttable presumption that shark fins are held illegally if the total weight of fins exceeds 5 percent of the total weight of the carcasses. I am not clear on the rationale behind this proposed deletion. While I am aware that applying a fixed fin to carcass ratio may create difficulties for enforcement in the U.S., to delete the rebuttable presumption seems to represent a step backward in terms of shark conservation. The requirement to demonstrate the "corresponding" carcasses are present would remain but there would be no guidance within the statute as to how this correspondence could or should be assessed, and this could lead to confusion and non-compliance.

In September 2006, I, along with several eminent U.S. and European shark scientists attended a workshop designed to propose workable alternatives to the European Union's controversial fin to carcass ratio. After spending two days acknowledging that fin to carcass ratios will necessarily vary from case to case based on differing species composition, fin cutting practices and the number of fins taken per shark, in the final hour of the workshop we realized that the only practical solution was to require that fins remain attached to the carcass.

I realize that some fishermen say this is impractical. I also realize that the ability to handle shark carcasses will depend on vessel hold space and refrigeration capabilities. Nevertheless I have on numerous occasions seen examples in Asian fisheries of shark carcasses being stored and brought back to port to serve a market for shark meat. These examples range from:

- Taiwanese fishermen with only ice on board who catch more sharks than tuna and place tuna in plastic bags to avoid contact with sharks; to

- Small (<10mt) Japanese vessels with chilled water freezers who routinely retain sharks; to
- Far seas Japanese longliners who always carry all shortfin mako sharks back to their home port in Japan and deny any problems whatsoever with shark handling and storage.

Based on the these experiences, I conclude that carcass retention is workable and will be accepted by fishermen when there is a viable market for shark meat. With the documented global decline in fish stocks, and soaring prices for most proteins, it is unconscionable to be discarding shark carcasses. Perhaps there need to be economic, as well as regulatory, incentives for the retention of shark carcasses.

In addition to being the most practical option, a fins attached policy would also benefit shark conservation. On one hand it simplifies enforcement by dispensing with ratios, avoiding separate weighing of fins and carcasses and preventing high grading of large fins with small carcasses, thereby discouraging finning. On the other hand, it greatly improves information on the actual number of sharks caught since identification and enumeration of whole carcasses is substantially easier than with fins.

Reporting of Nations without Comparable Shark Conservation Plans

Third, regarding the identification of nations catching sharks which do not have a shark conservation plan comparable to that in the U.S., I cannot comment specifically since the implications of the identification are not yet clear. I would like to state, though, that the mere existence of a National Plan of Action-Sharks (NPOA-Sharks) under the United Nations Food and Agriculture Organization's International Plan of Action-Sharks is not necessarily a sufficient basis for shark conservation. There are nations with large shark catches and NPOA-Sharks which do not require full catch reporting, do not perform routine stock assessments, and do not have any meaningful shark management measures in place. Furthermore if the measure of a nation's commitment to shark conservation is to include implementation of finning regulations, the challenge will be how to assess whether the nation has truly implemented the regulation on the water, rather than just on paper.

Summary

In closing, I would like to highlight the following points:

- While the ideal approach to shark conservation would be to study and manage fishing activities, the dearth of data on shark catches effectively prohibits this approach for most fisheries. Instead, it makes sense to research and regulate the highest value shark product, i.e. shark fins, as a proxy until better catch data are available.

- The shark fin trade relies heavily on 14 species of sharks, several of which are vulnerable or endangered over at least some part of their range. Depletions of some species are likely to be masked by substitution of other more prolific species, therefore we will not necessarily see a drop in the overall levels of the trade when depletions occur.

- The total number of sharks traded annually worldwide ranges from 26 to 73 million per year. These figures are three to four times higher than the catch recorded in the United Nations Food and Agriculture Organization's capture

production statistics. Probably the most prolific shark, the blue shark, is estimated to already be exploited at or near its maximum sustainable yield.

- Demand for shark fin in China appears to be increasing with population growth and higher standards of living. We are unable to track shark fin trade levels in China due to statistical problems, but indications in China and data from Hong Kong show that fin trade quantities are declining. Shark catches are also declining and while there may be alternative explanations (e.g. higher fuel costs leading to less fishing effort), the observed pattern sounds a clear warning of the possibility of over-exploitation.

- It is not certain whether finning regulations, particularly those that are not well enforced, are having an effect on the shark fin trade and on shark conservation.

- It is recommended that the drafting of the Shark Conservation Act of 2008 consider:

    - Prohibiting the transhipment at sea of shark fins without the corresponding carcass but allow legally taken shark fins to be transported on container vessels as commodities.

    - Replacing the current rebuttable presumption of 5% fins to carcass ratio with a requirement for fins to be attached to the carcass.

    - Identifying a clear measure of a nation's commitment to shark conservation, preferably one which encompasses meaningful data collection, management and enforcement.

Thank you again for the opportunity to offer my thoughts on these topics.

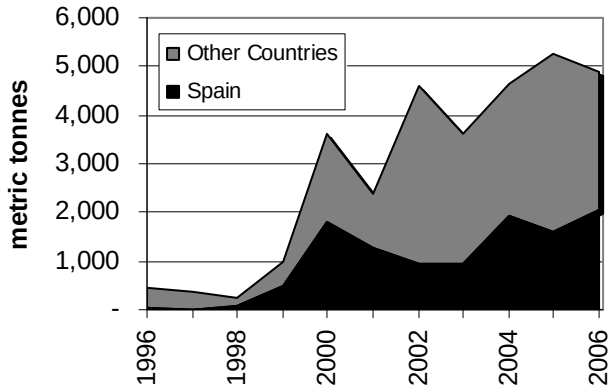

Figure 1. Mainland China imports of frozen shark "meat" from Spain and other countries, 1996-2006.

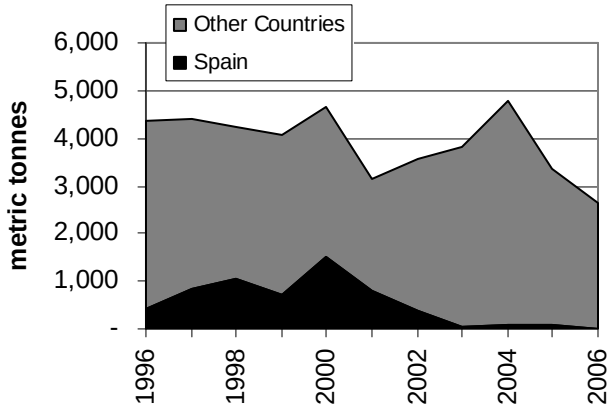

Figure 2. Mainland China imports of dried shark fins from Spain and other countries, 1996-2006.

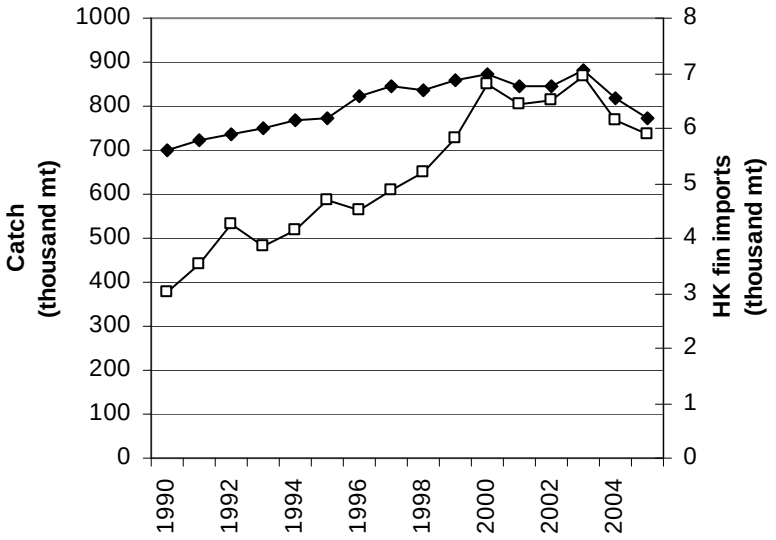

Figure 3. FAO Capture production for elasmobranches (♦, left axis) and adjusted Hong Kong imports of shark fin (□, right axis), 1990-2005.

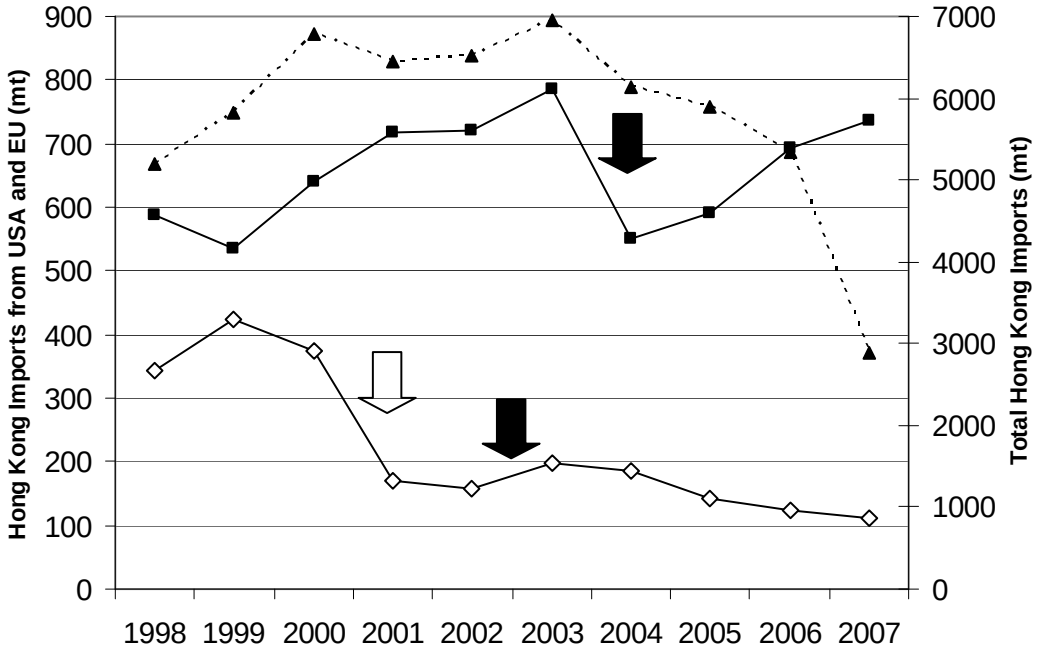

Figure 4. Annual shark fin imports to Hong Kong from the USA (◊) and the EU (■) and Total Hong Kong Imports (▲). Black arrows indicate the date of implementation of national/EU finning regulations. The clear arrow indicates the start of finning regulations in the State of Hawaii.