

Re-examining the shark trade as a tool for conservation

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Shark encounters of the comestible kind

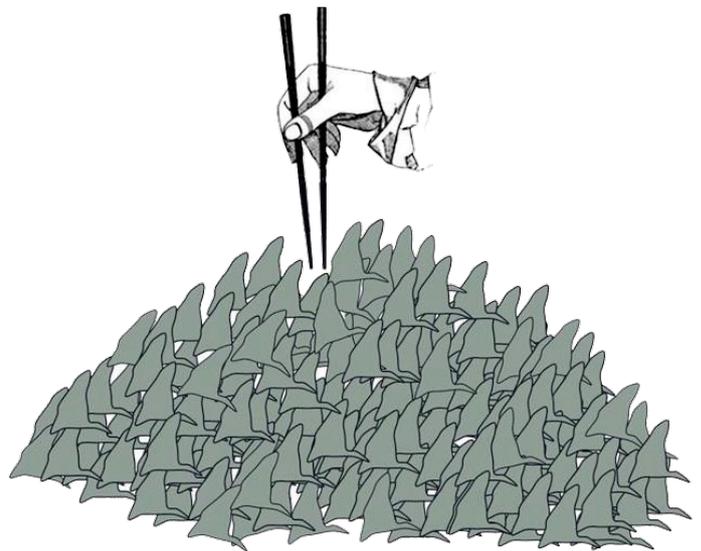
Telling the tale of public fascination with sharks usually begins with the blockbuster release of the movie “Jaws” in the summer of 1975. This event more than any other is credited with sparking a demonization of sharks that has continued for decades (Eilperin 2011). In recent years, less deadly but equally adrenalin-charged shark interactions, including cage diving, hand-feeding and even shark riding, have captured the public’s attention through ecotourism, television and social media. These more positive encounters (at least for most humans), in combination with many high-profile shark conservation campaigns, have turned large numbers from shark haters to shark lovers, and mobilized political support for shark protection around the world.

But let us step back for a moment from this information age version of history. The most ancient and widespread way that humans have interacted with sharks is through eating them. While some traditional societies have worshipped sharks as protective spirits for millennia, consumption was also part of the relationship (Dell’Apa et al. 2014). Societies such as the Chinese have used the serving and consumption of sharks as a token of respect and a way of reinforcing power since the Ming Dynasty (1368–1644 AD; Clarke et al. 2007).

Demand for this luxury product is one of the reasons why there are extensive and centuries-old trade networks linking China with far-off countries (Schwerdtner Mañez and Ferse 2010). Ironically, despite its venerated status, the Chinese refer to shark fin simply as yú chì (鱼翅, fish fin) rather than using the Chinese words for shark (shāyú, 鲨鱼). This may be the reason why some surveys report that consumers do not always know that the product is derived from sharks (Clarke et al. 2007). The Chinese are not alone in failing to recognize sharks on their plates: sharks have long been used, often under other names, as the “fish” in fish and chips in Europe, Australia, New Zealand and elsewhere.

Therefore, while sharks have become conspicuous as entertainment since the 1970s, they have been important as commodities for centuries.

In September 2014, the implementation of multiple new listings for sharks and rays by the Convention on International Trade in Endangered Species (CITES) of Wild Fauna and Flora (Box 1), underscored the need to re-ignite interest in using trade information to complement fisheries monitoring. These CITES listings are a spur to integrate international trade information with fishery management mechanisms in order to better regulate shark harvests and to anticipate future pressures and threats. To highlight both the importance and complexity of this integration, this article will explore four common suppositions about the relationship between shark fishing and trade and point to areas where further work is necessary.



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Box 1.

Shark and ray listings by the Convention on International Trade in Endangered Species (CITES)

- CITES was established to prevent the international trade in wild animals and plants from threatening their survival.
 - ✓ Species listed under CITES Appendix I are prohibited from trade under all but exceptional circumstances.
 - ✓ Species listed under CITES Appendix II can be internationally traded under permits authorized by national authorities.
- Because CITES governs trade it can encourage and complement the work of fishery management organizations that are responsible for sustainable fishing practices (Clarke et al. 2014a).
- The following CITES listings for sharks and rays are now in effect:
 - ✓ Appendix I: all sawfishes



- ✓ Appendix II: whale shark, great white shark, basking shark, oceanic whitetip shark, porbeagle shark, scalloped hammerhead shark (and look-alikes smooth and great hammerhead sharks), and all manta rays.



Supposition #1: Banning finning will reduce shark mortality

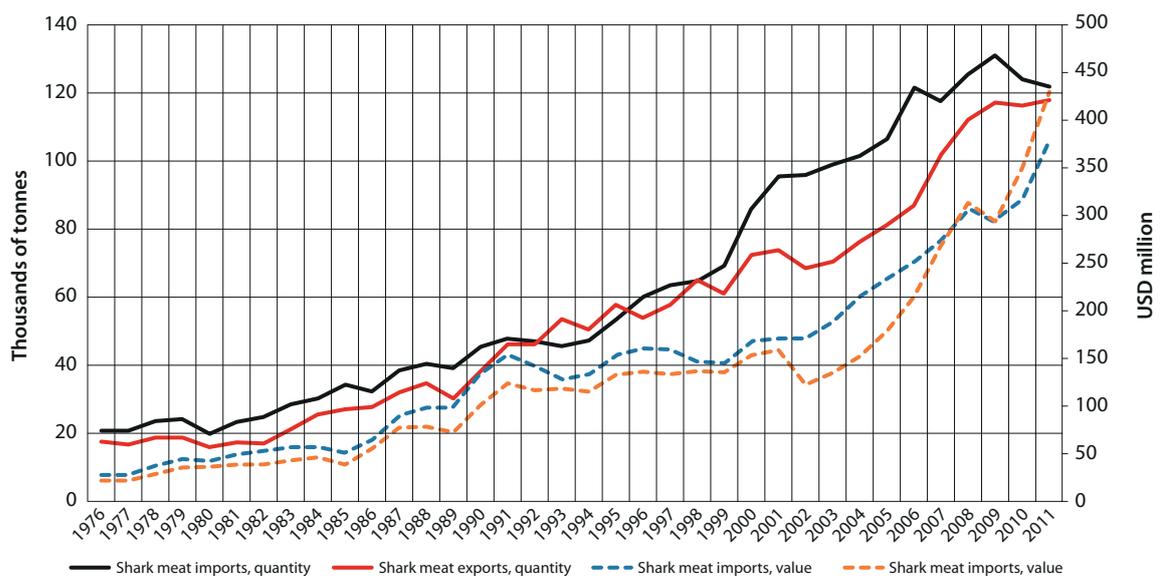
Many conservation campaigns have attacked the shark fin trade on grounds of animal cruelty (live finning), unnecessary waste (discarding of shark carcasses at sea), being unsustainable (overexploitation), or a combination of these. As a result shark finning — the practice of removing a shark’s fins and discarding its carcass at sea — is banned in many fisheries. Setting aside for the moment the issue of whether all the different formulations of these bans are enforceable (e.g. the 5% fins-to-carcass ratio), it is important to note that even under perfect enforcement, finning bans may fail to reduce shark mortality. This is because finning bans do not regulate the number of sharks killed, only the way in which they are killed. For fisheries that primarily want sharks for their fins, unless there are catch controls in place in addition to the finning controls, for example as in New Zealand’s Quota Management System (MPI 2014), an unlimited number of sharks with valuable fins can be retained and landed, with the fins sold and the carcasses dumped. Alternatively, there may be high demand for shark meat and, therefore, no incentive to fin sharks and discard carcasses at sea. A recent analysis in the Pacific found that even before the finning ban, overfished oceanic whitetip and silky sharks were more likely to be retained than finned (Clarke et al. 2013a). With or without a demand for shark meat, as long as the fishery is able to accommodate the storage and transport of shark carcasses to port, a prohibition on finning sharks may make no difference to shark mortality rates. Bans on

FOUR WAYS NOT TO FIN A SHARK

-  Retain shark with fins attached
-  Remove fins but maintain a 5% fins-to-carcass ratio
-  Kill the shark (e.g. for gear retrieval) but discard it whole
-  Release the shark without killing it

finning in the absence of catch controls also do not prevent fishermen from intentionally killing and discarding sharks; for example, to reduce bait loss on future sets.

A recent FAO analysis of global trade statistics reveals that imports of shark, skate, ray and chimaera meat increased by 42% between 2000 and 2011 (Fig. 1). Imports by Brazil, currently the world leader, increased eight-fold during this period, while more traditional importers such as Italy have maintained their market share. There are at least three possible reasons for this rise in the shark meat trade. The dramatic increase in shark meat imports may be a consequence of finning bans, which, if complied with, would encourage landings of sharks whose fins are intended for trade. Alternatively, these statistics



Source: FAO

Figure 1. The world trade in shark meat has grown steadily since 1976 and has roughly doubled since the late 1990s to over 120,000 tonnes per year (Source: Clarke and Dent in press).

may reflect a demand for protein that makes shark meat attractive regardless of the market for fins (Clarke and Dent in press). Finally, better recording of products as “shark” (see below) rather than unidentified fish might explain the trend. In any case, it is important to distinguish between increases in utilization and changes in the number of sharks being killed.

For all of these reasons, there is growing recognition that shark management and conservation must look beyond simply regulating finning, but effective measures to control shark mortality within sustainable limits remain to be adopted and verified in most national and international waters. One benefit of an increasing demand for shark meat should be that it is easier to identify shark carcasses (as sharks, if not always to species) at transshipment, port and border inspection posts as compared to shark fins which can be dried and packed away with other cargo.

Supposition #2: Consumers are being influenced by shark conservation campaigns

Some shark conservation campaigns have focused their efforts on Chinese consumers in the hope that increased awareness of threats to sharks would reduce their consumption of shark fin. A report in the *New York Times* in mid-2013 quoting both campaigners and traders, suggested that the trade had declined as much as 70% from 2011 to 2012 (Tsui 2013). While there is no question that the shark fin trade in Hong Kong and China has contracted (Clarke and Dent in press), both the scale of the contraction and its causes are debatable.

Box 2.

Three types of adjustments may be required when interpreting shark fin trade statistics:

1. Shark fins must be distinguished from shark meat.
2. Processed fins must be distinguished from unprocessed fins or else the same fins may be double counted.
3. Frozen fin weights must be reduced (usually by an assumed factor of four) to account for water content.

With many countries’ trade statistics it is not possible to make all of these adjustments. It is possible to do so for Hong Kong trade statistics and this is why data from Hong Kong is often used as an indicator of the global trade (Source: Clarke and Dent in press).

A forthcoming study of Hong Kong shark fin trade statistics — the most accurate proxy for global trends (Clarke 2004) — documents that imports have been dropping since 2003 (see Fig. 2) and that the media-reported declines of 70% from 2011 to 2012 reduce to ~25% when calculated using the proper adjustments for water content and commodity codes changes (Eriksson and Clarke 2015) (see Box 2). China’s trade statistics for shark fin are less reliable than Hong Kong’s due to commodity coding issues, but there are also media reports of a dip in demand in the northern capital, often attributed to new rules for government hospitality expenses announced in late 2012. Additional support for the effect of these rules, which restrict purchases of “shark

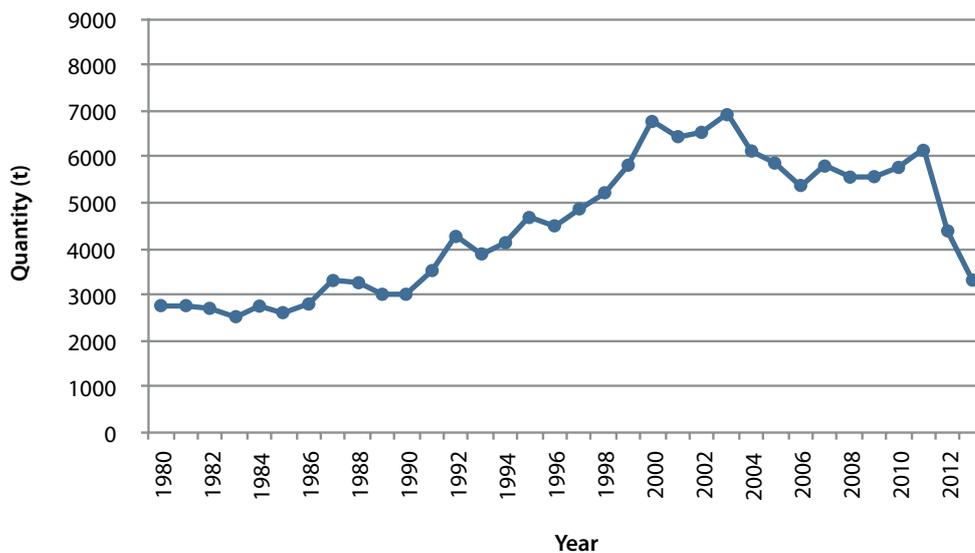


Figure 2. Adjusted shark fin imports by Hong Kong peaked in 2003 and fell thereafter as shark catches decreased. Larger declines in 2011–2012 are at least partially due to reduced consumption. (Source: Hong Kong Government Census and Statistics Department data).

fin, bird's nest and other luxury dishes", comes from reports of declining sales of other luxury seafoods such as abalone, sea cucumber, lobster and crab (Clarke and Dent in press).

But are shark conservation campaigns having any effect on Chinese consumers? It seems impossible to answer this question definitively, but independent interviews of 20 Beijing-based restaurateurs conducted just before the new government hospitality rules were announced offer some insight. All respondents agreed that consumption was falling, but there were divergent views on whether the conservation campaigns were the reason. Some stated that diners were shunning shark fin dishes because they are unhealthy, passé, or, most importantly, likely to be made from artificial materials given the threatened status of sharks and the expected shortage of real fins (Fabinyi and Liu 2014). Without fully understanding the scale or cause, it still seems safe to conclude that the demand for shark fin in China is waning and that sounds like good news for sharks.

Less encouraging is the finding by the new Food and Agriculture Organization (FAO) analysis (Clarke and Dent in press) that Thailand has surpassed Hong Kong as the world's largest exporter, and its main trading partners — Japan and Malaysia — may be among the world's top four importers, particularly of small, low-value fins. Not only do these markets show no sign of

slowing down, they are all among the world's top shark fishing nations and, thus, the full scope of their shark fin markets may be even larger than trade-based estimates suggest (Clarke and Dent in press). When we add to this the facts that most consumer-orientated conservation campaigns target shark fins rather than meat, and that shark meat consumption is both growing and often unrecognized as "shark", it is clear that the campaigns have more work to do.

Supposition #3: The trade will collapse when shark stocks become overfished

A third thorny issue at the intersection of shark fishing and trade is the ability of shark populations to support the global fin and meat trades. While many argue that shark populations have already begun to collapse, how have the high trade volumes for fins and meat been maintained for this long?

FAO maintains the only ongoing worldwide compilation of shark, skate, ray and chimaera (chondrichthyan) catches, and if we tally their catches reported as "shark" and "unidentified sharks and rays" they are 20% lower in 2010 than they were in 2000. The amount of catch reported as "skates and rays" is 16% lower. The amount of catch reported specifically as "sharks" has increased but this could be due to greater



Shark fin sales in Beijing have reportedly declined due to changing tastes and fears that the high-priced dish will be made from artificial materials. (Source: Fabinyi and Liu 2014) (image: S. Clarke).

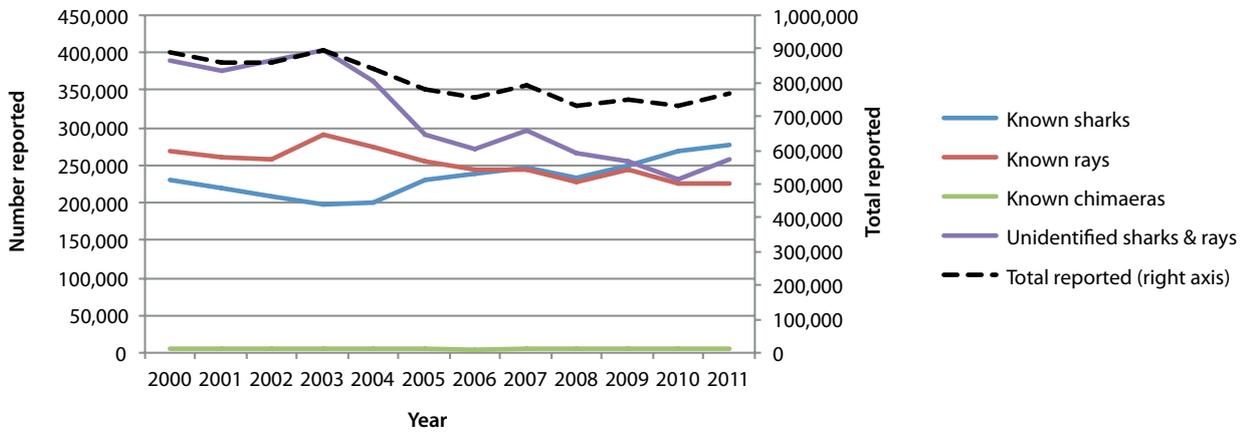


Figure 3. Although the reported catches of “sharks” have increased since 2000, the catches of “rays” and unidentified “sharks and rays” have decreased such that overall catches show a decline of ~15% (source: Clarke et al. 2014b).

species-specific reporting rather than a real increase in catch (Clarke et al. 2014b) (Fig. 3). A fallback to levels of ~11–23% less than the peak is also visible in the Hong Kong shark fin import data for 2004–2011 (see Fig. 2). Despite the potential for the relationship between shark catch and trade to resemble the relationship between chicken and egg, Davidson et al. (in prep.) conclude that the decline in reported chondrichthyan catches is due to overfishing, not a result of decreases in fishing effort or market demand.

Given the reproductive rates of most shark species, it may be surprising that these observed declines in catch and trade statistics are not larger. One possible contributing factor is species substitution. As shown in a forthcoming analysis, the relatively productive and distinctive blue shark is becoming a larger component of reported shark catches compared to the less productive, but equally distinctive and more valuable, mako shark. Therefore, it is likely that the shark fin trade is even more dependent on blue shark than it was in 2000 when that species supported at least 17% of the market (Eriksson and Clarke 2015).

There are already some visible signs of overexploitation in catch and trade statistics, and these may be damped down by substitution of more productive species for those whose populations have already collapsed, for example the oceanic whitetip shark (Clarke et al. 2013a). While there are complications in the data that hamper definitive conclusions, better catch reporting must be encouraged and more focused shark catch and trade analysis is certainly warranted.

Supposition #4: Prohibiting shark catches will curtail trade and reduce pressure on shark populations

It is easy to assume that forbidding fishermen to catch sharks will lead to a suppression of the shark trade and a conservation benefit for shark populations. But here, too, the devil is in the detail: both the ability and desire of fishermen to avoid catching and killing sharks need to be strong for this supposition to hold.

In tuna and billfish fisheries, sharks are caught alongside these target species in large numbers. Methods to reduce unwanted shark catches are a topic of active research but solutions appear to vary by fishery and may have economic or operational consequences (Clarke et al. 2014b; Restrepo et al. 2014). Under two forms of catch prohibition — no-retention measures for certain species and area-specific prohibitions for all species (sometimes referred to as “sanctuaries”) — sharks, if caught, must be released with minimal harm. However, studies in the Indian and Pacific Oceans have shown that 81–84% of sharks do not survive their encounter with purse-seine gear (Poisson et al. 2014; Hutchinson et al. 2014). In longline fisheries it is estimated that 12–59% of commonly caught shark species will die before reaching the vessel (Clarke 2011; Gallagher et al. 2014), 10–30% of those that survive haulback will die through handling (Clarke et al. 2013b), and 5–19% of those that survive handling will die after release (Clarke et al. 2014b). With such high potential mortality rates for released sharks, it is not clear whether no-retention and “sanctuary” measures can reduce overfishing to sustainable levels.

Whenever discarding sharks is seen by fishermen to come at a cost — for example loss of saleable products or increasing the likelihood that the next set will catch the same unwanted shark — enforcement must be strong. Small Island Developing States often struggle to find the resources to conduct intensive patrols at sea. Even if catch prohibitions in “sanctuaries” are strongly enforced, vessels that want to continue to catch and retain sharks, or to kill unwanted ones, may move to other jurisdictions with fewer rules and less monitoring (such as the high seas) and continue to fish the same stocks.

Trade data can help to highlight areas where existing fisheries controls may need to be strengthened. For example, the Marshall Islands declared itself a shark “sanctuary” in 2011 by prohibiting both catch and trade. Nevertheless, Hong Kong government records show imports of 7.2 t of dried unprocessed Marshallese shark fins in 2012 and 2.5 t in 2013 (HKSARG 2014). Similarly, United States trade records show 16 t of frozen shark exported to Palau in 2012 and 15 t in 2013 (NOAA 2014). While Palau may not have banned the trade in sharks, these exports suggest that the demand exists, either nationally or for onward trade, and this demand could undermine Palau’s designation as a shark “sanctuary” in 2009. These examples provide further impetus for integrating fishery and trade monitoring programmes.

Conclusion

This article has highlighted a number of ways that management of both shark catch and trade data can be integrated for conservation benefit (see Table below).

Humankind’s appetite for sharks has never been greater. While this poses a threat to shark populations, it also represents a powerful opportunity to strengthen fisheries management by using trade statistics as new tools for conservation.



Despite recent reductions in the shark fin trade, these mako caudal fins are some of the world’s most valuable seafood products (image: T. Miyamoto).

Acknowledgement

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Issues	Recommendations
Monitoring trade data can help interpret stock status and identify future threats, but it is dangerous to focus on single products and markets (e.g. shark fins in China) because trade patterns may shift while catches remain high (e.g. increase in demand for shark meat).	Fisheries management and trade measures need to focus on effective control of shark mortality, whether or not it is due to finning.
Consumers are influenced by a number of factors, only some of which relate to conservation concerns. Even consumers with preferences may not always be able to identify unlabelled shark products.	Conservation campaigns focused on shark fins need to recognize the growth in the shark meat trade.
Despite overfishing, trade levels can appear stable or to be increasing due to improvements over time in species-specific catch reporting and substitution of more abundant species when less productive populations crash.	Better catch and trade data are key to identifying early warnings of shark overexploitation.
Prohibiting shark catches should be complemented by improvements in bycatch reduction, adequate enforcement and development of trade surveillance programmes.	Fishery and trade data should be used in conjunction to monitor compliance with regulations and overall stock status.

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