

### Commercial fishing for sharks

By Kevin McLoughlin



Shark gillnet vessel at the wharf in Darwin (© Kevin McLoughlin)



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#### Background

Sharks have been fished for thousands of years. In primitive societies, they were caught with wooden or bone hooks for their meat and livers. Their teeth could be used as weapons or tools. Over time, uses have been found for most parts of a shark's body. The skin can be used for leather for shoes or belts, jaws are taken as souvenirs, the flesh is eaten, the carcass can be used for fertilizers, the fins in soup and liver oil is a rich source of Vitamin A and has been used in medicines and cosmetics.

Sharks and rays (chondrichthyans) form a very diverse group more than 1100 species are known. They can be as small as the cigar shark at 25 cm or as large as the whale shark at over 12 metres. They live in a wide variety of habitats, from freshwater rivers and lakes to the deep oceans, and employ many biological strategies to survive. Many are highly migratory and travel large distances. This diversity and wide distribution means sharks and rays can be exposed to many different fisheries and fishing methods, either as the target species or as bycatch. They sustain important fisheries in some countries and are a cheap but valuable source of protein in communities dependent on subsistence fishing.

### Why is there concern over fishing for sharks?

Despite their value to some communities, sharks are historically a low-value product. In the past, little priority has been given to data collection and research, even where they have been the target species of a fishery. Sharks are often difficult to identify and this has resulted in poor recording of catch information in fishers' logbooks. There has often been no recording of bycatch species that are discarded. Whilst this situation is improving in many countries, especially in Australia, the lack of data has led to a poor information base on which to base fisheries-management arrangements. The population dynamics of shark and ray species is generally not well known and the migratory behaviour of many species make it difficult for researchers to monitor changes in population size.

Most sharks and rays have slow growth, late maturity and low fecundity compared to bony fishes. These characteristics result

in sharks having low resilience to fishing and slow recovery rates if overfished. This means that sharks need careful management if shark fisheries are to be sustainable. Many shark fisheries throughout the world have brought about rapid stock declines and collapse.

## What fishing methods are used to catch sharks

Gillnets are the most common fishing gear used in fisheries that are targeting sharks (figures 1–4). Gillnets consist of a panel or panels of net held vertically in the water column, either suspended near the surface or near the ocean floor. The mesh size used depends on the species being fished. Small finfish and sharks are able to pass through the meshes. The meshes are designed to entrap the fish around the torso. Large specimens may become entangled in the net or may bounce off. Net panels are usually several hundred metres in length, and a number of panels can be joined in a single set. Nets are usually stored on net reels or drums and are set by placing one end in the water with a counter-weighted flagpole as the vessels steams forward. The drag of the net in the water then pulls the net from the reel until the end of the net is reached. This end remains attached to the vessel. Nets are usually allowed to fish for 2-6 hours. Hauling is the reverse of the setting process, with the catch being removed by hand as the net is wound back on to the reel.

Longlines can also be used to fish for sharks (figures 5 and 6). Longlines consist of a mainline that can be several kilometres long. Baited snoods are attached to the mainline at regular intervals as it is set from a moving vessel. As with gillnets, longlines can be set at various depths in the water column. Fishers targeting shark generally set their gear on the ocean floor with anchors to keep the mainline in place. Shark fishers using longlines generally set several hundred hooks at a time. The setting of longlines can be automated, with hooks passing



Figure 1. Shark gillnet vessel at the wharf in Darwin (© Kevin McLoughlin).





Figure 2. Shark gillnet vessel with net deployed (© Bureau of Rural Sciences, Australian Fisheries Resources, 1993).



Figure 3. Shark gillnet vessel-storing the catch (© Terry Walker).



Figure 4. Shark gillnet vessel returning to port in southern Australia (© Albert Caton).

through pre-cut pieces of bait as the line is fed over the vessel's stern. Longlines targeting pelagic fish such as tunas and billfish are set at pre-determined depth and suspended in the water by buoy lines. Although sharks are often not the target species of pelagic longliners, they are caught in high numbers as bycatch.

Trawling is one of the most common commercial fishing methods used in Australia, but fish and prawns are the usual targets rather than shark. Demersal trawls, where the net is towed along the seabed, are used to target species such as



Figure 5. Pelagic longline vessel with line deployed (© Bureau of Rural Sciences, Australian Fisheries Resources, 1993).



Figure 6. Longline vessel fishing out of Mooloolooba setting the gear (© Peter Ward).

orange roughy, gemfish, blue grenadier and redfish in southern Australia. In northern Australia, prawns, sea perch, emperors and rock cod are common target species of demersal trawls. Although sharks are not generally the target of trawling, they can be taken in high numbers. In southern Australia, where some species are managed by quotas that are allocated to individual fishers, quotas have been allocated for the major shark species to allow for the trawl bycatch. In the Northern Prawn Fishery that operates across northern Australia, sharks have been a major component of the trawl bycatch. This bycatch has been reduced somewhat by the introduction of bycatch reduction devices that allow large species to escape from the net. There has also been a decision by the industry to not retain any shark product in this fishery.

### World catches increasing

Commercial fishing for sharks expanded markedly in the 1930s and 1940s in many parts of the world. Global shark catches have risen steadily since the 1940s. The status of shark



populations did not receive much public attention until the late 1980s or early 1990s, largely due to their low economic value and their poor image symbolising terror. Global catches of chondrichthyans increased from approximately 272 000 tonnes in 1950 to 828 000 tonnes in 2000. In 1997 India was by far the world leading chondrichthyan fishing nation, followed by Indonesia, Pakistan, USA, Taiwan, Mexico and Japan. Many of these countries have little or no management in place for their chondrichthyan resources and virtually nothing is known about resource status. There has also been little management of sharks taken in high seas fisheries.

The development of the lucrative shark fin markets in southeast Asia, where dried fin can fetch several hundred dollars per kilogram, resulted in global expansion of shark fisheries in the 1990s, raising international concern over the sustainability of shark fisheries. Prior to this, fishers who targeted other species often viewed sharks as a nuisance and avoided areas where shark catches were high, or depending on the fishing method, were able to release unwanted sharks alive. The increasing value of fin has increased targeting and retention of sharks and has led to the widespread practice of removing fins from captured shark and dumping of the carcass. More than 150 countries are known to trade in shark fin. Hong Kong is an important centre for shark fin trade and import data show that imports there rose from 2700 tonnes in 1980 to 6100 tonnes in 1995.

#### Shark fishing in Australia

Australia is not immune to overfishing of sharks, but resources are generally considered to be well managed by international standards.

Fishing for sharks has a long history in Australia. Reports of the activities of the first white settlers, who arrived in Australia in 1788, show they supplemented their food resources by fishing. Sharks were caught and eaten, oil extracted from livers for uses such as lighting.

#### Southern shark fisheries

In 1927 a school shark fishery providing flesh for human consumption began in southern Australia. This has developed into Australia's major target shark fishery, the Southern Shark Fishery (SSF), now managed by the Australian Fisheries Management Authority (AFMA) for the Australian Government. The fishery extends from the Western Australia— South Australia border to the Victoria—New South Wales border and is worth about A\$15 million per year. Data from Melbourne fish markets show that 26 tonnes passed through the market in 1929. By 1939 the amount of shark traded had increased to 514 tonnes. Demand for Vitamin A gave impetus to the fishery, intensifying in World War Two. At this time and



Figure 7. School shark–a species targeted by the Australian Southern Shark Fishery (© Ken Hoppen).



Figure 8. School shark and gummy shark aboard vessel in Bass Strait (© Russell Reichelt).



until the 1960s most of the catch was taken using demersal longline and school shark was the dominant species taken. Monofilament gillnets were introduced in the 1960s, and by the early 1970s gillnetting was the main fishing method.

In 1972 the discovery of high mercury levels in shark led to a ban on the sale of large school shark in Victoria. This ban and the adoption of gillnets saw gummy shark become the principal species in the catch. Southern sawshark, common sawshark, elephant fish and several other shark species also became more important. Over the years 1970–2000, school (figure 7) and gummy shark (figure 8) provided 87 percent of the catch from the fishery; the remaining 13 percent was sawshark (7 percent), elephant fish (2 percent) and other species. The total catch peaked at 4228 tonnes (carcass weight) in 1987. Total SSF catch was 2823 tonnes in 1999, 2395 tonnes in 2000 and 2333 tonnes in 2001.

School shark have been assessed as overfished for a number of years. Gummy shark catches are seen to be sustainable whereas the status of the two other major species, sawfish and elephant fish, is uncertain. AFMA sets total allowable catches (TACs) for these four species that apply to the SSF and to other fisheries where they are taken as bycatch. Fishers in the SSF are allocated individual transferable quotas. School shark quotas are set at levels intended to allow rebuilding of the stock. The school shark TAC for 2003 was set at 309.6 tonnes, 264 tonnes of this allocated to the SSF. The 2003 TACs for other species were: gummy shark 1800 tonnes; sawshark 434.4 tonnes; and elephant fish 99.6 tonnes.

Two target shark fisheries in south western Australia are managed by the Western Australian Government under complementary arrangements and the status of major species of the two fisheries is assessed jointly. The value of the production of the two fisheries was A\$5.5 million in 2001-02. Specialised shark-fishing boats became common in the 1980s and, as a result, fishing effort increased six-fold from 1980-81 to 1987-88. Management is by input controls rather than quotas, with limited entry and with limits on the amount of gear that can be used and the months in which it can be operated. Demersal gillnetting is the main fishing method, although a few fishers use demersal longlines. Under this system each fisher has an allocation of units, each of which allows the setting of a specified length of net for one month. Initially each unit had a length of 600 metres for gillnet or 200 hooks for longline. The permitted net length has since been reduced in response to assessment of the stocks.

The principal species targeted are whiskery shark, dusky shark and gummy shark. Dusky and whiskery sharks are assessed as overfished and the effort levels permitted are designed to allow rebuilding of these stocks. A further 25 species of sharks and scalefish are also regularly caught, the most common being sandbar shark, hammerhead sharks, wobbegong sharks and school shark. Impacts on bycatch species are considered to be low. Catches of scalefish, such as queen snapper, blue groper and dhufish amounted collectively to 130 tonnes in 2002–03. The total shark catch for the fishery was 842 tonnes in 2001–02 and 875 tonnes in 2002–03. Catches of the major species reported in logbooks in 2002–03 were: gummy shark 380 tonnes; dusky shark 182 tonnes; and whiskery shark 133 tonnes.

#### Northern shark fisheries

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The demersal and pelagic fish resources in northern Australian waters are diverse and substantial. Foreign trawlers and gillnetters fished the region for many years before 1979 when the Australian Fishing Zone became operative. Shark were fished commercially off northern Australia between 1974 and 1986 by a pelagic gillnet fishery operated by vessels from Taiwan, their catches peaking at about 10 000 tonnes in 1977. Australians began fishing commercially for shark in northern Australia in about 1980.

The Northern Shark Fishery operates in these waters and management is implemented via joint authorities between the Commonwealth, Western Australia, the Northern Territory and Queensland. The principal fishing method is pelagic gillnetting, with most activity in waters off the Northern Territory. The major northern commercial shark species are two species of black-tip shark but large quantities of grey mackerel are also taken by gillnets. Reported landings of the targeted shark fishery in 2002 in Northern Territory waters were 1167 tonneswhich included 479 tonnes of grey mackerelvalued at A\$6.9 million. The total shark catch was 656 tonnes, of which 451 tonnes was black-tip shark. A total shark catch of 417 tonnes was reported by Queensland net fishers operating in the Gulf of Carpentaria. Queensland also manages shark fishing on its east coast. Reported shark catches in north-western Australia from target shark fisheries managed by Western Australia have been increasing in recent years and were approximately 500 tonnes in 2002–03.

The level of fishing by Australian fishers for the two major black-tip shark species is seen to be sustainable. However, increasing levels of illegal fishing effort by Indonesian fishers operating in Australian waters are putting these and other shark resources at risk.

#### **Other fisheries**

Sharks are also often a bycatch of many other fisheries around Australia, most notably trawl fisheries for finfish and prawns, and pelagic longline fisheries for tuna and billfish. Some of the shark catch is retained for sale and the level of monitoring of the catch varies from fishery to fishery. Much of the shark catch



is discarded, but the value of fins in recent years has increased the incentive to retain fins. All jurisdictions in Australia have legislation requiring shark trunks to be retained as well as fins when they are landed.

Trawl fisheries such as the South East Trawl Fishery operating in south-east Australia have a significant bycatch of sharks. Recording of shark catch has generally been poor in these fisheries, but changes to fishery logbooks and the development of bycatch action plans are improving the data collected. Dogfish, angel, gummy and school sharks dominate the landed commercial species in the South East Trawl Fishery. Sharks are also a common bycatch in the prawn trawl fisheries around Australia.

Tuna longline fisheries catch large amounts of shark. The major tuna fisheries in Australia currently restrict shark landings to 20 per trip. Typical species caught by tuna longlines include blue (figure 9), bronze whaler, porbeagle, mako, thresher and hammerhead sharks.



Figure 9. Bringing a blue shark aboard a longline vessel (© Peter Ward).

#### Acknowledgements

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