



FISHERIES FACT SHEET

SHARKS



Sharks
Class Chondrichthyes

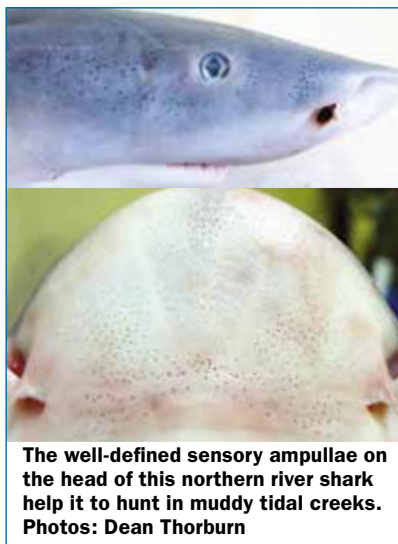
The truth about sharks!

Of the 370-plus shark species in the world, more than 100 live in Western Australian waters. These range in size from the tiny pygmy shark, which grows up to 30 centimetres long, to the whale shark – the world’s biggest fish – that grows up to 12 metres.

Shark senses

Sharks have excellent eyesight and can smell, touch and taste. Sharks – like other fish – also have clusters of hair-cells called ‘neuromasts’ located in canals just below their skin. These form a ‘lateral line’ down the side of their bodies that can sense vibrations and sound hundreds of metres away.

Sharks also have the ability to detect the weak electrical signals produced by most living organisms through pores in their snouts and heads called ‘ampullae of Lorenzini’. These help them to find prey that is buried in sand or hidden in the dark. It is thought these may also help sharks respond to large-scale fluctuations in the Earth’s magnetic fields, allowing them to navigate over big distances.



The well-defined sensory ampullae on the head of this northern river shark help it to hunt in muddy tidal creeks. Photos: Dean Thorburn

Upper level predators

Sharks feed on a wide variety of prey, including fish, squid, octopus, crustaceans, mammals, reptiles and other marine creatures.

Large sharks are often the upper level or top predators within an ecosystem and help to control prey populations. They also remove weak animals, leaving healthy ones to reproduce – thus they play an important role in maintaining balanced ecosystems.



Grey nurse shark. Photo: AQWA

Because they are often at the top of aquatic food webs, sharks have few predators, apart from humans, other sharks and orcas.

Where sharks are found

Sharks live in every ocean. Some species, such as bull sharks, are also found in rivers, many kilometres from the sea.

Some shark species migrate long distances, others stay in one region. Some, such as megamouth sharks, favour the deep ocean while others (for example, reef sharks) prefer shallow water and reefs.

i Sharks have nostrils and can smell diluted scent. In laboratory experiments, sharks have responded to scent concentrations as low as one part of fish oil or blood in one million parts of seawater. No wonder they are effective hunters!

Shark features

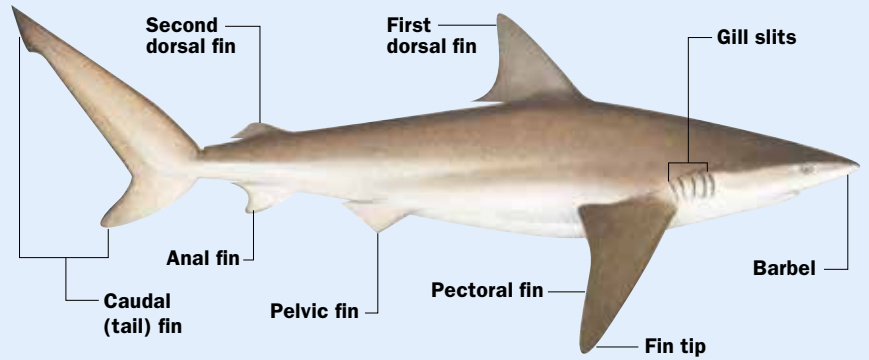
Shape: a lot of sharks have a torpedo-shaped body, a large triangular dorsal fin and a second small one on their backs, large pectoral fins on either side behind their gills and a large tail or 'caudal' fin. Some sharks, such as angel sharks and wobbegongs that live on the seabed, have a flattened shape that makes them resemble their relatives, rays and skates.

Fins: pectoral fins are used for steering and turning while the dorsal fins help keep the shark stable, like a yacht keel. The caudal fin propels the shark forward.

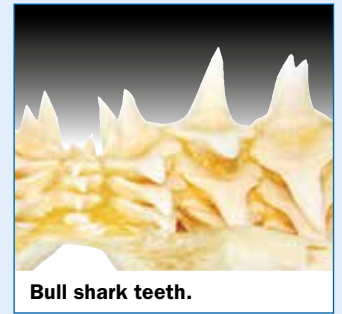
Gills: sharks have between five and seven external gill slits.

Skin: unlike the scales of bony fish, shark skin is made up of tiny bumps called 'dermal denticles'. These make shark skin extremely tough and abrasive.

Teeth: sharks have an endless supply of teeth. As one row wears out, the shark replaces it with one from the next row. Their teeth vary according to diet. Great white sharks have



large serrated teeth for cutting big prey, while Port Jackson sharks have small pointed teeth at the front of their jaws (ideal for holding) and flat molar-like teeth at the back (for breaking and grinding crabs, lobsters, shellfish and sea urchins). Grey nurse sharks have long, needle-like teeth, used for gripping.



Some shark species are known to live to 50 years' old or more. Despite this potential for a long life, many young sharks do not survive to reach adulthood.

Live births

Most sharks are slow to mature and some species do not reproduce each year. Unlike bony fish, which release thousands of tiny eggs into the sea during spawning, sharks produce fewer eggs and fertilisation occurs internally. Most sharks give birth to live young but some species produce eggs that develop externally.

- **Matrotrophic viviparity:** Fertilised eggs develop into young inside the mother. For at least part of their development, they depend for food on a placenta-like connection with the mother's uterine wall (for example, whaler sharks).
- **Yolk-sac viviparity** (previously known as ovoviviparity or aplacental viviparity): Embryos develop internally but their food is derived entirely from yolk sacs (for example, gummy sharks and whiskery sharks).
- **Oviparity:** Embryonic development occurs entirely within egg cases, which are most commonly left on the seabed (for example, Port Jackson sharks), but in some species are kept within the mother's oviduct until just before they hatch.

Most sharks and all rays are viviparous – that is, they give birth to live young. However, some smaller shark species and all skates are oviparous. The embryos of mackerel sharks are 'oophagous' (meaning they feed on unfertilised eggs), while grey nurse shark embryos are 'adelphophagous' (meaning they cannibalise other embryos).

Class Chondrichthyes

Sharks belong to a class of fish called Chondrichthyes. Other members of this class include rays, skates and chimaeras (also called ghost sharks). All members of this class have skeletons made of cartilage rather than bone.

Lipstick to shark fin soup

Humans use sharks for their meat, for example, in fish and chips. A wide range of other shark products, including cartilage, blood, gall bladder, corneas and liver, are used in medical treatments or as a source of vitamins. Other shark products include liver oils, used in cosmetics; jaws and teeth, sometimes sold as souvenirs and for jewellery; and skin, which is turned into leather.

The most valuable product is shark fin, used as a delicacy in Asian cooking. Shark fin is so valuable that there has been a severe depletion of shark numbers in many parts of the world.

Shark science

Department of Fisheries researchers assess the status of sharks stocks using computer models that include information about different species' biology and catch and effort data provided by commercial fishers.

The researchers also study shark growth rates using cross-sections of vertebrae, their reproductive biology, different shark movements and use of different habitats through tagging studies, genetic identification of shark stocks, and the efficiency of different gear types used to catch sharks.



A grey nurse shark tagged with a device to record temperature, depth, light and location. Photo: Rory McAuley

Protected species

Concerns about shark stocks have led to big reductions in effort in WA's shark fishery.

All sharks and rays are now commercially protected, meaning that only a few commercial fisheries are authorised to keep their shark and ray catches for sale.

The white shark, whale shark, northern river shark and spartooth shark – and all sawfish, which are related to sharks – are totally protected from all fishing.

In 2009, all species of whaler sharks (family Carcharhinidae) were given extra protection from fishing in Western Australia. The new rules introduced a maximum size limit for whaler sharks caught in the West Coast and South Coast bioregions, with exceptions provided to allow some commercial and recreational take in specific fisheries and parts of the State.

More information on these rules is available on the Department of Fisheries website www.fish.wa.gov.au

White shark

Carcharodon carcharias



Photo: AQWA

Also called: White pointer shark, great white.

Distribution: All oceans.

Habitat: Cool, temperate offshore waters but occasionally found in subtropical and tropical regions. Found off South Australia and southern Western Australia, and known to travel up to WA's coast as far north as North West Cape.

Size: Up to seven metres long.

Diet: Fish and marine mammals.

Conservation status: Vulnerable (EPBC Act); totally protected (FRMA); specially protected (Wildlife Conservation Act).

Whaler Sharks

Family Carcharhinidae



29 whaler shark species are known to occur in WA, including tiger shark, bull shark, bronze whaler and lemon shark.

Distribution: All oceans.

Habitat: Highly varied, ranging from reefs to open ocean and, in the bull shark's case, they can be found inhabiting marine, estuarine and freshwater environments including the Swan River.

Size: Generally ranging from one to three metres at adult size, but tiger sharks can grow as big as six metres.

Diet: Highly varied.

Conservation status: All whaler sharks with an interdorsal fin length of 700mm or greater are recreationally protected, when taken from the South Coast and West Coast bioregions.

Whale shark

Rhincodon typus



Photo: Tourism Western Australia

Also called: Tofu fish (Taiwan).

Distribution: All tropical seas.

Habitat: Highly migratory and will travel through deep water to gather at coral reefs and atolls during coral spawning. Seasonal visitors to Ningaloo Reef.

Size: Up to 12 metres.

Diet: Plankton (filter feeder).

Conservation status: Vulnerable (EPBC Act); totally protected (FRMA).

Grey nurse shark

Carcharias taurus



Photo: AQWA

Also called: Sand tiger shark; spotted ragged tooth shark.

Distribution: Found in all subtropical and tropical areas except the eastern Pacific Ocean.

Habitat: Occurs around offshore reefs and inhabits caves and ledges. Juveniles are highly migratory. Found in WA continental shelf waters from Esperance to the Kimberley.

Size: Up to four metres.

Diet: Mainly fish.

Conservation status: Vulnerable (EPBC Act); specially protected (Wildlife Conservation Act).

Northern river shark

Glyphis sp. C



Photo: Dean Thorburn

Also called: Northern spartooth shark; New Guinea river shark.

Distribution: Very rare, with a only few specimens found in rivers in Papua New Guinea and northern Australia, including tidal creeks draining into King Sound near Derby.

Habitat: Freshwater and weakly saline rivers, estuaries and tidal creeks dominated by mangroves.

Size: Largest specimen caught in WA was 1.4 metres.

Diet: Other fish, including salmon catfish and threadfin salmon in WA.

Conservation status: Endangered (EPBC Act); totally protected (FRMA).

Shark fishing in WA

Four main shark species are caught commercially in WA: dusky whaler sharks (*Carcharhinus obscurus*), sandbar sharks (*Carcharhinus plumbeus*), gummy sharks (*Mustelus antarcticus*) and whiskery sharks (*Furgaleus macki*).

While some unethical and potentially unsustainable shark fishing practices are practiced in some parts of the world, WA's shark fisheries are strictly managed. Specific controls on fishing effort are continually adjusted in response to ongoing monitoring and assessment to ensure that shark fishing remains sustainable.



A commercial shark boat. Photo: Rory McAuley

Sharks are mainly fished in WA for their meat for sale in fish and chip shops (sometimes billed as 'flake') here and in the Eastern States. The practice of 'finning' – taking the fins and throwing back the rest of the shark into the ocean (often while it is still alive) – is banned in Western Australian waters. However, WA shark fishers do legally sell shark fins as a by-product of their catch.

Management controls on commercial shark fishing include limits on the number of boats licensed to work in a zone, the amount of fishing gear used and the months and the number of days of operation, and closures over certain regions.

Although there has traditionally been little recreational fishing for sharks in WA, management arrangements (including bag limits) are regularly reviewed to ensure shark stocks are protected into the future. For example, a size limit was placed on the recreational take of whaler sharks in 2010 to give these species additional protection from overfishing. The increasing ownership of large boats, global positioning satellite systems, radar and high-quality echo sounders has made it easier for people to catch sharks.

Why sharks are vulnerable

Many people are fearful of sharks, but sharks may have more to fear from humans. Their long life cycles and small litters mean that many species are highly vulnerable to overfishing and take a long time to recover if stocks are depleted. Results of conservation efforts may not become apparent for many decades.

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Glossary

Cartilage

Dense, fibrous tissue, which is heavily calcified in sharks and ray skeletons

Chimaeras

(also called ghost sharks)
Cartilaginous fish, related to sharks and rays, that grow up to two metres and live on the ocean bottom

Crustaceans

A class of arthropods (animals with hard outer skeletons), such as crabs, shrimp, lobster and krill

Effort

Amount of time and quantity of gear used by fishers

EPBC Act

The Commonwealth Government of Australia's *Environment Protection and Biodiversity Conservation Act 1999*

Filter feeder

An animal that strains food such as plankton from the water by using sieve-like structures in its mouth

FRMA

The Government of Western Australia's *Fish Resources Management Act 1994*

Litter

Shark offspring

Neuromasts

Clusters of hair-like cells that act as receptors

Oviduct

The passage between the ovaries and the outside of the body in egg-laying animals

Plankton

Tiny plants and animals that live near the ocean surface and are carried by currents

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FURTHER INFORMATION

Visit the Department's website at www.fish.wa.gov.au or contact:

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