

LIBRARY

Department of Biodiversity,
Conservation and Attractions

This PDF has been created for digital preservation. It may be used for research but is not suitable for other purposes. It may be superseded by a more current version or just be out-of-date and have no relevance to current situations.

BI/WS_293
PAM 02742



Whale Shark

Public Awareness
Project

**This species needs
international protection
to ensure future conservation**



The Largest Living Shark

History

The whale shark (*Rhincodon typus*) is a relatively recent addition to the human record of the ocean and its inhabitants. However, the ancestry of this shark goes back to the Jurassic and Cretaceous periods 245-65 million years ago, when the present groups of sharks began to appear.

It was not until 1828 when the first whale shark specimen known to science was discovered off the South African coast. Dr Andrew Smith formally described this species later that year as the largest living shark in the ocean.

This species is rare. Prior to the mid-1980's, there had been less than 350 confirmed reports of whale sharks worldwide. Since this time, consistent sightings have been recorded in Australia. A lucrative ecotourism industry revolving around their annual appearance at Ningaloo Marine Park (NMP) on the Western Australian northwest coast is now well established.

Biology and Ecology

This species is closely related to the bottom-dwelling sharks (Orectolobiformes), which include the wobbegong. There is a pattern of lines and spots on the skin of each shark which enables them to 'blend' into their surroundings. This 'camouflage' makes the sharks less conspicuous in their oceanic environment. The unique patterning (see photo - above right) does not appear to change over time and can be used to identify individual sharks (see p. 4).

One of only three filter-feeding sharks (the other two being the basking and megamouth sharks), the whale shark feeds on minute organisms including krill, crab larvae, jellyfish etc. Although they have approximately 3,000 tiny teeth (each less than 6mm in length), these teeth are not used while feeding. Instead, the whale shark can sieve prey items as small as 1mm through the fine mesh of the gill-rakers. They are able to open their mouth to a great width (greater than 1m) to optimise feeding (see below).

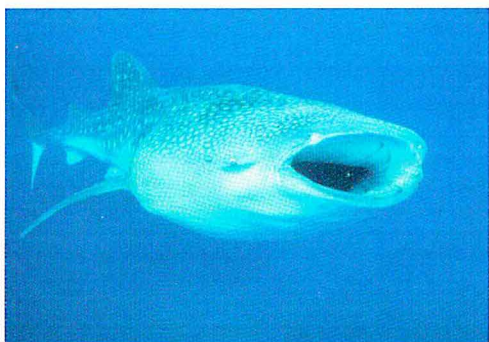


Photo © Brad Norman

Whale sharks can also feed via 'suction' while vertical in the water (see cover - Photo-ID Brochure). Information on feeding behaviour, when combined with sighting data, may help researchers understand how shark appearance is related to natural events in the marine environment.

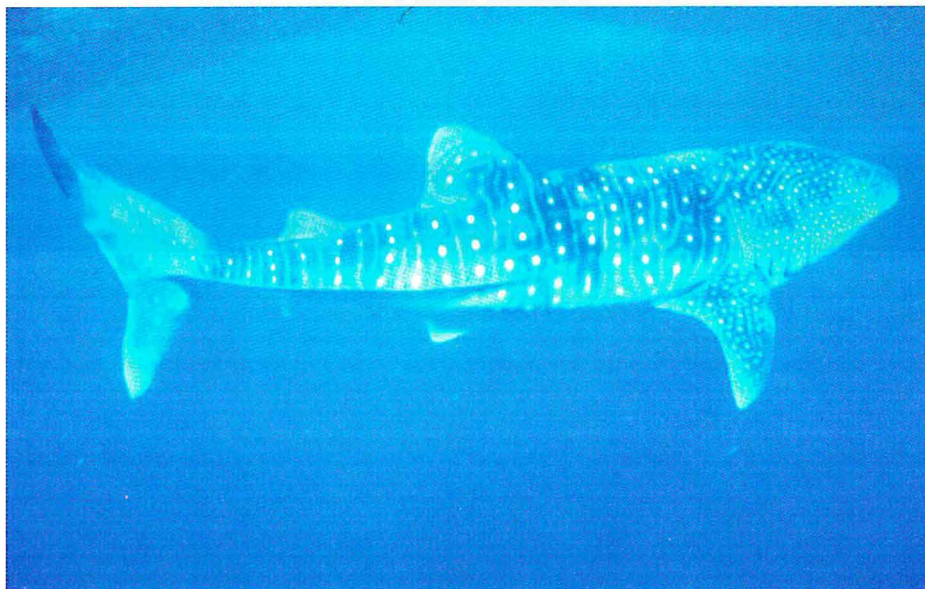


Photo © Brad Norman

Breeding

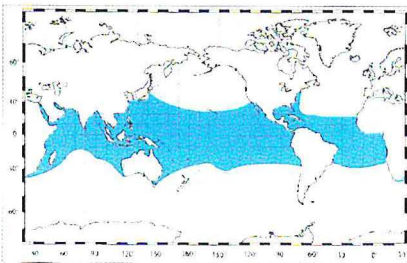
Whale sharks have internal fertilisation and produce live young. Males can be distinguished by the presence of two claspers near the pelvic fin. These organs are absent in females.

A long-term study has been undertaken at NMP since 1995 by Mr Brad Norman. This has established that male whale sharks do not usually mature before they reach a length of around 8-9m. The size at maturity of female whale sharks cannot, however, be determined through similar external observation.

It is, at present, not known where whale sharks breed. Only one pregnant whale shark has ever been recorded (near Taiwan - see photo p.3). There have been very few juvenile whale sharks seen at any location throughout their range.

Distribution

Whale sharks have a broad distribution in tropical and warm temperate seas, usually between latitudes 30°N and 35°S (see below).



(from Last & Stevens 1994)

They are known to inhabit both deep and shallow coastal waters and the lagoons of coral atolls and reefs.

Australia is one of the most reliable locations to find whale sharks. Regular sightings have also been recorded from many other regions including India, the Maldives, South Africa, Belize, Mexico, the Galapagos Islands, Southeast Asia and Indonesia.

This species is widely distributed in Australian waters. Although most common at NMP (and to a lesser extent at Christmas Island and in the Coral Sea), sightings have been confirmed as far south as Kalbarri (on the mid-west coast of WA) and Eden (on the NSW south coast). Whale sharks have also been recorded from Commonwealth waters between Australia and Indonesia.

This species is thought to prefer surface sea-water temperatures between 21 - 25°C. Sightings at NMP, however, are most common in water temperatures around 27°C.

The sharks (regularly) appear at locations where seasonal food 'pulses' are known to occur. The predictable annual whale shark aggregation at NMP is closely linked with an increase in productivity of the region. This is associated with a mass coral spawn which occurs around March/April each year.

Habits

Whale sharks are fish, and therefore obtain oxygen via their gills. They have no physiological requirement to swim at the surface - unlike air-breathing whales and dolphins. Although they are most often observed swimming at the surface during 'seasonal' aggregations, evidence from tracking studies undertaken at NMP and at other international locations indicate that whale sharks can dive to great depths (~700m). They can remain away from the surface for long periods.



Photo © Brad Norman

Although whale sharks are often sighted with numerous other fish - these gaining some protection from the larger whale shark - they invariably react when subject to physical contact. It is important for boats and swimmers not to impede the path of the sharks in any way.

Radio-tracking studies at NMP indicate that individual whale sharks may stay close to Ningaloo Reef over day/night periods. In addition, using the **Whale Shark Photo-identification Library** (see p.4), it was possible to show that one identified shark had been resighted at NMP on 14 separate days over a 28 day period - within a very restricted area. Some sharks appear to show a level of 'site-attachment' when returning to the Australian northwest coastline.

Migration

Whale sharks are regarded as highly migratory - although these 'migration patterns' are poorly understood. Previous research at NMP suggests the sharks may undertake a northerly migration when leaving the area. Their seasonal appearance at Christmas Island and sightings near Ashmore Reef provide support for this theory. Sadly, it is when the sharks leave Australian waters that they are potentially at risk of 'unsustainable hunting pressure'.

Satellite tracking of whale sharks in US waters and also in the South China Sea reveal that whale sharks can travel great distances (1,000's of kilometres). These migrations may take years to complete. A far greater understanding of whale shark movements will be possible with the continuation of tagging and tracking studies throughout the world. To date, short-term movements and behaviour of whale sharks at NMP have been successfully investigated using acoustic tracking.

It will be interesting to determine the preferred habitat of whale sharks visiting the Australian coastline. Further information on the ecology and oceanography from locations where shark sightings are common will provide a better understanding of the reasons for whale shark movements. In addition, satellite technology will enable researchers to map the movements of tagged sharks and broaden our knowledge of this species.

Natural events (e.g. weather patterns) and the particular physical geography of a region can influence productivity. Warm tropical surface-waters are often nutrient-poor, in contrast to areas of cold-water (nutrient-rich) upwellings. Some long-distance migrators travel to and from areas of increased food abundance e.g. another filter-feeder - the humpback whale.

Additional information on the biology and ecology of whale sharks is needed to help with conservation and management.

You can Help

Please send in any information on whale shark sightings (past and present) to help efforts to address the conservation concerns for this species.

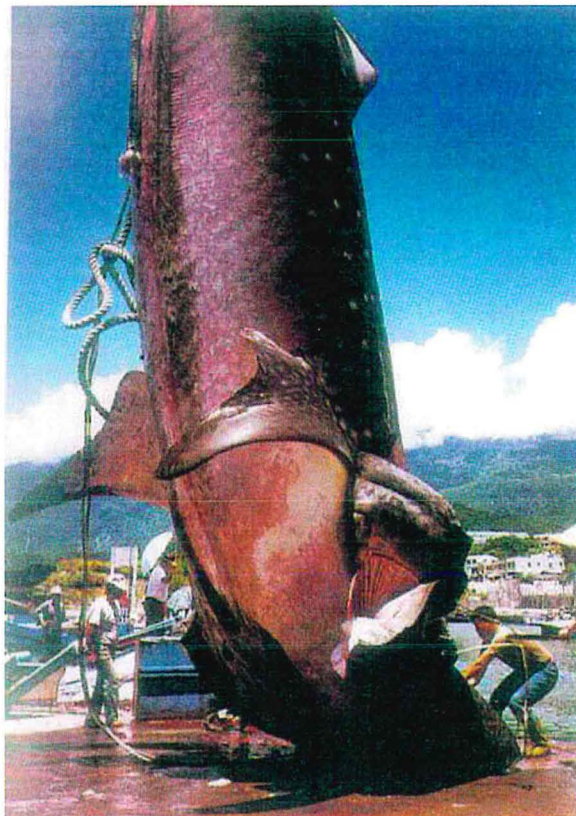
The **Whale Shark Project** provides the opportunity for all Australians to become involved.

The Whale Shark is **VULNERABLE to EXTINCTION!**

The World Conservation Union (IUCN) lists the global conservation status of animals (and plants). The status of the whale shark was recently identified as '*Vulnerable to extinction*'. This listing indicates a need for us all to be concerned.

Threats

There are very few known predators of the whale shark. The most significant threat to the species appears to be humans (see below). In one fishery alone (India), as many as 1000 whale sharks were believed killed in 1999 and 2000.



Taiwanese whale shark fishery (from Joung *et al.* 1996)

Their habit of swimming at the surface makes the whale shark particularly susceptible to fishing pressure. At the present level, it is feared that the kill of whale sharks is unsustainable.

In nature, the most susceptible period in their life cycle appears to be before reaching a substantial size (*i.e.* when the sharks are still very young). Whale shark pups are born at a fraction of their adult size - being only approximately 55cm in length at birth.

The skin of an adult whale shark provides their main protection.

On average, the thickness of the skin on the dorsal surface is 12-15cm and greater than that of any other living animal. In young whale sharks however, this 'protection' is not fully developed.

Very few juvenile whale sharks (*i.e.* less than 1-2m) have been reported throughout history. However, small individuals are known to be prey items of blue marlin and blue sharks. An adult whale shark was recently reported taken by a killer whale in Mexican waters.

Are they protected internationally?

The whale shark is protected in the waters of very few of the approximately 100 countries where this species is known to visit. While protected in Honduras and some US waters, the Maldives brought in legislation to protect whale sharks in 1995 and the Philippine government banned the hunting of whale sharks in 1998. However, some illegal hunting still continues.

At several other locations, unregulated fishing for whale sharks is apparent. The effort is expanding, with the number of whale sharks caught (relative to effort) appearing to decline.

In Western Australian waters, the whale shark is fully protected under the *Wildlife Conservation Act 1996* and the *Fish Resources Management Act 1994*. The whale sharks are identified as a migratory species on the Commonwealth *Environment Protection and Biodiversity Conservation (EPBC) Act 1999*. More comprehensive recognition on the *EPBC Act* (see p.4) will provide additional protection - important to assist with whale shark conservation.

The whale shark is listed on the Bonn Convention for the Conservation of Migratory Species (CMS). This identifies the whale shark as a species whose conservation status would benefit from the implementation of international cooperative agreements.

As a species protected in Australian waters, international cooperation is needed to limit trade in whale shark products. Australia has nominated the whale shark on the *Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) Appendix III*. Importantly, this listing will help restrict or prevent unsustainable exploitation of this species. Other 'signatory' countries can assist in controlling trade in whale shark products. A subsequent nomination for CITES Appendix II will provide for more comprehensive trade monitoring requirements. The collection of further data on this species will greatly assist efforts to ensure the future conservation of this species.

Whale Shark Project

'conservation and protection'

The 'Gentle Giant'

Current situation

The harvest continues. Hunting pressure is expanding especially since the rise in popularity of whale shark products for the Chinese, Hong Kong and Taiwanese markets. Although protected in several countries, there is often inadequate resources to ensure the law is upheld.

The number of whale sharks appears to be declining worldwide and the survival of this species is potentially threatened.

For the whale shark, there are at present:

- * **NO** international trade measures in place;
- * **NO** management measures in place for the majority of countries visited by this species;
- * **NO** localised control measures in place other than protection in WA and Qld;
- * **NO** programs currently in place to protect the habitat of the whale shark;
- * **NO** immediate plans to identify areas of ecological significance utilised by this species (e.g. breeding grounds).

Initiatives

To increase the probability of success in gaining greater protection for the whale shark, more research into the ecology and basic biology of this species must be undertaken as a priority. Further data collection is encouraged and can be achieved, in part, via the **Whale Shark Project**


(coordinated by AMCS and ECOCEAN).

For example, data on aspects of shark behaviour, biology and distribution will be recorded and may provide an estimate of the number of individual sharks that return to the Australian coastline each year.

Whale Shark Photo-identification Library

Whale Shark Photo-identification Library

Shark identification number: A-021
Sex: male
Size: 10 m
Date and location of sighting:
a) 28/04/98 - 21°53.367S 113°56.292E



a) Left side patterning is pale, although two vivid white spots exist at the top of the trailing edge of the 4th and 5th gill slits. The patterning is predominantly angled downwards at ca 45°.

b) Right side patterning is also very pale, with a bright white spot at the most dorsal point of the leading edge of the 5th gill slit.

c) The lower 1/3 of the trailing edge of the 1st dorsal fin is characterised by the presence of several small nicks.

d) The trailing edge of the 2nd dorsal fin is characterised by three semi-circular serrations (ca 2cm diameter).

© Brad Norman

The Whale Shark Photo-identification Library (example entry above) enables sharks to be 'naturally tagged' and helps with continued data collection on this species.

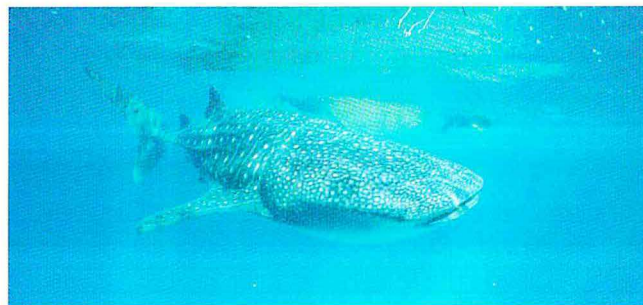


Photo © Brad Norman

Ecotourism - an alternative to hunting?

Whale sharks are not subject to fishing pressure in Australia. At NMP, continued protection for this species has been provided via the CALM Management Guidelines and the ecotourism industry 'Code of Conduct'. The latter was established through discussions between CALM and the whale shark ecotourism operators at NMP.

Extensive research on the effects of ecotourism on the behaviour of whale sharks has been undertaken within Australia since 1995. Information collected during this study will help ensure human-induced impacts on whale shark in Australian waters are minimised. The results will be made available to assist similar ecotour operations as they develop worldwide.

Whale sharks are worth far more alive than dead. Providing it is well-managed, ecotourism can be an economically viable alternative to hunting. This form of 'nature-based' tourism can also serve to establish a greater public awareness of the conservation concerns facing the whale shark.

Future

If Australia succeeds in gaining broader protection for the whale shark in Australian waters (especially the nomination on the *EPBC Act* as a 'threatened species'), this will encourage efforts to implement wider regional protection for this species. It will highlight to foreign governments (including countries where the whale sharks are hunted) the need for international cooperation to ensure the survival of this shark. CITES Appendix III (followed by CITES Appendix II) listing is a priority.

Community support has enabled arguably the most extensive study on the whale shark to be undertaken within Australian waters. Volunteers continue to assist with simple data collection. Further research to gather important baseline information on this species will help efforts for the global conservation of the whale shark. The Australian Marine Conservation Society (AMCS) and ECOCEAN will continue to drive this initiative nationally and internationally.

Action!

** Please support the **Whale Shark Project**. This is as simple as completing and submitting whale shark sighting forms for collation.

** Pass these brochures on to friends and colleagues to raise awareness of the world-wide conservation concerns for this VULNERABLE species.

** Write to the Federal Environment Minister asking that the Australian Government continue with efforts to protect this species in Australian (and international) waters.

** Help the Australian Marine Conservation Society continue to drive efforts to assist with the conservation of the largest fish in the ocean.

For further information, contact:

ECOCEAN
PO Box 5053
KINGSTON ACT 2604
ecocean@ozemail.com.au

AMCS WA
PO Box 8157
Perth Business Ctr WA 6849
amcswa@inet.net.au