



THE NORTH MARINE BIOREGIONAL PLAN

# BIOREGIONAL PROFILE

## APPENDIX D1

# NORTH MARINE REGION PROTECTED SPECIES GROUP REPORT CARDS: CARTILAGINOUS FISH



A DESCRIPTION OF THE ECOSYSTEMS, CONSERVATION VALUES AND USES  
OF THE NORTH MARINE REGION



Australian Government

Department of the Environment, Water, Heritage and the Arts

## APPENDIX D NORTH MARINE REGION PROTECTED SPECIES GROUP REPORT CARDS

These report cards summarise information on those species that occur in the Region and are protected under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The report cards present relevant information on species groups and are designed to be updated as new information becomes available. The report cards included in this appendix are current at February 2008. Updates of the report cards will be available on the web at <[www.environment.gov.au/coasts/mbp/north](http://www.environment.gov.au/coasts/mbp/north)>.

Protected species occurring in the Region for which species group report cards have been compiled include:

- D1 Cartilaginous fish (including sharks and sawfish)
- D2 Bony fish (including seahorses, pipefish and ghost pipefish)
- D3 Reptiles – marine turtles
- D4 Reptiles – seasnakes
- D5 Reptiles – saltwater crocodiles
- D6 Birds (including seabirds, waterbirds and shorebirds)
- D7 Mammals – dugongs
- D8 Mammals – cetaceans (including whales and dolphins)

### D1 North Marine Region Protected Species Group Report Card – Cartilaginous fish

Current at February 2008. For updates see <[www.environment.gov.au/coasts/mbp/north](http://www.environment.gov.au/coasts/mbp/north)>.

#### General information

Sharks, rays, skates and chimaeras (or ghost sharks) are cartilaginous fish belonging to the class Chondrichthyes within the subgroup Elasmobranchii. The National Oceans Office (2004) *Description of Key Species Groups in the Northern Planning Area* report provides an overview of this species group in the Region.

Sawfish belong to the class Pristidae within the subgroup Elasmobranchii (Hamlett 1999). Sawfish are unique creatures that are actually highly modified rays that have a body similar to that of a shark, but with gill slits situated ventrally on the head like other rays. The Pristidae comprise two genera; *Pristis* and *Anoxypristis*, and there are currently up to 7 species known from Australia (Last and Steven 1994). Two of these species, the freshwater sawfish (*Pristis microdon*) and the green sawfish (*Pristis zijsron*), are listed as vulnerable under the EPBC Act. In June 2007, six of the seven species of sawfish were listed under Appendix I of the *Convention on International Trade in Endangered Species of Wild Fauna and Flora* (CITES), with the freshwater sawfish, *Pristis microdon*, listed under Appendix II for the exclusive purpose of allowing international trade in live animals to appropriate and acceptable aquaria, primarily for conservation purposes.



#### Nationally protected species

Three species of shark – the whale shark, spartooth shark and northern river shark – as well as the freshwater sawfish and green sawfish, are known to occur in the Region and are listed as threatened under the EPBC Act. The whale shark is also listed on Appendix II of both CITES and the *Convention on the Conservation of Migratory Species of Wild Animals* (CMS). Recovery plans are in place for the whale shark and can be found at <[www.environment.gov.au/coasts/species/sharks](http://www.environment.gov.au/coasts/species/sharks)>.

**Table D 1 Elasmobranch species listed as threatened or migratory under the EPBC Act that are known to occur in the North Marine Region**

Species	Conservation status	Australian Government conservation plans or strategies for the species
Whale shark ( <i>Rhincodon typus</i> )	Vulnerable, Migratory [also listed under CITES (Appendix II) and CMS (Appendix II)]	<ul style="list-style-type: none"> <li>National Plan of Action for the Conservation and Management of Sharks (2004)</li> <li>Whale shark (<i>Rhincodon typus</i>) Recovery Plan 2005–2010 (2005)</li> </ul>
Spertooth shark ( <i>Glyphis</i> species A)	Critically endangered	
Northern river shark ( <i>Glyphis</i> species C)	Endangered	
Freshwater sawfish ( <i>Pristis microdon</i> )	Vulnerable [also listed under CITES (Appendix II)]	
Green sawfish ( <i>Pristis zijsron</i> )	Vulnerable [also listed under CITES (Appendix I)]	

## Ecology of protected sharks and sawfish in the North Marine Region

### Whale shark

Whale sharks are wide-ranging species that are usually observed between latitudes 30°N and 35°S in tropical and warm temperate seas, both oceanic and coastal. They are usually found close to or at the surface, often as single individuals but also occasionally in schools or aggregations of up to hundreds in number. Although it is believed that this species prefers waters with temperatures between 21–25°C, whale sharks sighted in the North-west Marine Region (Ningaloo Marine Park) are predominantly found in waters averaging 27°C. Whale sharks are regarded as highly migratory, but their migration patterns are poorly understood. Research on whale shark migration patterns adjacent to the Region suggests that the whale sharks observed there may have northerly migration paths.

Although whale sharks have been observed in the Region, there are no known aggregation areas. There are no known threats to this species known in the Region. Further information on whale sharks is available at [www.environment.gov.au/biodiversity/threatened/publications/recovery/r-typus](http://www.environment.gov.au/biodiversity/threatened/publications/recovery/r-typus).

### Spertooth shark

The spertooth shark (*Glyphis glyphis*) is endemic to Australia and is listed as critically endangered under the EPBC Act. Records of spertooth sharks in the North Marine Region are predominantly of juvenile species found in fresh water and estuarine environments,

although the species is occasionally seen in marine coastal waters (Stevens *et al.* 2005). Jaw trophies of the species and anecdotal reports by commercial fishers operating in the Region indicate that this species does inhabit the Region. Little is known about the reproductive biology of this species.

### Northern river shark

The northern river shark (*Glyphis garricki* sp. nov) is listed as endangered under the EPBC Act and is possibly endemic to Australia. Little is known of the ecology or reproductive biology of this shark. Previously the species was thought to be restricted to fresh water and estuarine environments, particularly the freshwater to brackish reaches of the Adelaide and Alligator River systems. However, a specimen has been recorded at Doctors Creek in Western Australia (Thornburn *et al.* 2003), and other specimens have more recently been found in coastal waters (Stevens *et al.* 2005). Northern river shark specimens have recently been positively identified in the by-catch of offshore net fisheries (Sly, S., 2007, pers. comm.). It is likely that specimens previously caught by fishing boats have been misidentified as bull sharks.

### Freshwater sawfish

The freshwater sawfish is listed as vulnerable under the EPBC Act and was recently listed under CITES Appendix II for the exclusive purpose of allowing international trade in live animals to appropriate and acceptable aquaria, primarily for conservation purposes. Juveniles and sub-adult freshwater sawfish mainly live in rivers and estuaries, while large mature animals tend to occur more often in coastal and offshore waters up to 25 m

depth (Giles *et al.* 2006; Stevens *et al.* 2005). The higher frequency of freshwater sawfish reported in inshore waters than offshore waters is likely to be the result of greater fishing pressure leading to a greater chance of reporting in these waters. Anecdotal evidence suggests that the abundance of large freshwater sawfish has declined in recent years.

The known use of the Region by freshwater sawfish includes sanctuary and foraging, with sawfish only returning seasonally to inshore coastal waters adjacent to the Region to breed and pup. Observations of reproductive staging in freshwater sawfish found along the east coast of the Gulf of Carpentaria suggest that pupping occurs through the wet season and continues until the beginning of the dry season in early May (Peeverell 2005). Freshwater sawfish give birth to live young and have a litter size of between 1–11 offspring (Peeverell *et al.* 2004).

### Green sawfish

The green sawfish is listed as vulnerable under the EPBC Act and under CITES Appendix I. Juveniles and sub-adult green sawfish mainly live in marine coastal waters, as well as estuaries and river mouths at slightly reduced salinities, but does not venture into freshwater. Larger mature animals have been recorded in coastal waters and offshore waters up to 70 m depth (Stevens *et al.* 2005).

The green sawfish is found throughout northern Australia. However, its abundance and specific habitat requirements are largely unknown (Stevens *et al.* 2005). The likely use of the Region by green sawfish includes sanctuary and foraging, with sawfish returning seasonally to inshore coastal waters adjacent to the Region to breed and pup, as occurs for the freshwater sawfish. Pupping is likely to occur in the wet season as for other sawfish species (Peeverell 2005). There is a lack

of data on the reproductive biology of the green sawfish (Stevens *et al.* 2005).

### Important areas for sharks and sawfish in the North Marine Region

Important areas in the Region are identified for those species listed as threatened or migratory under the EPBC Act. The distribution, abundance, important nursery areas, and feeding habits of the spartooth shark, northern river shark and freshwater sawfish are largely unknown. All of the major river systems in Queensland's Gulf of Carpentaria region support juvenile and sub-adult freshwater sawfish and are considered as important. The migratory patterns of whale sharks in the Region are poorly known.

Van Diemen Gulf (Northern Territory) – the Adelaide and Alligator River systems adjacent to the Region contain recorded populations of spartooth and northern river sharks.

Port Musgrave – the Ducie River and Wenlock River within the Port Musgrave region adjacent to the North Marine Region is the only area in Queensland where the spartooth shark has been identified in the last 20 years. The Wenlock River also supports a healthy population of juvenile freshwater sawfish.

### Known interactions, threats and mitigation measures

#### Fisheries

Sharks are particularly susceptible to fishing pressure because of their biology. They generally show slow growth, late attainment of sexual maturity, low fecundity and a close stock-recruitment relationship. Unlike finfish, sharks and rays do not have a larval dispersal stage to their life cycle, and recruitment can



Freshwater sawfish. Photo: Richard Pillans, CSIRO.

be very poor in certain areas. Juvenile sharks and rays generally have localised home ranges, often remaining close to where pupping occurs. This behaviour leaves juvenile sharks and rays vulnerable to localised depletion especially in areas of moderate to high fishing pressure or habitat modification. In particular, the speartooth and northern river shark are likely to have small population sizes and may be subject to pressures by commercial gill-netting and recreational fishing (Stirrat and Larson 2002). The demand and prices for shark products, including fins, is high, which is likely to contribute to fishing pressures on some shark species.

### Commercial fishing

Gill-netting and line-fishing in estuaries may have an impact on populations of northern river sharks (Thorburn *et al.* 2003) and speartooth sharks (Salini *et al.* 2007). For example, in 2004, a fishery observer recorded 17 speartooth sharks caught in five net casts in the Adelaide River, where the Northern Territory Barramundi Fishery operated at the time (Salini *et al.* 2007). The introduction of legislation in February 2005 that excludes commercial barramundi fishers from rivers where the speartooth shark is recorded in the Northern Territory, is likely to have largely reduced the impact of gillnet fishing on this species. Northern river and speartooth sharks may also be caught in commercial

operations further offshore. The speartooth shark has been recorded as by-catch in the Queensland Gulf of Carpentaria Inshore Finfish Fishery, which operates from the shore to seven nautical miles offshore (Salini *et al.* 2007). In addition, some species of small sharks and juveniles of large estuarine sharks may be used as bait in mud crab fisheries. Northern river and speartooth sharks have been misidentified as bull sharks in the past and fishers are encouraged to release these sharks if caught.

Sawfish share similar biological characteristics to sharks in their long gestation periods, giving birth to live young, late sexual maturation, and intermittent breeding (Stobutzki *et al.* 2002). Sawfish of all size classes are vulnerable to net fishing because of their toothed rostrum and thus altering gear types and sizes has little influence in reducing entanglement of sawfish in net fisheries. Sawfish tend to interact more with coastal fisheries and gill-nets than offshore fisheries. Net fishing has been identified as contributing to a rapid decline in sawfish populations globally (Peverell *et al.* 2004). Tag and release measures or exclusion of fishers from areas is the most effective means of mitigating sawfish interactions with net fishing gear. Sawfish were identified at threat from over fishing due to their life history characteristics (Stobutzki *et al.* 2002) and thus also may be at higher threat in by-catch as a consequence of trawling operations.



Whale shark. Photo: Gavin Leese, Queensland Department of Primary Industries and Fisheries.

### Recreational fishing

Both the spartooth and northern river shark are considered to be at risk of being taken by recreational fishers using nets or lines (Pogonoski *et al.* 2002). Specimens are generally returned alive, discarded dead or utilised as bait. Management of recreational fishing lies with State and Territory fisheries management agencies.

The level of interaction between *Glyphis* and recreational fishers is unknown. This may reflect a low level of interaction and/or a lack of reporting on the part of fishers (including detail and accuracy of reporting and lack of knowledge of reporting requirements).

Over a ten day period, Stevens *et al.* (2005) observed eight spartooth sharks of 50–70 cm total length being captured in the same location on the Adelaide River. All were killed and either eaten or left on the bank. This observation from only one location across numerous recreational fishing spots in northern Australia highlights the potential threat to the species from the increasing number of recreational fishers accessing these remote locations (Thorburn *et al.* 2003).

Data on sawfish capture by recreational line fishers is limited (based on Queensland records). Sawfish exhibit both scavenging and predatory behaviour and will commonly take dead or live bait and as such are vulnerable to capture by baited line (Last and Stevens, 1994; Peverell, 2007, pers. comm.). This threat is more serious during the end of the dry season when food resources within drying waterholes become scarce.

Recreational fishers in Queensland and the Northern Territory are permitted to use bow and arrow as a form of fishing apparatus, with sawfish recognised as trophy animals. Bow hunting is not permitted in non-tidal waters and a number of regulated special use zones have been introduced to manage this activity under the *Queensland Fisheries Act 1994* (Peverell *et al.* 2004).

### Indigenous harvest

Sawfish have a significant cultural and spiritual relevance to Indigenous people in the Gulf of Carpentaria (McDavitt 2001). The level of Indigenous harvest of sawfish is unknown, although anecdotal reports suggests that Indigenous fishing may be contributing to localised declines in sawfish populations (Peverell *et al.* 2004).

### Illegal fishing

The impact of illegal net and line fishing from foreign fishing vessels in the Region and adjacent waters on cartilaginous fish is unknown, although the illegal catch is thought to be significant and possibly exceeds that of the Australian domestic fleet. Of particular concern is the type of fishing gear used and the manner in which it is used. Large cord nets (15 inch diameter) are bottom set for the sole purpose of catching sawfish, large shark and other ray species (Peverell, S., 2007, pers. comm.) due to the high value of fins of these species. This method of fishing is illegal in Australia because of the increased risk of interaction with sharks and rays.

### Marine debris

The ingestion of, or entanglement in, harmful marine debris has been identified under the EPBC Act as a key threatening process causing injury and fatality to vertebrate marine life. Entanglement in marine debris such as discarded fishing gear can lead to restricted mobility, starvation, infection, amputation, drowning and smothering. The ingestion of plastic marine debris can cause physical blockages leading to starvation, or injuries to the digestive system leading to infection or death.

International studies have shown the impact of plastic debris on sharks (Sazima *et al.* 2002). Observations of grey nurse sharks in aquaria have also indicated that derelict hooks may puncture the stomach, pericardial cavity, and oesophagus, causing infection and death (Threatened Species Scientific Committee 2003). Entanglement of Australian sharks and rays in derelict fishing gear has been observed on numerous occasions in coastal areas adjacent to the Region (eg. Sloan *et al.* 1998, Alderman *et al.* 1999), but few published records exist. The low number of records of shark and ray entanglement in fishing gear is likely due to entangled animals often being eaten before they are washed up on to the beach.

The Australian Government is currently developing a threat abatement plan that aims to minimise the impacts of marine debris on threatened marine species. Further information is available at [www.environment.gov.au/biodiversity/threatened/publications/marine-debris.html](http://www.environment.gov.au/biodiversity/threatened/publications/marine-debris.html).



### Habitat modification

Waters adjacent to the Region are subject to development and habitat modification, especially in some freshwater regions of rivers where weirs are in place. Proposals are being considered for dams in the rivers adjacent to the Region to supply both agricultural and mining demands for water. This is especially the case for the Walsh and Flinders rivers which also support populations of freshwater sawfish (Peeverell, S., 2007, pers. comm.). Of concern is the potential development of Port Musgrave by mining companies, with a proposal of dredging activities in the Ducie River, Wenlock River systems and Port Musgrave. This would potentially affect the populations of spartooth shark in this area.

### Mitigation measures

Fishers working in the Northern Prawn Fishery are not permitted to target sharks, and there is a ban on retaining shark products in this fishery. Retention of shark fins is permitted in Queensland and Northern Territory waters if obtained in accordance with fisheries regulations. In Queensland, the fins may only be removed if the shark body is retained. In the Northern Territory, if sharks fins are removed, a set percentage of trunks or fillets must be kept on board. More specifically, in the Northern Territory Shark Fishery, shark product on board a vessel is required to conform to the following conditions:

- fin weight to be no more than 6.5 per cent of trunk weight fresh or frozen or three per cent dried weight of trunk weight, on board a vessel;
- fin weight to be no more than 13 per cent of fillet weight fresh or frozen or six per cent dried weight of fillet weight on board a vessel;
- there shall be no more than 500 kg of converted whole shark weight on board a vessel; and
- no shark products to be allowed on board a vessel upon commencement of the next voyage.

Shark by-product limits also apply in other Northern Territory fisheries.

Within the Northern Prawn Fishery, the mandatory use of by-catch reduction devices and turtle excluder devices since 2000 has substantially reduced the incidental capture of species of shark and rays. In a study by Brewer *et al* (2006) it was found for larger species of sharks and rays (greater than 1 m) the use of turtle excluder devices had reduced the incidental capture of

sharks by 86 per cent and rays by 94 per cent. This study also found the total number of sawfish captured was not reduced, however turtle excluder devices did reduce the incidental capture of the most commonly caught species, the narrow sawfish, by 73 per cent (Brewer *et al.* 2006).

Seasonal net closures over the monsoonal wet season put in place to protect spawning barramundi have unintentionally protected pupping sawfish and shark species (Peeverell, S., 2007, pers. comm.). Sawfish are also listed in the fisheries code of practice as a release species and are under consideration as a no take species in the Gulf finfish fishery management plan.

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