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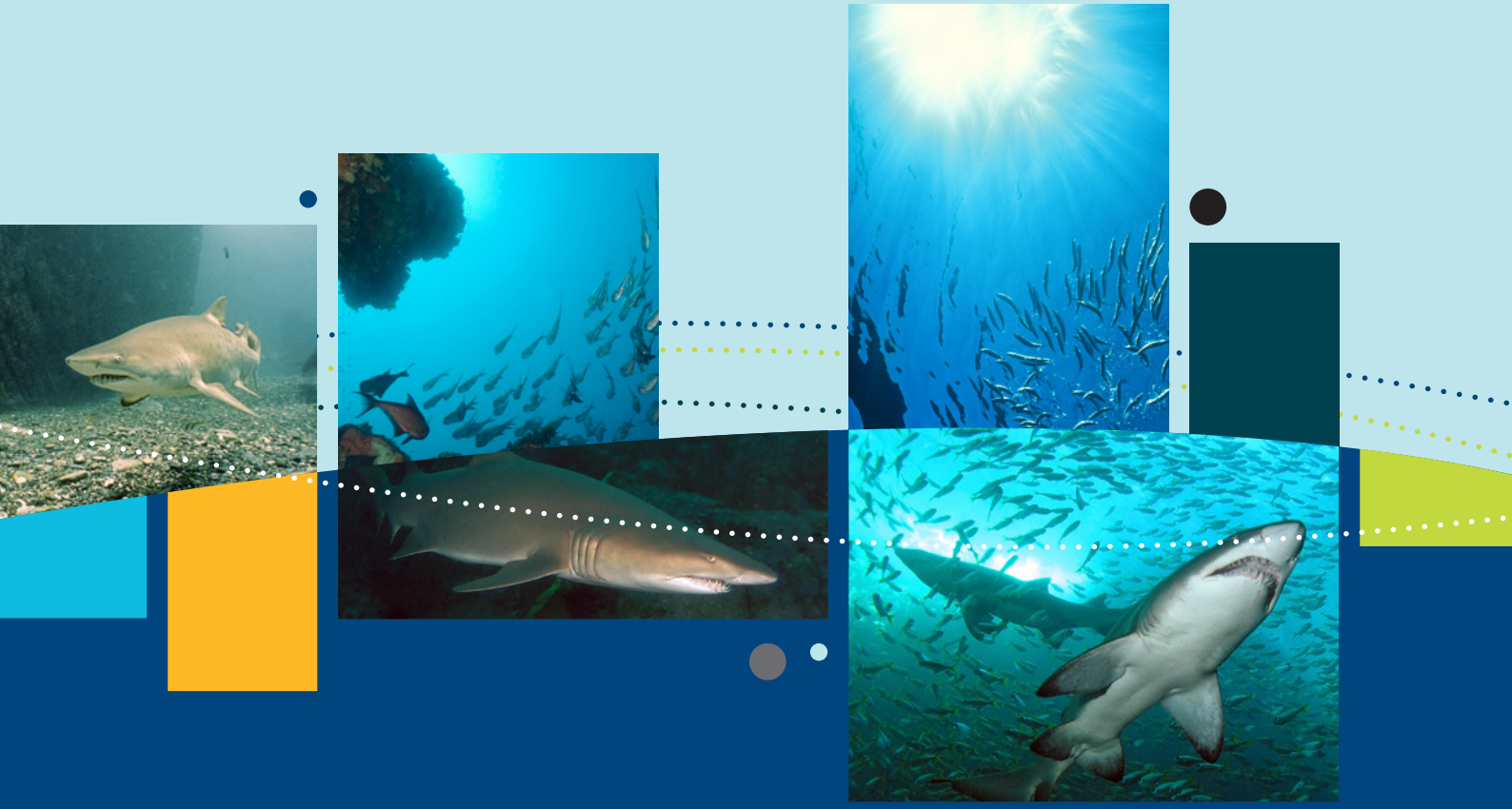

Species group report card —sharks

Supporting the marine bioregional plan for the South-west Marine Region

prepared under the *Environment Protection and Biodiversity Conservation Act 1999*

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Report cards

The primary objective of the report cards is to provide accessible information on the conservation values found in Commonwealth marine regions. This information is maintained by the Department of Sustainability, Environment, Water, Population and Communities and is available online through the department's website (**www.environment.gov.au**). A glossary of terms relevant to marine bioregional planning is located at **www.environment.gov.au/marineplans**.

Reflecting the categories of conservation values, there are three types of report cards:

- species group report cards
- marine environment report cards
- heritage places report cards.

While the focus of these report cards is the Commonwealth marine environment, in some instances pressures and ecological processes occurring in state waters are referred to where there is connectivity between pressures and ecological processes in state and Commonwealth waters.

Species group report cards

Species group report cards are prepared for large taxonomic groups that include species identified as conservation values in a region; that is, species that are listed under Part 13 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and live in the Commonwealth marine area for all or part of their lifecycle. All listed threatened, migratory and marine species and all cetaceans occurring in Commonwealth waters are protected under the EPBC Act and are identified in the relevant marine bioregional plans as conservation values.

Species group report cards focus on species for which the region is important from a conservation perspective; for example, species of which a significant proportion of the population or an important life stage occurs in the region's waters.

For these species, the report cards:

- outline the conservation status of the species and the current state of knowledge about its ecology in the region
- define biologically important areas; that is, areas where aggregations of individuals of a species display biologically important behaviours
- assess the level of concern in relation to different pressures.

1. Sharks of the South-west Marine Region

Seven species of shark listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) are known to occur in the South-west Marine Region: white, grey nurse, whale, shortfin mako, longfin mako, porbeagle and school sharks (Attachment 1). Sharks in the region predominantly feed on bony fish and cephalopods, although some species feed on other sharks, rays, crustaceans, birds and marine mammals. Some of the pelagic species are diverse in their ecological function; whale sharks are plankton feeders, while other sharks are predominantly fish and cephalopod predators.

White shark

White sharks (*Carcharodon carcharias*) are widely distributed throughout temperate and subtropical regions, and are most frequently observed and captured in inshore cool to warm temperate continental waters (Last & Stevens 2009). In Australia, they are listed as vulnerable under the EPBC Act. Data from recent tracking studies show that white sharks can travel thousands of kilometres between sites of temporary residency. There are currently no direct estimates of the size of the white shark population in Australian waters and no reliable measures with which to compare changes in population status over time. This is due partly to the scarcity of white sharks and also to the difficulty in distinguishing population changes from the high rates of variability in numbers observed within any one site or region between years (Bruce 2008).

White sharks eat a variety of prey including finfish, other sharks and rays, marine mammals such as seals, sea lions, dolphins and whales (the latter primarily as carrion), as well as squid, crustaceans and seabirds (DEWHA 2009a). Their diet is known to change with size—juveniles less than 2.7 m long feed primarily on fish and other sharks and rays while larger sharks (reaching up to 6 m in length) are known to also feed on marine mammals (Malcolm et al. 2001). Female white sharks do not mature in Australian waters until approximately 5 m in length (Bruce 1992); reproduction may follow a three-year cycle and the number of pups produced is low (Francis 1996, Mollet et al. 2000)..White sharks appear to be more abundant in the South-west Marine Region relative to other areas in Australian waters particularly from Shark Bay to Bunbury and in areas of the Great Australian Bight. Estimates of bycatch from commercial fisheries are highest in these areas, relative to other regions in Australia, and have not been well correlated with fishing effort (Malcolm et al. 2001). Due to the internationally threatened status of this species, the region may not only be significant for the conservation and management of white sharks in Australia, but possibly also in a global context.

White sharks are widely, but not evenly, distributed in Australian waters. Areas where white shark observations are more frequent include waters in and around some fur seal and sea lion colonies such as the Neptune Islands (South Australia), areas of the Great Australian Bight, the Recherche Archipelago and the islands off the lower west coast of Western Australia (DEWHA 2009a). The coast off the Goolwa region of South Australia is reportedly frequented by juvenile white sharks at times. The locations of Australian pupping grounds are unknown, although neonate white sharks have been taken as bycatch by commercial and recreational fishers in the western Great Australian Bight and Bass Strait (CSIRO unpublished data, in DEWHA 2009a). Pupping is believed to occur during spring or early summer (DEWHA 2009a), which coincides with the period when Robbins (2007) reported the absence of female white sharks from the Neptune Islands.

In Western Australia, white sharks move north along the coast as far as North West Cape during spring and appear to return south during summer (Bruce et al. 2006), although data for this region are still sparse. Coastal movements are more complex than simple seasonal migrations north and south along these coasts. The waters of the Great Australian Bight appear to be the common link for at least sub-adult and adult white sharks, with individuals moving from there across their Australian range and then returning to this region (Bruce et al. 2006).

White sharks can be found from close inshore around rocky reefs, surf beaches and shallow coastal bays to outer continental shelf and slope areas (Bruce & Bradford 2011a, Bruce et al. 2006). However, they also make open ocean excursions and can cross ocean basins (Bruce & Bradford 2011b; Bonfil et al. 2010; Bonfil et al. 2005). Both adults and juveniles have been recorded diving to depths of 1 000 m. Most white shark movements and activities in Australian waters occur between the coast and the 120 m depth contour (Bruce & Bradford 2008; Bruceet al. 2006). White sharks are often found in regions with high prey density, which results in higher numbers near some seal colonies and in sites where other prey species (e.g. some finfish) aggregate. They are not known to form and defend territories, and do not live in one specific area or territory but travel great distances between sites of temporary residency. There is also mounting evidence for common movement pathways between areas of temporary residency in Australian waters (Bruce & Bradford 2011b; Werry et al. 2012; Bruce & Bradford 2008; Bruce et al. 2006). However, their ability to return on a highly seasonal or more regular basis implies a degree of site fidelity that has implications for repeat interactions with site-specific threats (DEWHA 2009a). Research on site fidelity and residence patterns of white sharks in Australian waters has contributed to the identification of habitat critical for its recovery (Bruce & Bradford 2011a; Bruce & Bradford 2008; Bruce et al. 2005).

Grey nurse shark

Grey nurse sharks (*Carcharias taurus*) have a widespread, but disjunct, coastal distribution in temperate and subtropical waters worldwide (Last & Stevens 2009). In Australia, they are listed as two separate populations under the EPBC Act. The west coast population is listed as vulnerable, while the east coast population is listed as critically endangered. The extent to which the west coast population extends into South Australian waters has not been well established.. There are no population estimates for the west coast population; however commercial bycatch rates have been stable over time suggesting that this population has not undergone the significant declines as seen in the eastern population.

The diet of grey nurse sharks in Australia has not been well studied, but is likely to consist of species such as pilchards, jewfish, tailor, bonito, moray eels, wrasses, sea mullet, flathead, yellowtail kingfish, small sharks, squid and crustaceans (EA 2002a).

The species is found primarily in warm-temperate (from subtropical to cool-temperate) inshore waters around rocky reefs and islands and is occasionally found in the surf zone and in shallow bays (Pollard et al. 1996). Grey nurse sharks have been recorded at varying depths. They are commonly found between 15–40 m (Otway & Parker 2000), but have been recorded diving to depths of approximately 230 m (Otway and Ellis 2011). Localised, recurrent aggregations of grey nurse sharks are well documented for the eastern Australian population (Otway et al. 2003) with residency by some individuals at these sites occurring seasonally for periods of up to 30–40 days (Otway and Ellis 2011, Bruce et al. 2005). Reef areas with pronounced vertical and horizontal structure, including deep gutters, caves and large overhanging ledges, are favoured aggregation sites. Seasonal movements by grey nurse sharks vary in their spatial scale between sexes and by size in eastern Australia and for other areas of their distribution (Otway & Ellis 2011, Dicken et al. 2007). However, aggregation behaviour for the west coast population is not well understood and overall movements for the species within the South-west Marine Region are poorly documented relative to the eastern population. Aggregation sites have been reported from Roebuck Bay off Broome and in the vicinity of Exmouth, in the North-west Marine Region. Chidlow et al. (2006) identified a series of potential aggregation sites between Augusta and Exmouth, but failed to confirm the presence of grey nurse sharks at these sites, despite widespread reports of captures and sightings by fishers and divers. These authors suggest that grey nurse sharks either do not aggregate in the South-west Marine Region to the same extent as in eastern Australia, or that aggregation sites may primarily occur in deeper waters where they are less vulnerable to interactions with commercial fishing operations. A tracking study found that juveniles can move hundreds of kilometres north along the Western Australia coast, from Perth to Kalbarri, before returning south (McAuley 2004). The length of the migration indicates that grey nurse sharks do not need to stay close to what is considered their typical habitat, such as rocky ledges, gutters and caves (McAuley 2004).

Whale shark

Whale sharks (*Rhincodon typus*) are listed as vulnerable under the EPBC Act. It is a wide-ranging species with a broad distribution, usually observed between latitudes 30° N and 35° S in tropical and warm–temperate seas, both oceanic and coastal (Compagno 1984). The species is generally encountered close to or at the surface, as single individuals or occasionally in small groups or aggregations (Stevens 2007). Whale sharks. have occasionally been reported from the South-west Marine Region, including the western Great Australian Bight (Last & Stevens 2009). A well-studied aggregation site is located off Ningaloo Reef in the North-west Marine Region (Meekan et al. 2006). No whale shark aggregation areas have been identified in the South-west Marine Region and no interactions with the species, such as capture in fisheries, are known to occur in the region. As a result, whale sharks are not discussed further in this report card. Further information on whale sharks and threats to the species is available at **www.environment.gov.au/biodiversity/threatened/publications/recovery/r-typus**

Longfin mako shark

Longfin mako sharks (*Isurus paucus*) are listed as migratory under the EPBC Act. They are widely distributed but rarely encountered oceanic tropical sharks. In Australia, longfin mako sharks range from Geraldton (Western Australia) around the north coast to at least Port Stephens (New South Wales) (Last & Stevens 2009). The species is often confused with its slightly more slender-bodied relative, shortfin mako. They can grow to just over 4 m in length and are thought to feed on pelagic fish and cephalopods. Their relatively large eyes suggest it may feed at depth. Longfin mako sharks are rare in the South-west Marine Region and are not discussed further in this report card.

Shortfin mako shark

Shortfin mako sharks (*Isurus oxyrinchus*) are an oceanic and pelagic species, although they are occasionally seen inshore. Shortfin mako sharks are found throughout temperate seas but are rarely found in waters colder than 16 °C. Their diet consists mainly of bony fish and cephalopods (Last & Stevens 2009). They are listed as migratory under the EPBC Act and are being considered for listing as a threatened species.

Porbeagle shark

Porbeagle sharks (*Lamna nasus*) are listed as migratory under the EPBC Act. They are wide-ranging coastal and oceanic sharks. In Australian waters, porbeagle sharks are found off southern Australia from southern Queensland to southern Western Australia (Last & Stevens 2009). Porbeagle sharks can be confused with shortfin makos. Their diet consists mainly of bony fish and squid (Last & Stevens 2009).

School shark

School sharks (*Galeorhinus galeus*) are listed as conservation dependent under the EPBC Act. As suggested by their common name, school sharks are found in small schools composed predominately of one sex and size group (Last & Stevens 2009). School sharks occur throughout the temperate coastal waters of southern Australia, from Moreton Bay in southern Queensland to Perth (Pogonoski et al. 2002). However, recent records suggest that their distribution is confined to the area south of Bermagui (New South Wales) to east of Cape Leeuwin (Western Australia) (Last & Stevens 2009). School sharks move extensively throughout the waters of southern Australia and are known to make long migrations (up to 1 400 km) that appear to be associated with reproduction (Last & Stevens 2009). The species also makes movements on a diurnal basis, which are probably related to feeding. School sharks are found mainly in demersal waters, over the continental shelf and insular shelves, but also over the upper slopes, in depths from near shore to 600 m (Last & Stevens 2009). Inshore areas are particularly important as birthing and nursery sites (TSSC 2009a). Their diet consists of bony fish and cephalopods.

Biologically important areas

Biologically important areas are areas that are particularly important for the conservation of the protected species and where aggregations of individuals display biologically important behaviour such as breeding, foraging, resting or migration. The presence of the observed behaviour is assumed to indicate that the habitat required for the behaviour is also present. Biologically important areas have been identified for some EPBC Act listed species found in the South-west Marine Region, using expert scientific knowledge about species' distribution, abundance and behaviour in the region. The selection of species was informed by the availability of scientific information, the conservation status of listed species and the importance of the region for the species. The range of species for which biologically important areas are identified will continue to expand as reliable spatial and scientific information becomes available.

Behaviours that have been used to define biologically important areas for sharks in the South-west Marine Region include distribution (high density), foraging (abundant food source) and foraging (likely). The Great Australian Bight is likely to hold biologically important areas for school shark, but at this stage they have only been identified for the white shark. Biologically important areas are included in the South-west Marine Conservation Values Atlas (**www.environment.gov.au/cva**).

2. Vulnerabilities and pressures

Vulnerabilities

The life history strategies of sharks make them vulnerable to a range of pressures in the marine environment. In general, sharks show slow growth, late attainment of sexual maturity, low fecundity and a close stock-recruitment relationship. These characteristics mean that many sharks have a low reproductive potential and show a low rate at which populations, once they experience declines, can recover (Walker 1998). In the face of undetermined mortality levels from fishing and other anthropogenic sources, as well as the uncertainty in the status of shark populations, sound precautionary management is required to prevent population collapse and the maintenance of ecosystem function (Simpfendorfer et al. 2008). Listed species that occur within the South-west Marine Region are primarily at the lower level of productivity for sharks, and thus are particularly vulnerable to population declines.

Analysis of pressures

On the basis of current information, pressures have been analysed for the five sharks discussed in this report card. As the range of whale sharks does not extend substantially into the region, pressures on this species were not considered. A summary of the pressure analysis for sharks is provided in Table 1. Only those pressures identified as *of concern* or *of potential concern* are discussed in further detail below. An explanation of the pressure analysis process, including the definition of substantial impact used in this analysis, is provided in Part 3 and Section S1.1 of Schedule 1 of the plan.

Table 1: Outputs of the shark species pressure analysis for the South-west Marine Region

Note: To maintain uniformity among all bioregions, this table has been added subsequently to the review by independent experts.

Pressure	Source	Species				
		Grey nurse shark	Shortfin mako shark	Porbeagle shark	School shark	White shark
Sea level rise	Climate change					
Changes in sea temperature	Climate change					
Changes in oceanography	Climate change					
Ocean acidification	Climate change					
Chemical pollution/contaminants						
Nutrient pollution						
Changes in turbidity						
Marine debris	Aquaculture infrastructure Fishing boats Land-based activities Oil rigs Renewable energy infrastructure Shipping Urban development Vessels (other)					
Noise pollution						
Light pollution						
Physical habitat modification	Dredging (and/or dredge spoil) Telecommunications cables Urban/coastal development					
Human presence at sensitive sites	Tourism					
Nuisance species						
Extraction of living resources						
Bycatch	Commercial fishing Recreational and charter fishing					
Oil pollution						
Collision with vessels						
Collision/entanglement with infrastructure	Aquaculture infrastructure					
Disease						
Invasive species						

Legend of concern; of potential concern; of less or no concern

Sea level rise—climate change

This pressure is of *potential concern* to school sharks. Global sea levels have risen by 20 cm between 1870 and 2004 and predictions estimate a further rise of 5–15 cm by 2030, relative to 1990 levels (Church et al. 2009). Longer term predictions estimate increases of 0.5 to 1 m by 2100, relative to 2000 levels (Climate Commission 2011). The impacts of sea level rise are unlikely to be significant for deepwater species. However, those with important life history stages in inshore habitats, such as estuaries, may be affected. These include commercially important species such as school shark, which has nursery areas in inshore habitats (Hobday et al. 2007). School sharks are thought to occur in high concentrations on the inner shelf in Commonwealth waters adjacent to the Head of Bight. School sharks appear to use this relatively sheltered area of mixed seagrass, sand and limestone reef as nursery and feeding grounds.

Changes in sea temperature—climate change

Changes in sea temperature are of *potential concern* for all species assessed. Sea temperatures have warmed by 0.7 °C between 1910–1929 and 1989–2008, and current projections estimate ocean temperatures will be 1 °C warmer by 2030 (Lough 2009). It is likely that this warming is affecting the ranges and growth of temperate marine fishes (Booth et al. 2009). With these temperature increases, preferred habitat for a range of species, including sharks, is predicted to move southwards by an average of 3.5 degrees (about 390 km) along the west coast of Australia (Hobday et al. 2009).

Change in oceanography—climate change

Changes in the strength of the Leeuwin Current are *of potential concern* to white sharks, grey nurse sharks, porbeagle sharks and school sharks through changes in productivity, influencing the distribution and abundance of sharks. A number of productivity hotspots in the region may be affected by this; for example, the Western Eyre and Kangaroo Island upwelling. This upwelling of productivity supports Australia's largest population of sardines, which in turn supports large aggregations of predators. Changes to this productivity could significantly affect community structure and function (Hobday et al. 2009).

Ocean acidification—climate change

Ocean acidification is considered *of potential concern* for all species assessed. Driven by increasing levels of atmospheric carbon dioxide and subsequent chemical changes in the ocean, acidification is already underway and detectible. Since pre-industrial times, acidification has lowered ocean pH by 0.1 units (Howard et al. 2009). Furthermore, climate models predict this trend will continue, with a further 0.2–0.3 unit decline by 2100 (Howard et al. 2009).

There is a high level of uncertainty about the effects of ocean acidification on marine life. While some organisms might be able to adapt (Orr et al. 2009), anticipated changes to phytoplankton and zooplankton have the potential to detrimentally affect ecosystem processes and the structure of ecological communities. The potential effects of increased ocean acidity on shark and fish species are not well understood. It is believed that for some invertebrates and fish, accumulation of CO_2 in the body may result in morphological changes, and impact metabolic state, physical activity and reproduction (Orr et al. 2009). Effects on phytoplankton and zooplankton are also likely to disrupt trophic dynamics and affect fish species and communities.

Marine debris

Marine debris is recognised nationally as a key threatening process, and is considered here *of potential concern* to all species assessed through either ingestion or entanglement in debris. Entanglement of Australian sharks in derelict fishing gear has been observed on numerous occasions (Alderman et al. 1999 cited in DEWHA 2009b; Sloan et al. 1998), although few published records exist. Within the region, many shark species, including white sharks and school sharks, are exposed to areas where marine debris is located. However, it is unknown to what extent sharks interact with marine debris in the region. Marine debris is expected to increase as both marine- and land-based sources of debris intensify in the region.

Physical habitat modification

Habitat modification is of *potential concern* to school sharks, due to possible effects on juveniles, prey availability and quality of nursery and other biologically important habitats. Coastal marine habitats can be altered through activities such as dredging, installation of pipelines and outfalls, construction of piers, sewerage and industrial outlets, and land run-off. Research surveys of school shark nursery areas in Tasmania and Victoria have indicated a decline in abundance of pups between the 1950s and 1990s (McLoughlin 2007). School sharks depend on inshore nursery areas as habitat for females giving birth and for juveniles. Coastal development and human activity in adjacent waters are likely to have increased pollution and environmental degradation around these areas, and may be affecting the recovery capability of the species (McLoughlin 2007).

Bycatch

Bycatch is considered *of concern* for school and white sharks and *of potential concern* for shortfin mako, porbeagle and grey nurse sharks.

In Australia, the principal causes of shark mortality are captures by the commercial and recreational fishingindustries, where protected sharks are caught incidentally, or, in the case of mako sharks, where targeting by recreational fishers is permitted under an amendment to the EPBC Act. School sharks were listed in 2009 as conservation dependent under the EPBC Act. A rebuilding strategy is in place and while the species is currently not targeted (AFMA 2009a), some incidental catch is unavoidable by those fisheries in the region that target gummy shark. Effectiveness of reduction in bycatch allowable catch is as yet unknown as it is likely to take several years before increases in the stock can be detected. Consequently, evidence of management effectiveness is at present inconclusive.

Incidental bycatch of white sharks has been reported in a number of shark fisheries and occasionally in crab trap and rock lobster pot ropes and in demersal trawls (DEWHA 2008). White sharks are also accidentally taken on recreational lines, droplines and longlines. Studies indicate that there are more interactions between white sharks and fishing activities along the west coast of Western Australia (from Shark Bay to Bunbury) and in the Great Australian Bight than in other areas of Australia (Malcolm et al. 2001). Whether the species is recovering is unknown given the lack of data on the population size and structure; consequently, the effectiveness of management measures is not fully understood.Bycatch mortality continues to be *of concern* for this species until evidence of management effectiveness is conclusive.

The Australian Fisheries Management Authority's ecological risk assessment identifies shortfin mako sharks as high-risk in the demersal gillnet fishery (AFMA2010). Porbeagle sharks are caught as byproduct in pelagic longline fisheries in the region, although the numbers caught are low due to reductions in long-line effort since the late 1990s. The overall significance of bycatch mortality from the region for mako and porbeagle sharks is unknown . Targeted commercial fishing of these species is prohibited. They may be retained as bycatch if caught in accordance with approved management arrangements, but if landed alive they must be returned to the water. Recreational targeting of shortfin mako, longfin mako and porbeagle sharks is permitted under amendments to the EPBC Act legislated in July 2010. The amendment allows recreational fishers, including charter boat operators and game fishers, to legally catch these species as was permitted before their listing under the EPBC Act in January 2010.

Grey nurse sharks are incidentally caught in commercial demersal nets, droplines and other line fishing gear. The main cause of mortality in grey nurse sharks has been incidental capture in demersal gillnet fisheries operating in the region (Chidlow et al. 2006; Pollard et al. 2003). Records from the mid-1990s indicated that grey nurse sharks were commonly distributed across the area and the population was stable (the west coast population was not subjected to the severe fishery-related declines experienced by the east coast population and populations elsewhere in the world). Reporting of incidental catches, however, ceased in 1997 following listing of the species as vulnerable under the EPBC Act, and thus there is some uncertainty about the ongoing status of the west coast population (Chidlow et al. 2006). Reductions in commercial shark fishing effort within the South-west Marine Region, the presence of large areas of unfished ground which offer potential refugia to the species and the lack of clear aggregation sites within fished areas where sharks may be more susceptible to incidental capture, suggest that the species is unlikely to be exposed to the same level of threat identified for the east coast population. However, while the population is likely to be stable, the inherent vulnerability of the species to population declines and the limited understanding of the west coast population level and structure warrants that the population status is regularly reviewed (Chidlow et al. 2006).

Human presence at sensitive sites

Human presence at sensitive sites is *of potential concern* for the white shark. Regular interactions with white sharks occur in response to burleying by shark-cage diving tourism operators at the Neptune Islands in South Australia, which are in waters adjacent to the South-west Marine Region. The Neptune Islands supports the largest aggregations of pinnipeds in Australian waters of which the majority reside at the North Neptune Islands (Shaughnessy & Mckeown 2002) and white sharks commonly visit the area to feed. Increases in periods of residency and in the duration and the timing of visits by sharks to the area which are consistent with responses to burleying have been documented (Bruce & Bradford 2011b). Management of industry activities is under review to reduce the level of impact on shark behaviour.

Collision or entanglement with infrastructure

Collision or entanglement with infrastructure is *of potential concern* for the white shark, particularly with respect to interactions with aquaculture ropes and nets, which may result in entanglement and drowning (Trinder 2006). White sharks are the only protected species of shark recorded in and around tuna pens in South Australia. White sharks are known to become entangled in nets or to enter aquaculture cages in search of food, posing a risk to stock and cage operators. Malcolm et al. (2001) estimated that interaction with aquaculture infrastructure resulted in up to 20 white shark deaths per year, the significance of which is not understood given the uncertainty about white shark population levels and structure. Releasing sharks after they have entered aquaculture cages has had some success both internationally (Galaz & De Maddalena 2004) and in South Australian waters.

3. Relevant protection measures

While there are some differences in the protective management measures in place for species listed under different categories, under the EPBC Act in general it is an offence to kill, injure, take, trade, keep, or move listed marine, migratory or threatened species[1] on Australian Government land or in Commonwealth waters without a permit. A legislative amendment to the EPBC Act in 2010 provides for the recreational fishing of shortfin mako, longfin mako and porbeagle sharks in Australian waters.

Alongside the EPBC Act, a broad range of sector-specific management measures to address environmental issues and mitigate impacts apply to activities that take place in Commonwealth marine areas. These measures give effect to regulatory and administrative requirements under Commonwealth and state legislation for activities such as commercial and recreational fishing, oil and gas exploration and production, ports activities and maritime transport. In some instances, as in the case of shipping, these measures also fulfil Australia's obligations under a number of international conventions for the protection of the marine environment from pollution and environmental harm.

Protection and conservation measures administered under the EPBC Act that are relevant to the conservation values described in this Report Card are listed below.

EPBC Act conservation plans and action plans

- White Shark (*Carcharodon carcharias*) Recovery Plan (EA 2002b)
- Draft White Shark Recovery Plan (DEWHA 2009c)
- Recovery Plan for the Grey Nurse Shark (*Carcharias taurus*) in Australia (EA 2002a)
- Whale Shark (*Rhincodon typus*) Recovery Plan 2005–2010 (DEH 2005)
- Addendum to the School Shark Rebuilding Strategy 2008 (TSSC 2009b)
- Conservation Overview and Action Plan for Australian Threatened and Potentially Threatened Marine and Estuarine Fishes (Pogonoski, Pollard & Paxton 2002)
- Threat Abatement Plan for the Impacts of Marine Debris on Vertebrate Marine Life (DEWHA 2009b).

1 This does not apply to conservation dependent species (see Section 196 of the EPBC Act).

International measures

Australia is a signatory to the following international agreements for the conservation of sharks:

- Convention on International Trade in Endangered Species of Wild Fauna and Flora 1975 (CITES)—**www.cites.org**
- Convention on the Conservation of Migratory Species of Wild Animals 1979 (CMS)—**www.cms.int**
- Memorandum of Understanding on the Conservation of Migratory Sharks—**www.cms.int/species/sharks/MoU/Migratory_Shark_ MoU_Eng.pdf**
- International Plan of Action for the Conservation and Management of Sharks 1999 (IPOA-Sharks)—**ftp://ftp.fao.org/docrep/fao/006/x3170e/X3170E00.pdf**.

For more information on conservation listings under the EPBC Act, and related management objectives and protection measures, visit the following sites:

- **www.environment.gov.au/epbc/protect/species-communities.html** (listed threatened species)
- **www.environment.gov.au/epbc/protect/migratory.html** (listed migratory species)
- **www.environment.gov.au/cgi-bin/sprat/public/sprat.pl** (species profile and threats database).

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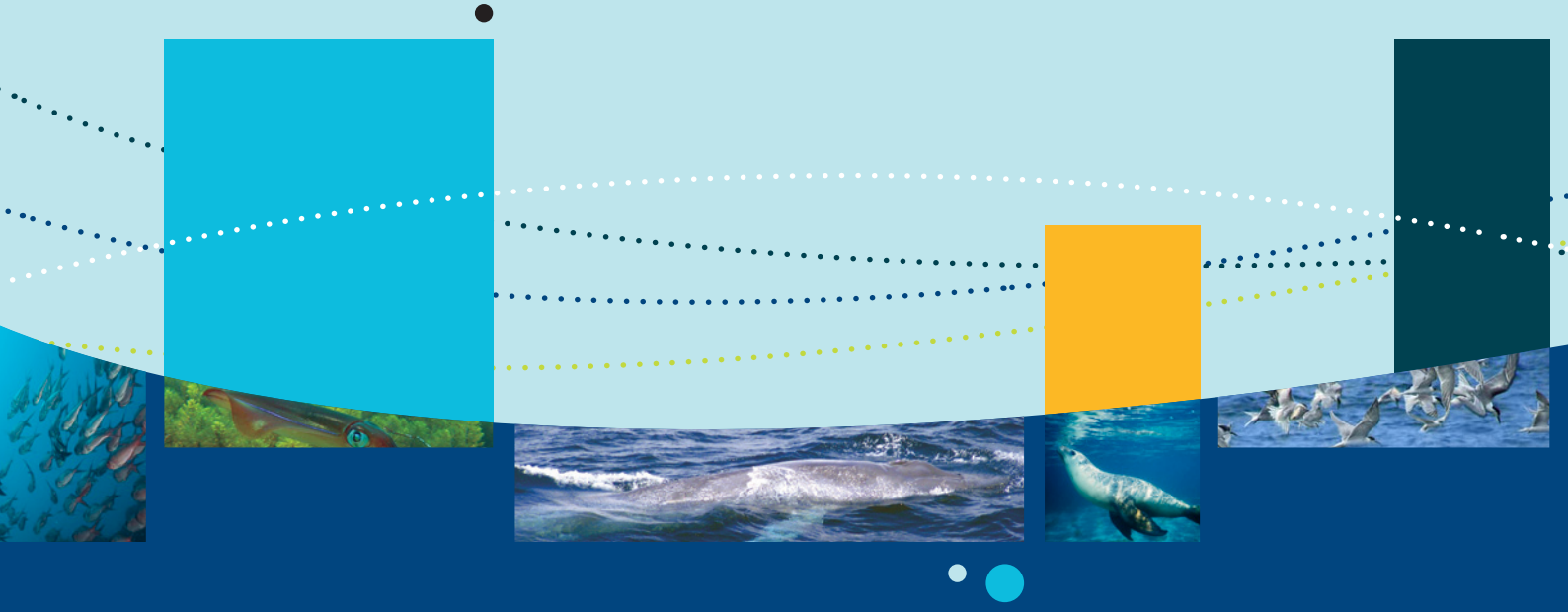
ATTACHMENT 1: LISTED SHARKS KNOWN TO OCCUR IN THE SOUTH-WEST MARINE REGION

Table A1: Listed shark species known to occur in the South-west Marine Region

Species (common name/ scientific name)	Conservation status
White shark (*Carcharodon carcharias*)	Vulnerable, migratory—listed under CITES (Appendix II) and CMS (Appendix I)
Whale shark (*Rhincodon typus*)	Vulnerable, migratory—listed under CITES (Appendix II) and CMS (Appendix II)
Shortfin mako (*Isurus oxyrinchus*)	Migratory—listed under CMS (Appendix II)
Longfin mako (*Isurus paucus*)	Migratory—listed under CMS (Appendix II)
Porbeagle shark (*Lamna nasus*)	Migratory—listed under CMS (Appendix II)
School shark (*Galeorhinus galeus*)	Conservation dependent
Grey nurse shark (*Carcharias taurus*) west coast population	Vulnerable

CITES = Convention on International Trade in Endangered Species of Wild Fauna and Flora;
CMS = Convention on the Conservation of Migratory Species of Wild Animals



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