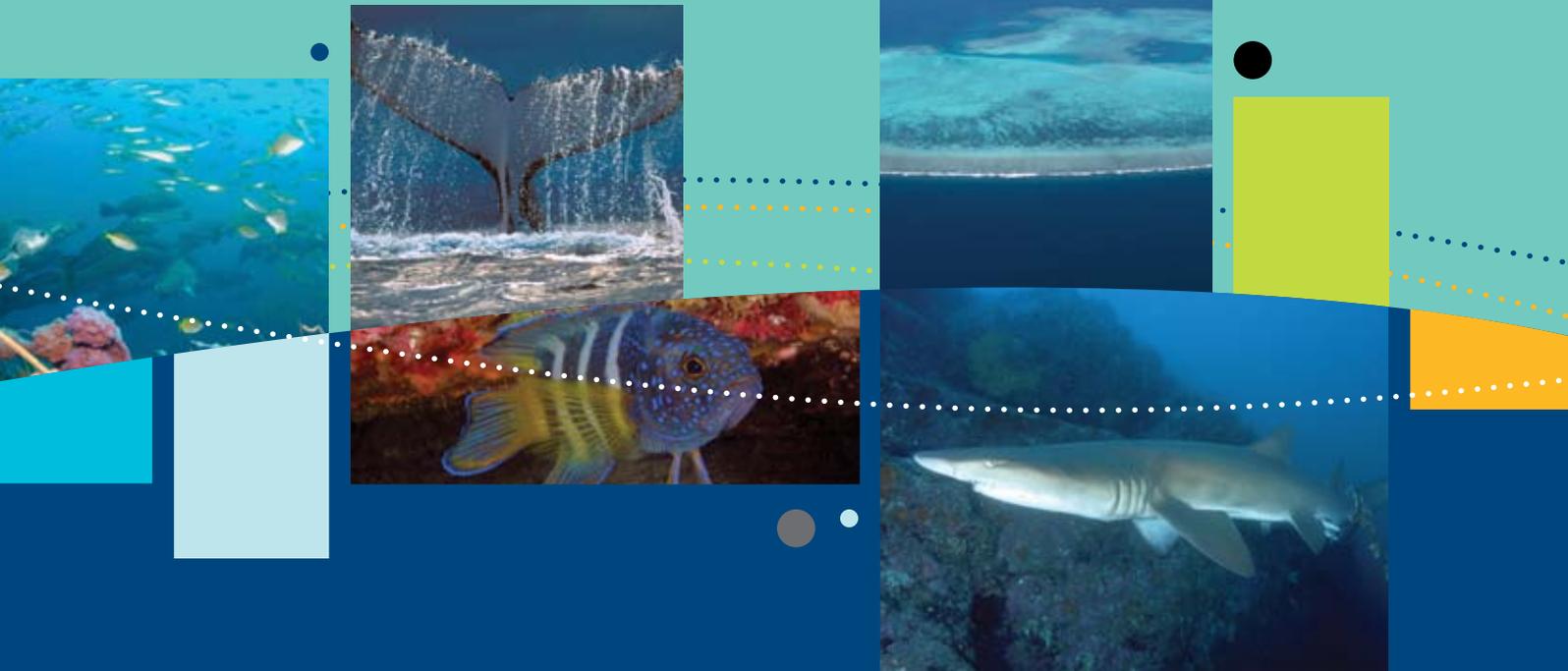




Australian Government

**Department of Sustainability, Environment,
Water, Population and Communities**



Species group report card – sharks

Supporting the marine bioregional plan
for the Temperate East Marine Region

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

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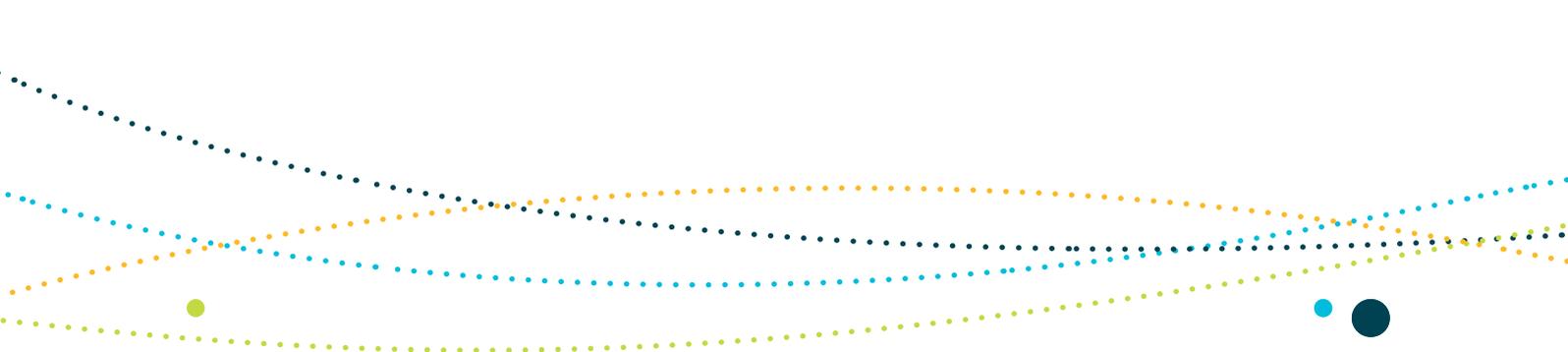
Images:

Grey Nurse Shark – M.Spencer, Pimpnel Rock, Solitary Islands – D.Harasti, Middleton Reef from air – Director of National Parks, Whale tail – D.Paton, Blue Devil – D.Harasti, A Green turtle swims over sand along the edge of reef platform – GBRMPA, Olive sea snake searching for food over coral and algae – GBRMPA, Runic wreck on Middleton Reef – Director of National Parks, Black-browed Albatross – M.Double, Acropora species – R.Chesher Ph.D



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SPECIES GROUP REPORT CARD—SHARKS

Supporting the marine bioregional plan for the Temperate East Marine Region prepared under the *Environment Protection and Biodiversity Conservation Act 1999*

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.





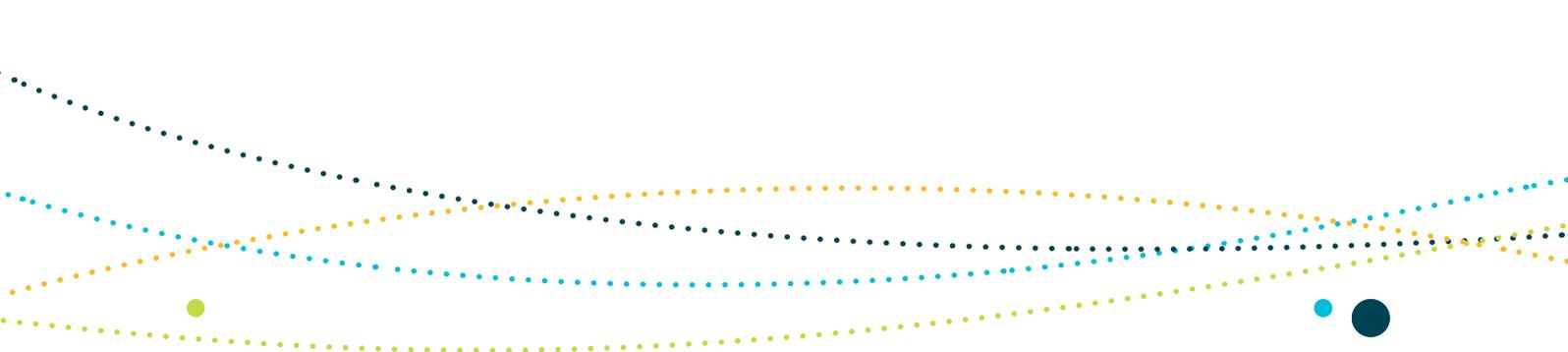
Species group report cards

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 Temperate East Marine Region

The Temperate East Marine Region and its adjacent state waters are known to play an important role for many shark species, providing key breeding, feeding and aggregation grounds. Grey nurse sharks are found on the continental shelf, aggregating around inshore rocky reefs or islands and occasionally venturing off the continental shelf (Dicken 2006; Last & Stevens 2009; Otway & Burke 2004). Wider ranging, pelagic species shortfin and longfin mako and porbeagle sharks are more at home in the offshore oceanic waters, utilising productivity hotspots generated by currents and eddies as key feeding sites. As well as habitat use, diet is another important distinction that can be made within the shark group. Some species, such as the whale sharks are plankton feeders whilst others like the white shark are top-order predators feeding on a range of prey items including smaller sharks, birds and marine mammals.

This report card provides information on six shark species known to occur in the Temperate East Marine Region; two other species may infrequently occur in the region (see Attachment 1). A further two species, the southern and Harrison's dogfish species, are currently undergoing assessment for potential listing under the Act.

The selection of species for discussion in this report card was made with consideration given to their conservation status, distribution and population structure within the region, life history characteristics and the potential for the population(s) in the region to be genetically distinct from populations elsewhere.

Six species of shark listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) are known to occur in the Temperate East Marine Region; two other species may infrequently occur in the region (see Attachment 1). In addition to these listed species, two species are currently undergoing assessment for potential listing (Harrison's dogfish and southern dogfish).

This report card considers the six species known to occur in the region (see Attachment 1). These species were selected with consideration given to their conservation status, distribution and population structure within the region, life history characteristics and the potential for the population(s) in the region to be genetically distinct from populations elsewhere.

Grey nurse shark

The grey nurse shark (*Carcharias taurus*) is 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 east coast population, estimated to be between 1146 and 1662 individuals (Cardno Ecology Lab 2010), is found between the Capricornia coast off central Queensland to Narooma in southern New South Wales, although records from locations further north and south do exist. Only the east coast population is discussed in this report card.



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. They have been recorded at varying depths down to 230 metres, but are most commonly found between 15 and 40 metres (Otway & Parker 2000). Critical habitats and key aggregation sites exist adjacent to the region in New South Wales and southern Queensland state waters, as well as several in Commonwealth waters at the Cod Grounds and Solitary islands. These regular aggregation sites may play an important role in pupping and/or mating activities.

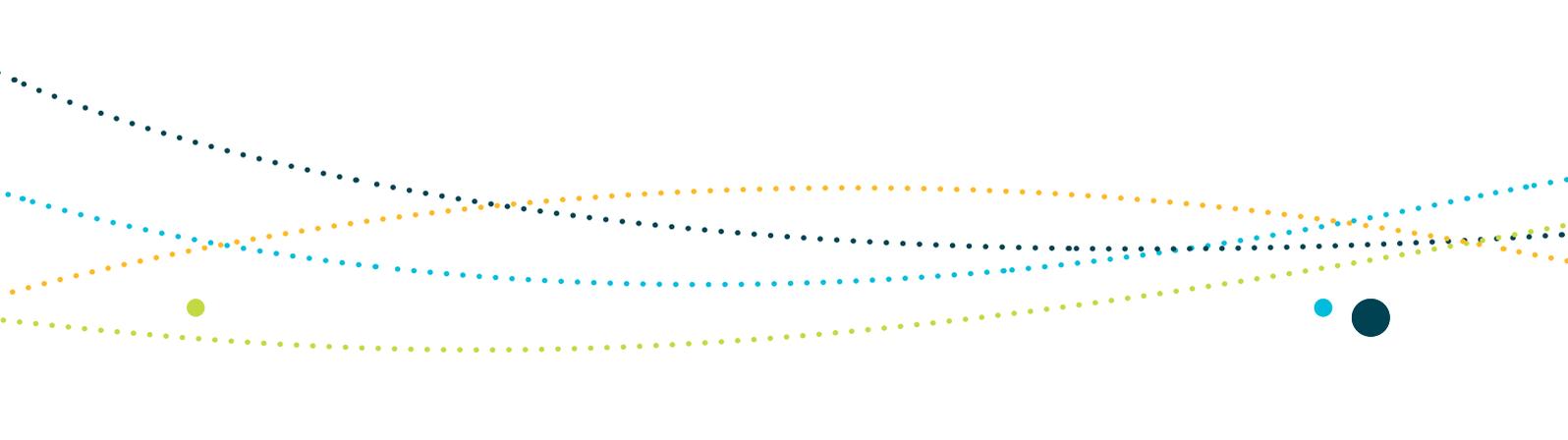
The eastern population migrates within its range, making seasonal north–south movements to form aggregations at critical habitat sites, thought to be related to breeding (Bansemer & Bennett 2008). At certain times of the year, it is thought that the species aggregates according to sex. A northerly migration to the Capricorn channel off Yeppoon of mature males has been observed over autumn–winter. Males predominate in southern Queensland waters during July and October, while a high proportion (77.4 per cent) of the catch from bather protection programs off central New South Wales during the same period is of females. Female are also known to head south over summer and migrate north in winter to meet males for reproduction along the east coast. Immature and mature male grey nurse sharks, and immature female are known to migrate to southern New South Wales.

Adult grey nurse sharks feed on a wide range of fish, other sharks and rays, squids, crabs and lobsters (Compagno 1984; Otway et al. 2003; Smale 2005).

White shark

White sharks (*Carcharodon carcharias*) are widely distributed throughout temperate and subtropical regions, and are known to range southwards from central–southern Queensland (Bruce et al. 2006; Last & Stevens 2009). Although capable of crossing ocean basins, the species is typically found from close inshore habitats (e.g. rocky reefs and shallow coastal bays) to the outer continental shelf and slope areas. Within Australian waters, the majority of recorded shark movements occur between the coast and the 100 metre depth contour (Bruce & Bradford 2008; Bruce et al. 2006). Both adults and juveniles have been recorded diving to depths of 1000 metres.

The region supports a population that is thought to move seasonally along the south and east Australian coasts, moving northerly along the east coast during autumn and winter, and returning to southern Australian waters by early summer (Bruce et al. 2006). There are currently no 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).



The species is not site-specific—individuals travel between sites of temporary residency, sometime covering great distances. Recent evidence suggests that these routes between residency sites may be common movement pathways for multiple individuals (Bruce & Bradford 2008; Bruce et al. 2006). Typically, these sites coincide with regions of high prey density or are sites where other prey species aggregate. White sharks eat a variety of prey, including fish, other sharks and rays, marine mammals, squid and crustaceans (DEWHA 2009a). Their diet is known to change between their juvenile and adult years. Within the region, the Stockton Beach–Hawks Nest region of New South Wales and Fraser Island, Queensland, are known aggregation areas for juvenile white sharks (Bruce & Bradford 2008). The location of pupping grounds is currently unknown (Bruce 2008).

Whale shark

Whale sharks (*Rhincodon typus*) are a migratory, planktonic feeder known to make seasonal movements that are associated with prey pulses, ocean circulation and water temperatures (Last & Stevens 2009). They have a widespread distribution occurring within both oceanic and coastal waters from the tropics to the cooler, temperate zone (Last & Stevens 2009). Although capable of diving to great depths (at least 980 metres), they are more commonly seen at, or close to, the surface (Wilson et al. 2006). Within the region, their distribution is poorly understood.

Typically, whale sharks are solitary although occasional aggregations (100+ individuals) have been recorded. Whale shark populations also appear to be spatially and seasonally segregated according to size and sex; for example, coastal aggregations at Ningaloo, and seasonal aggregations in the adjacent waters of the Coral Sea between November and December. It is unknown when and where whale sharks breed.

Porbeagle

The porbeagle (*Lamna nasus*) is a wide-ranging shark inhabiting the subtropical and temperate waters of the North Atlantic and Southern Hemisphere. In Australia, it occurs from southern Queensland to south-west Australia (Last & Stevens 2009), typically in oceanic waters on the continental shelf, although it is occasionally found in coastal waters. The porbeagle is known to use the water column to depths of at least 1360 metres (Campana et al. 2010). The species undertakes extensive seasonal migrations. In the North Atlantic, mature females have migrated to nursery areas in subtropical waters (Campana et al. 2010). Little data exists for Southern Hemisphere populations, although they are thought to give birth off New Zealand and Australia in winter (Francis & Stevens 2000). Porbeagles are also known to segregate populations by size and sex. They feed mainly on teleost fish and squid (Last & Stevens 2009).



Shortfin mako

The shortfin mako (*Isurus oxyrinchus*) is an oceanic species that occurs worldwide in tropical and temperate seas (rarely in waters less than 16 °C), using the water column from the surface to at least 888 metres (Abascal et al. 2011; Last & Stevens 2009). It is widespread in Australian waters, including off the east coast, but is not found in the Arafura Sea, Gulf of Carpentaria or Torres Strait (Last & Stevens 2009). It feeds mainly on teleost fish and cephalopods, with larger individuals known to take billfish and small cetaceans (Last & Stevens 2009; Stevens 1984). Young are born off New South Wales around November (Stevens 1983).

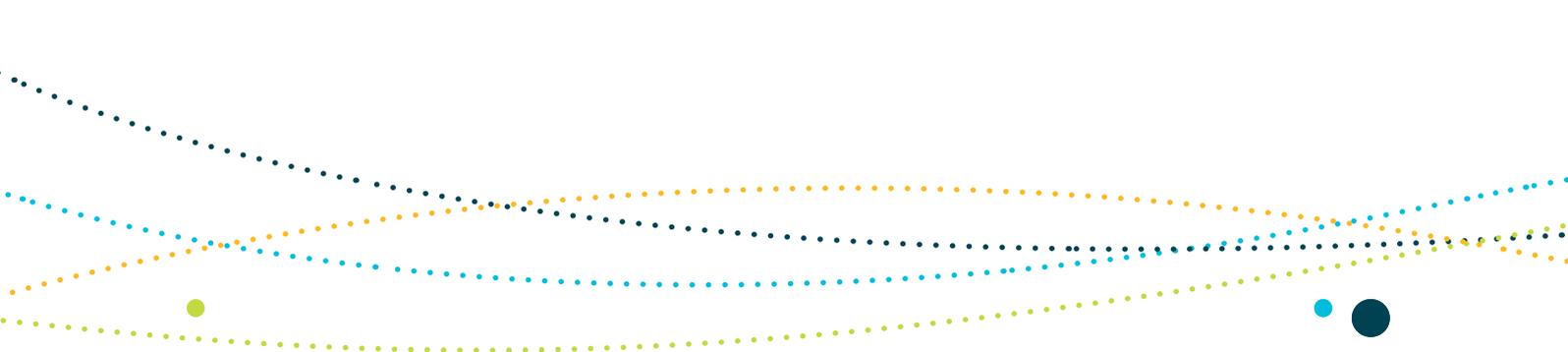
Longfin mako

The longfin mako (*Isurus paucus*) is an epipelagic species with a usual depth range between 120 and 240 metres (Ebert 2003). Like the shortfin mako, it also has a worldwide distribution in tropical and warm temperate seas but is rarely encountered. Within the region, it is known to occur south to at least Port Stephens in New South Wales (Last & Stevens 2009). However, its exact range is difficult to determine due to confusion with the shortfin mako. Longfin mako sharks were only confirmed from Australian waters in 1995, with north-eastern waters considered a locally important region (Stevens & Scott 1995). It is thought to feed on pelagic fish and cephalopods, and its relatively large eyes suggest it may feed at depth (Last & Stevens 2009). In the North Atlantic, females give birth in winter (Gilmore 1993).

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 Temperate East 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.

Biologically important areas have been identified for the grey nurse and white shark species. Behaviours used to identify biologically important areas for sharks in the region include juvenile aggregation, breeding, foraging and migration. Biologically important areas are included in the Temperate East Marine Region Conservation Values Atlas (www.environment.gov.au/cva).



2. Vulnerabilities and pressures

Vulnerabilities

The life history characteristics 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 and low fecundity. For example, white sharks are long lived, with estimates ranging up to 40–60 years (Bruce 2008). They have relatively slow development, a low reproductive rate and a long gestation period, estimated at up to 18 months (Mollet et al. 2000).

The grey nurse shark displays a rare reproductive strategy called intrauterine cannibalism, whereby embryos feed on other embryos, thus reducing the overall reproductive output. The low reproductive potential of many sharks has implications for the vulnerability of these species to anthropogenic mortality and the rate at which populations, once they experience declines, can recover. The specialist diet of the planktivorous whale shark exposes this species to a higher degree of vulnerability.

Analysis of pressures

On the basis of current information, pressures have been analysed for six shark species discussed in this report card. 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. An explanation of the pressure analysis process, including the definition of substantial impact used in this analysis, is provided in Part 3 and Section 1.1 of Schedule 1 of the plan.



Table 1: Outputs of the shark species pressure analysis for the Temperate East Marine Region

Pressure	Source	Species					
		Whale shark	Grey nurse shark	White shark	Shortfin mako shark	Longfin mako shark	Porbeagle shark
Sea level rise	Climate change	Grey	Grey	Grey	Grey	Grey	Grey
Changes in sea temperature	Climate change	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
Change in oceanography	Climate change	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
Ocean acidification	Climate change	Grey	Green	Grey	Grey	Grey	Grey
Chemical pollution/contaminants	Shipping Vessels (other)	Green	Green	Green	Green	Green	Green
	Urban development Agricultural activities	Grey	Grey	Grey	Grey	Grey	Grey
Nutrient pollution	Urban development Agricultural activities	Grey	Grey	Grey	Grey	Grey	Grey
	Shipping Vessels (other) Fishing boats Land-based activities	Green	Green	Green	Green	Green	Green
Noise pollution	Seismic exploration	Grey	Grey	Grey	Grey	Grey	Grey
	Shipping Vessels (other)	Grey	Grey	Green	Grey	Grey	Grey
	Urban development	Grey	Grey	Grey	Grey	Grey	Grey
Light pollution	Land-based activities	Grey	Grey	Grey	Grey	Grey	Grey
	Shipping Vessels (other)	Grey	Grey	Grey	Grey	Grey	Grey
Physical habitat modification	Dredging Dredge spoil	Grey	Grey	Grey	Grey	Grey	Grey
	Fishing gear	Grey	Grey	Grey	Grey	Grey	Grey
Human presence at sensitive sites	Tourism Recreational and charter fishing Research	Grey	Yellow	Grey	Grey	Grey	Grey

Legend ■ of concern ■ of potential concern ■ of less concern ■ not of concern

Table 1 continued: Outputs of the shark species pressure analysis for the Temperate East Marine Region

Pressure	Source	Species					
		Whale shark	Grey nurse shark	White shark	Shortfin mako shark	Longfin mako shark	Porbeagle shark
Extraction of living resources	Commercial fishing (domestic)	Grey	Grey	Grey	Yellow	Green	Green
	Commercial fishing (non-domestic)	Green	Grey	Yellow	Yellow	Yellow	Yellow
	Recreational and charter fishing	Grey	Grey	Grey	Green	Green	Green
	Indigenous harvest	Grey	Grey	Grey	Grey	Grey	Grey
	Illegal, unregulated and unreported fishing (non-domestic)	Green	Grey	Grey	Yellow	Yellow	Grey
	Illegal, unregulated and unreported fishing (domestic)	Green	Green	Yellow	Green	Green	Green
Bycatch	Commercial fishing (domestic)	Grey	Red	Yellow	Grey	Grey	Grey
	Recreational and charter fishing	Grey	Red	Red	Green	Green	Green
Oil pollution	Shipping Vessels (other)	Green	Green	Green	Green	Green	Green
	Oil rigs	Grey	Grey	Grey	Grey	Grey	Grey
Collision with vessels	Shipping	Grey	Grey	Grey	Grey	Grey	Grey
	Tourism Fishing	Grey	Grey	Grey	Grey	Grey	Grey
Invasive species	Shipping	Grey	Grey	Grey	Grey	Grey	Grey
	Fishing vessels Land-based activities	Grey	Grey	Grey	Grey	Grey	Grey

Legend ■ of concern ■ of potential concern ■ of less concern ■ not of concern



Changes in sea temperature—climate change

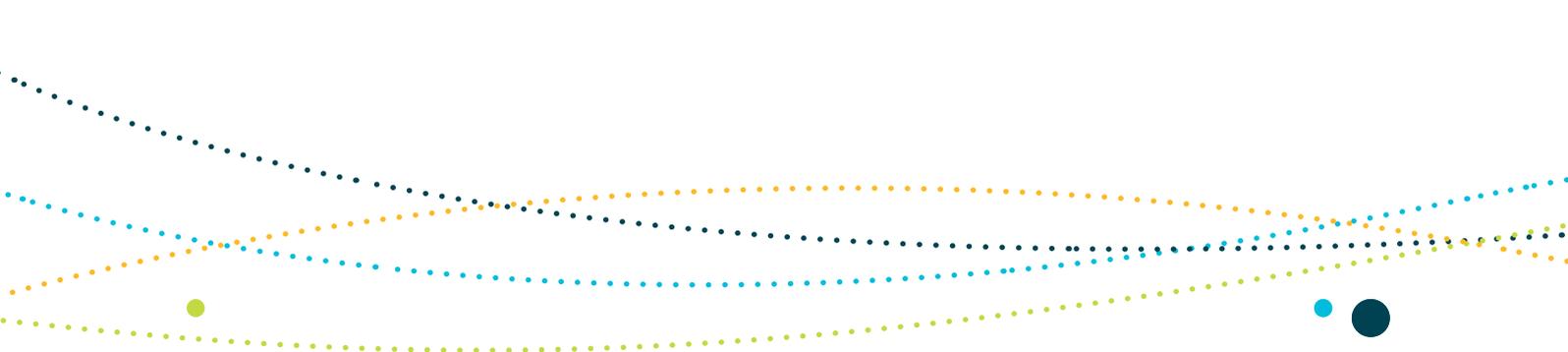
A change in sea temperature associated with climate change has been assessed as *of potential concern* for the all six shark species. Sea temperatures have warmed by 0.7 °C between 1910–1929 and 1989–2008, and current projections estimate ocean temperatures will be 1 °C warmer by 2030 (Lough 2009). For sharks, increasing temperatures may result in changes in metabolism, behaviour and movement patterns (Chin & Kyne 2007).

In a climate change vulnerability assessment in the Great Barrier Reef region, the grey nurse shark was assessed as having high exposure levels to the effects of rising temperatures and was ranked as moderately vulnerable to this pressure (Chin et al. 2010). In the same assessment, white sharks were assessed as having a moderate exposure to the effects of rising temperatures and ranked as moderately vulnerable to this pressure (Chin et al. 2010). For white sharks, a further implication of rising temperatures is the potential change in abundance and distribution of prey species, which in turn can influence the species' distribution and behaviour. Other oceanic, migratory species (e.g. mako and porbeagle) are likely to be similarly affected. Prey distributions are also a potential concern for whale sharks, as modelling studies predict that ocean warming will cause large southward shifts in the distribution of many tropical and subtropical zooplankton (Hobday et al. 2006). As specialist planktivores, these changes may influence the distribution of whale sharks both within the region and beyond, including annual migration patterns.

Changes in oceanography—climate change

Changes in oceanography related to climate change were assessed as *of potential concern* for all six shark species. Oceanographic changes in the region will be primarily driven by the East Australian Current. Studies indicate this major boundary current has been strengthening, pushing warmer, saltier water further southward along the east coast, up to 350 kilometres (Ridgway & Hill 2009). There will also be associated circulation effects from expected changes to the El Niño–Southern Oscillation. A range of potential consequences for ocean circulation patterns arising from these changes include alterations to current locations and directions, changes to upwelling events, increased thermal stratification and eddy activity (Chin et al. 2010). These changes are likely to impact productivity, resulting in shifts in trophic webs and migration patterns, and possible changes to reef and shelf habitats, all of which have implications for shark species (Chin et al. 2010).

A climate change vulnerability assessment of sharks in the Great Barrier Reef region indicates that white sharks have a high exposure and vulnerability to oceanographic change (Chin et al. 2010). Other migratory species (e.g. makos and porbeagle) are likely to be impacted by altered upwelling and eddy events. As a specialist plankton feeder, whale sharks are also considered to have a high exposure and vulnerability due to expected implications for the abundance and location of plankton populations (Chin et al. 2010).



Human presence at sensitive sites—tourism

Human presence at sensitive sites related to tourism (e.g. recreational diving) was assessed as *of potential concern* for the grey nurse shark. Critical aggregation sites for grey nurse sharks off south-east Queensland and New South Wales are popular recreational diving locations, and these sharks are a major drawcard for divers at many of the sites (Pollard et al. 1996). There is potential for interactions between divers and grey nurse sharks, and both states have diving regulations in place that aim to limit the adverse effects of divers on sharks, particularly diver harassment of the animals. Smith et al. (2010) found that divers were generally compliant with the regulations. They also found that in the presence of six or more divers sharks milled less, and that the frequency of behaviours like jaw gaping, rapid withdrawal and stiff or jerky movements were associated with the distance between divers and sharks. Pollard et al. (1996) also reported that larger numbers of divers can cause aggregations to disperse. As recreational diving continues to grow in popularity, so does the potential for negative impacts at sensitive grey nurse shark sites.

Extraction of living resources—commercial fishing (domestic)

Extraction of living resources related to Australian domestic commercial fishing was assessed as *of potential concern* for shortfin mako. Targeted commercial fishing for shortfin mako is prohibited in Commonwealth waters. Individuals can be retained as byproduct if they are dead upon capture but must be released if they are alive. The shortfin mako is considered at high risk from interactions with commercial fishing, in particular, Commonwealth-managed gillnet and longline fisheries (Patterson & Tudman 2009). Furthermore, the species is often retained as byproduct. Since their migratory listing in 2010, there has been a 30 per cent reduction in the level of byproduct and a number of management arrangements are in place. Nonetheless, they remain susceptible to capture and will likely to continue to be impacted by the Commonwealth fisheries operating in the region.

Extraction of living resources—commercial fishing (non-domestic)

Extraction of living resources related to non-domestic commercial fishing was assessed as *of potential concern* for white shark, porbeagle, and shortfin and longfin mako. All are highly migratory oceanic species that cross over the region's exclusive economic zone boundary, where they will be potentially exposed to non-domestic commercial fisheries targeting sharks for their meat and fins. This pressure is recognised to be devastating northern Australian shark populations and although Temperate East populations are not expected to interact with this pressure to the same extent, it nonetheless has the potential to significantly impact them (Lack & Sant 2008).



Extraction of living resources—illegal, unregulated and unreported fishing (non-domestic)

Extraction of living resources related to non-domestic illegal, unregulated and unreported (IUU) fishing was assessed as *of potential concern* for the shortfin and longfin mako. Although the full extent of IUU fishing for these species is largely unquantified, they are considered to be among the most vulnerable shark species to this pressure (Lack & Sant 2008; Putt & Anderson 2007), and an important component of the international shark fin trade (Clarke et al. 2006). It is likely that all non-domestic IUU take, both within and beyond Australian waters, may impact on populations of makos within the region.

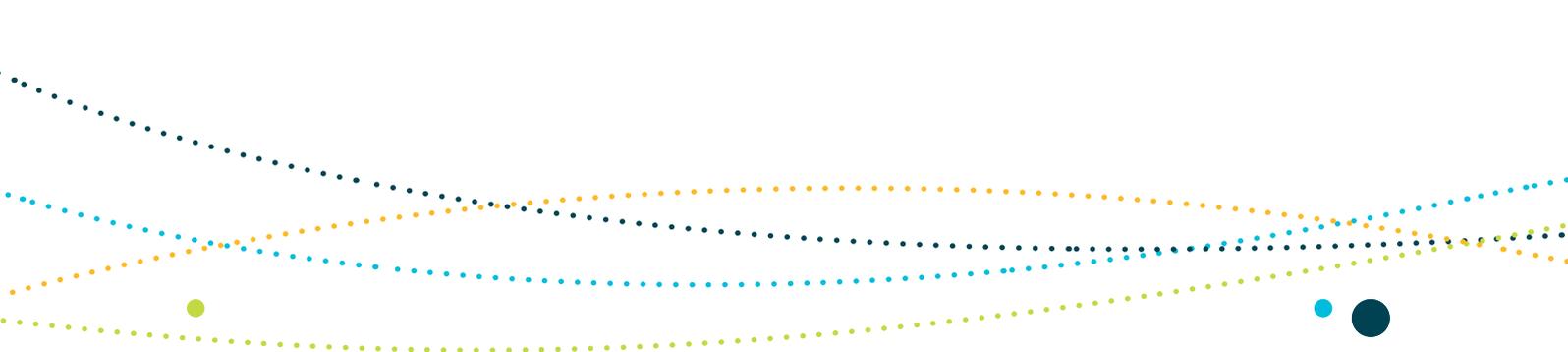
Extraction of living resources—illegal, unregulated and unreported fishing (domestic)

Extraction of living resources related to domestic IUU fishing was assessed as of potential concern for the white shark. The illegal capture of white sharks by Australian fishers (commercial and recreational) and the subsequent illegal trade in white shark products are considered threats to this species in Australian waters (DEWHA 2009a; DEWHA 2010). White shark products demand high prices and despite stricter regulations implemented at both national and international levels, they continue to provide incentive for this illegal trade (DEWHA 2009a). Of further concern is that larger individuals are targeted, which may compound the long-term impacts on populations (DEWHA 2009a).

Bycatch—commercial fishing (domestic)

Bycatch in Australian domestic commercial fisheries was assessed as *of concern* for the grey nurse shark and *of potential concern* for white sharks.

For the grey nurse shark (eastern population), bycatch is a key threat to the population's viability (EA 2002b). Numerous reports of individuals with fishing gear trailing from their mouth suggest a high rate of interaction with fishing activities (both recreational and commercial) (Bansemmer & Bennett 2010). The retained fishing gear has included gear types commonly used in longline operations, and includes large hooks that may have been used to target sharks, and ropes tied around the caudal peduncle that may have been used to release sharks post-capture (Bansemmer & Bennett 2010). The exact bycatch mortality figures for the grey nurse shark are unknown; however, in a number of reported incidents, the incidental capture resulted in death. Given the low population size of the species and its conservation status, this pressure may have a significant impact on the species in the region.



For white sharks, bycatch occurring in commercial fisheries is considered to be a direct threat to populations (DEWHA 2010). Individuals are susceptible to being hooked on longlines, and caught in the nets of commercial fishers and in aquaculture cages (e.g. in tuna farms) (DEWHA 2010). In addition, there is evidence to suggest that significant levels of under-reporting of bycatch occurs (DEWHA 2009a). Given their largely inshore distribution in the region, interactions with Commonwealth-managed fisheries, such as the Eastern Tuna and Billfish Fishery, are limited (Bruce & Bradford 2008).

Bycatch—recreational and charter fishing

Bycatch associated with recreational and charter fishing activities was assessed as *of concern* for the grey nurse shark and white shark. Although recreational take of these species is prohibited in both state and Commonwealth waters, bycatch from this sector remains a potential problem. The region has one of the largest numbers of recreational fishers in Australia (DEWHA 2009b), and growth is projected for the recreational boating sector (Bay Journal 2008; MSQ 2011). Furthermore, improvements in technology and larger boats are likely to increase the overlap between fishing activities and species of conservation concern in the Temperate East Marine Region.

There are numerous reports of grey nurse sharks with fishing gear trailing from their mouth, suggesting a high rate of interaction with fishing activities (both recreational or commercial) (Bansemer & Bennett 2010). Given the small population size and conservation status of this species, any fishing impacts could be of significant concern. Retained fishing gear includes relatively light fishing gear consistent with that used by recreational fishers, such as lures that are often used while trolling or drifting. The bycatch of white sharks from recreational and charter fishing is unclear, but evidence suggesting a partial failure to report captures and interactions with recreational fishing activities is concerning (DEWHA 2009b). As such, this pressure is considered a threat to white shark populations (DEWHA 2010). Data from the Great Barrier Reef Marine Park suggests that post-release mortality could account for the majority of recreational fishing shark mortalities—as a result of damage from the actual capture and subsequent handling or, as seen in the grey nurse shark populations, from retained fishing gear (Lynch et al. 2009).



3. Relevant protection measures

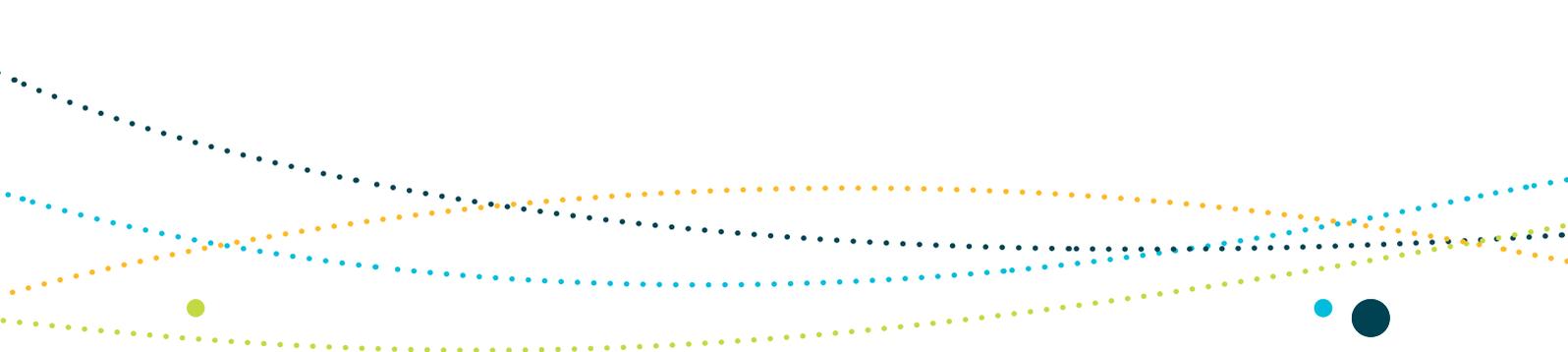
The six shark species have different listings under the EPBC Act; critically endangered (Grey nurse shark – eastern population), vulnerable (white and whale shark) and migratory (longfin mako, shortfin mako and porbeagle sharks). Under the Act, it is generally an offence to kill, injure, take, trade, keep or move listed marine, migratory or threatened species on Australian Government land or in Commonwealth waters without a permit.

In addition to 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 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 2002a)
- *Draft recovery plan for the white shark* (DEWHA 2010)
- *Recovery plan for the grey nurse shark (Carcharias taurus) in Australia* (EA 2002b)
- *Whale shark (Rhincodon typus) recovery plan 2005–2010* (DEH 2005)
- *Conservation overview and action plan for Australian threatened and potentially threatened marine and estuarine fish* (Pogonoski et al. 2002)
- *Australian shark assessment report for the Australian national plan of action for the conservation and management of sharks* (Rose & Shark Advisory Group 2001)
- *Shark assessment report for the Australian national plan of action for the conservation and management of sharks* (Bensley et al. 2009)
- *Guidelines for the ecologically sustainable management of fisheries* (DEWR 2007).



International measures

- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)
—www.cites.org
- International Plan of Action for the Conservation and Management of Sharks (IPOA—Sharks)—<ftp://ftp.fao.org/docrep/fao/006/x3170e/X3170E00.pdf>
- Memorandum of Understanding on the Conservation of Migratory Sharks
—www.cms.int/species/sharks/MoU/Migratory_Shark_MoU_Eng.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/coasts/species/marine-species-list.html
(listed marine species)
- 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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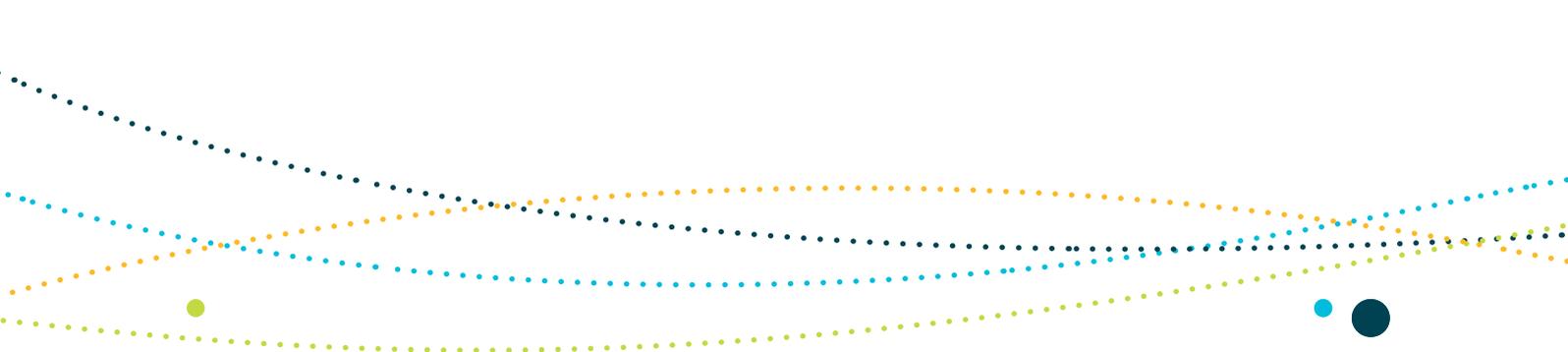
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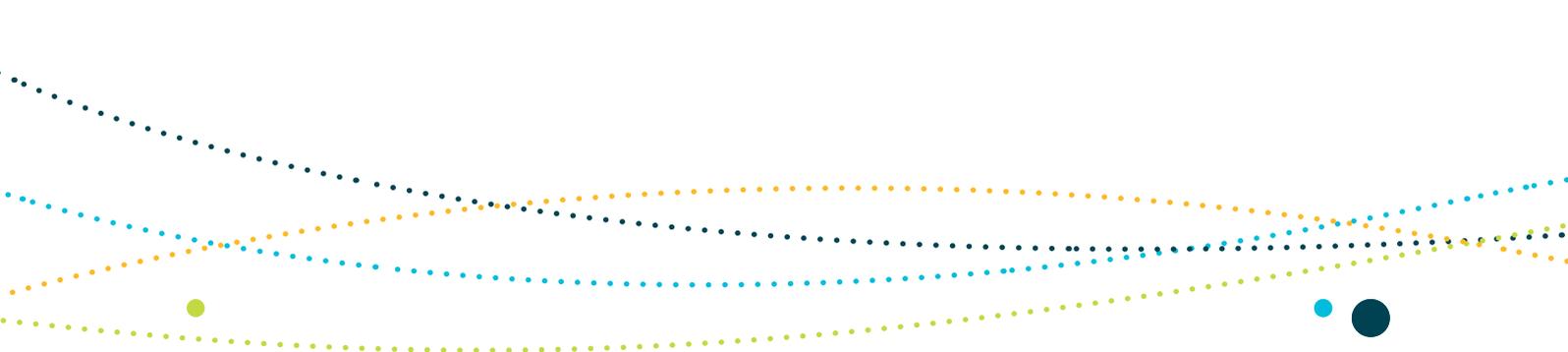
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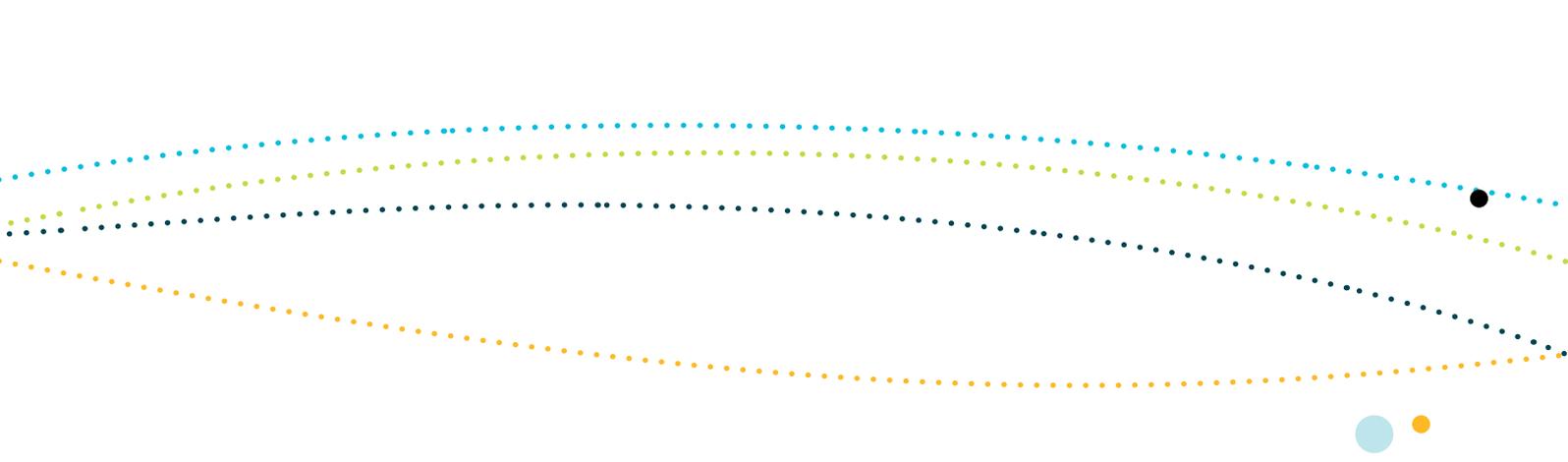
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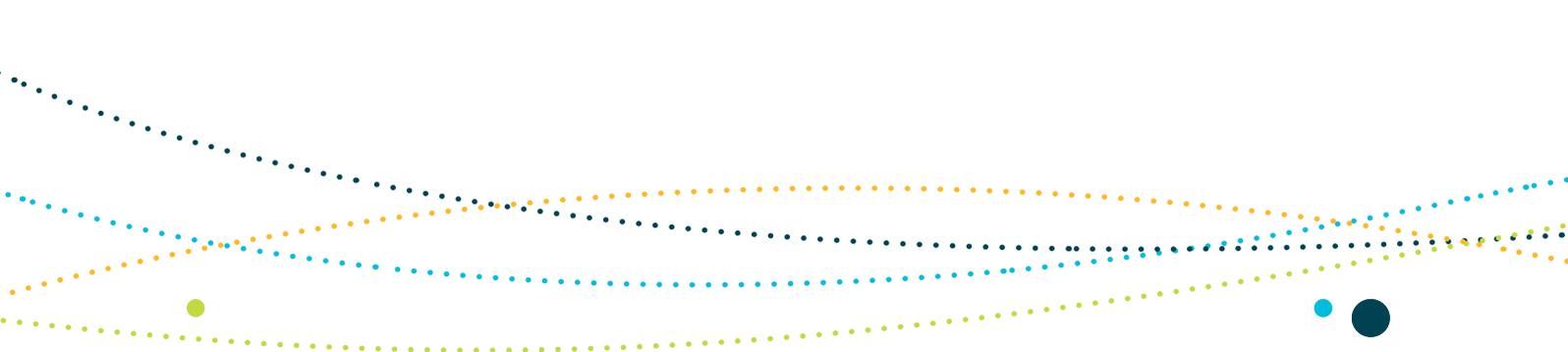
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ATTACHMENT 1: SHARK SPECIES OCCURRING IN THE TEMPERATE EAST MARINE REGION

Table A1: Listed shark species known to occur in the Temperate East Marine Region

Species (common name/scientific name)	Conservation status
Grey nurse shark—east coast population (<i>Carcharias taurus</i>)	Critically endangered
White shark (<i>Carcharodon carcharias</i>)	Vulnerable, migratory
Whale shark (<i>Rhincodon typus</i>)	Vulnerable, migratory
Longfin mako shark (<i>Isurus paucus</i>)	Migratory
Porbeagle (<i>Lamna nasus</i>)	Migratory
Shortfin mako shark (<i>Isurus oxyrinchus</i>)	Migratory

Table A2: Listed shark species known to occur in the Temperate East Marine Region on an infrequent basis

Species (common name/scientific name)	Conservation status
School shark (<i>Galeorhinus galeus</i>)	Conservation dependent
Green sawfish (<i>Pristis zijsron</i>)	Vulnerable

