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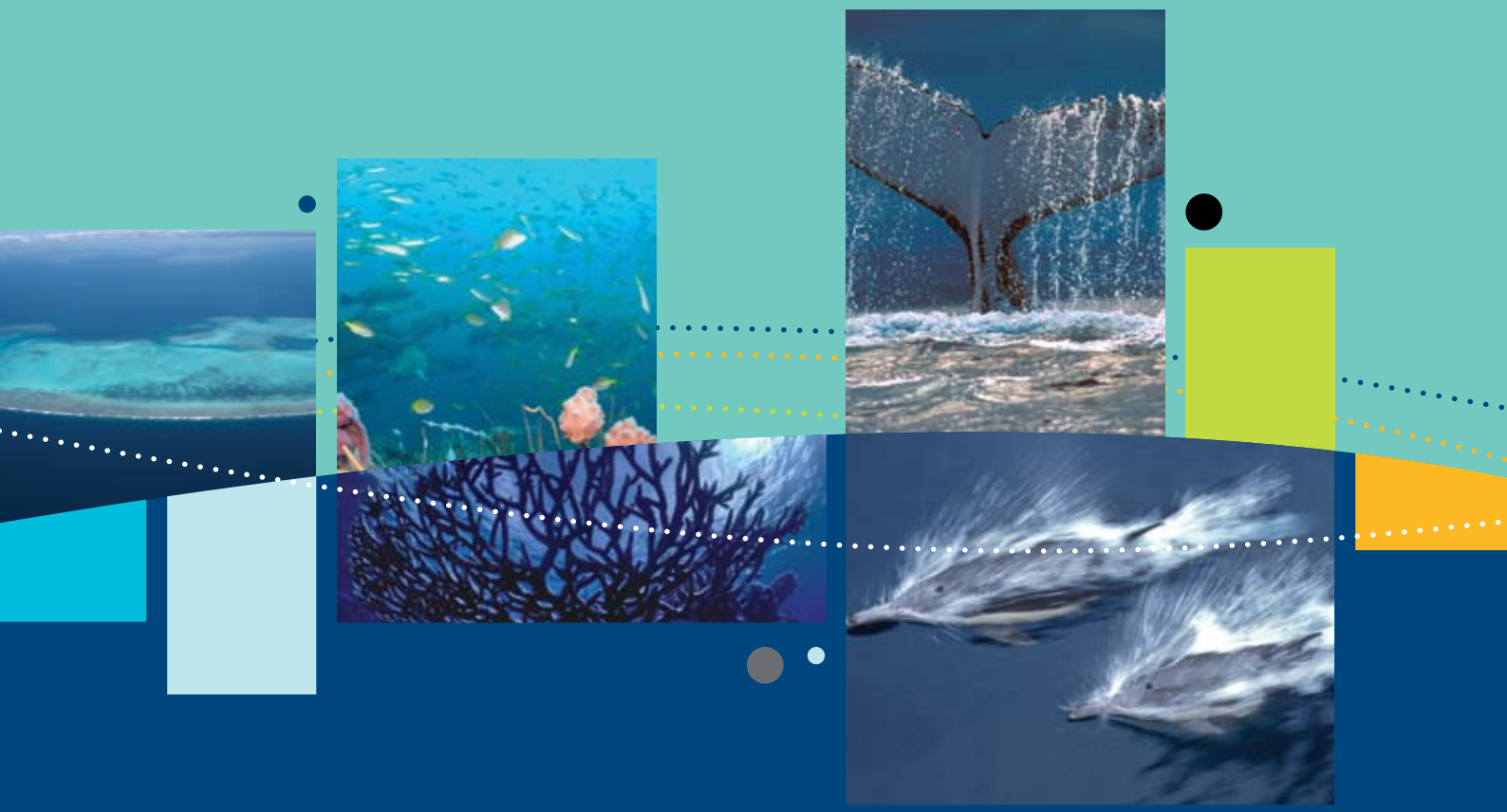

Species group report card – cetaceans

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:
Whale tail – D.Paton, Middleton Reef from air – Director of National Parks, Pimpernel Rock, Solitary Islands – D.Harasti, Acropora species – R.Chesher Ph.D, Black-browed Albatross – M.Double, Runic wreck on Middleton Reef – Director of National Parks, Bottlenose Dolphins – M.Spencer, Wandering Albatross – M.Double, A Loggerhead turtle swims over Acropora corals – GBRMPA, Blue Devil – D.Harasti

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SPECIES GROUP REPORT CARD—CETACEANS

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. Cetaceans of the Temperate East Marine Region

A diverse range of cetacean species (whales, dolphins and porpoises) are known to use the habitats and resources of the Temperate East Marine Region. The region is a known migration pathway for humpback whales travelling between feeding and breeding areas, whilst toothed whales, such as killer whales, forage widely in the region on a wide range of prey, including fish and squid. Dolphin speices, such as the Indo-Pacific humpback dolphin and Indo-Pacific bottlenose dolphin are resident in the region.

In total, 40 species of cetacean are known to occur in the Temperate East Marine Region (see Table A1, Attachment A) and this report card provides information on nine of these species. The following species were selected based on consideration of 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.

Whales

Blue whale

The taxonomy of blue whales (*Balaenoptera musculus*) is unclear, but it is generally accepted that there are two subspecies in the Southern Hemisphere: the Antarctic blue whale (*B. m. intermedia*) and the pygmy blue whale (*B. m. brevicauda*). The Antarctic blue whale is typically found south of 60° S, while the pygmy blue whale is found north of 55° S.

Pygmy blue whales use the region for migration. Scientists consider there to be a migration route from Antarctic and southern Australian waters to areas of upwelling in tropical waters such as the Solomon Sea. Pygmy blue whales are likely to be found between the southern boundary of the region around the New South Wales–Victorian border to the northernmost extent of the region, between depths of 40 and 500 metres.

Dwarf minke whale

The dwarf minke whale (*Balaenoptera acutorostrata*) is widely distributed throughout the Southern Hemisphere and the species is considered to be abundant over much of its range, with a stable population (Harrison et al. 2009; Reilly et al. 2008a).

Dwarf minke whales have been recorded along the Australian coastline, with the exception of Tasmania and the Northern Territory. Adjacent to the region, they are found in the Great Barrier Reef, north of Lizard Island to the Swains reefs. This known distribution, however, may be more reflective of vessel activity and sighting opportunities than actual species distribution (Birtles & Arnold 2002). From December to March, most sightings are in subantarctic waters to the south of Australia and New Zealand, while between March and October, dwarf minke whales are seen in the northern Great Barrier Reef, with an estimated 80 per cent of sightings occurring in June and July (Birtles & Arnold 2002). The species has not been observed feeding in the Great Barrier Reef; however, whales from subantarctic waters are known to feed on open-ocean lantern fish and krill (Birtles & Arnold 2002).

Fin whale

Fin whales (*Balaenoptera physalus*) are found throughout the world's oceans, predominantly in deep offshore waters. They were depleted worldwide by commercial whaling in the 20th century, but have been protected in the Southern Hemisphere since 1975 (Reilly et al. 2008b). In 2008, the International Union for Conservation of Nature (IUCN) determined that the global fin whale population had been reduced by more than 70 per cent since 1929, decreasing from almost 400 000 to less than 100 000 by 2007. Population trend information for the species is uncertain, but their numbers appear to be increasing in some locations (Harrison et al. 2009).

It is likely that fin whales migrate through Australian waters to subantarctic and Antarctic feeding areas (e.g. the Southern Ocean) from tropical breeding areas (e.g. Indonesia, the northern Indian Ocean and south-west Pacific Ocean waters) (DSEWPaC 2011a). The species is known to feed in high latitudes and may also feed in lower latitudes on plankton, fish and cephalopods. In the Antarctic, they mainly feed on krill (DSEWPaC 2011a).

Humpback whale

Humpback whales (*Megaptera novaeangliae*) were heavily exploited through commercial whaling and it is thought that up to 95 per cent of the population was eliminated, although exact figures are unknown (Baker & Clapham 2004; Johnson & Wolman 1985; Yablokov 1994). The Australian populations appear to be growing consistently at about 10 per cent per year (Bannister & Hedley 2001; Bryden et al. 1990; Chaloupka & Osmond 1999; Paterson et al. 2004). The Australian east coast population is currently estimated to be 10 000 whales (Noad et al. 2008).

Humpback whales migrate annually between their summer feeding grounds in Antarctica and their tropical and subtropical breeding grounds in winter. In general, the species is sighted in southern Australian waters in May and it migrates slowly up the east and west coasts. By October, most whales have started their southward migration, and sightings are rarer after November. During migration, individuals travel alone or in temporary aggregations of non-related individuals, with cow–calf pairs being the exception (Valsecchi et al. 2002).

Killer whale

Killer whales (*Orcinus orca*) are found throughout the world's oceans. The killer whale was once thought to be a single, cosmopolitan species (Rice 1998), but recent genetic studies indicate three distinct species (Morin et al. 2010), although this distinction is not yet official. The species occur from the equator to polar waters, and are generally more common in near-shore and higher productivity areas, and in higher latitudes. Their range is not considered to be restricted by water temperature or depth (Taylor et al. 2008).

Killer whales have been recorded in every Australian ocean environment (DSEWPaC 2011b). They forage in the Temperate East Marine Region and are likely to breed in and migrate through the region. The diet of killer whales in Australia is unclear; however, there are reports of killer whales feeding on dolphins, young humpback whales, blue whales, sperm whales, dugongs, Australian sea lions, and tuna that have been hooked on longlines (Bannister et al. 1996, cited in DSEWPaC 2011b).

Sei whale

Sei whales (*Balaenoptera borealis*) are found throughout the world's oceans. They prefer temperate waters rather than polar or tropical waters, and offshore rather than inshore areas (Harrison et al. 2009). Populations were depleted by whaling, and the global population is estimated to have declined by 80 per cent since 1937. Most of this decline is attributable to hunting in the Southern Hemisphere, but the population trend is unknown (Reilly et al. 2008c).

Sei whales migrate between tropical and subtropical latitudes in winter, and temperate and subpolar latitudes in summer, staying mainly in water temperatures of 8–18 °C. They tend not to reach such high latitudes as other rorquals (whales that have folds of skin under the mouth, which allow the mouth to expand when feeding). Their winter distribution seems to be widely dispersed and not well defined (Horwood 1987, 2002, cited in Reilly et al. 2008b). In January and February, the distribution in the Southern Hemisphere is mainly in the zone of 45–60° S in the south Pacific (Miyashita et al. 1996, cited in Reilly et al. 2008b). Based on diet studies, the species feeds on euphausiids, copepods and amphipods in the Southern Hemisphere (Nemoto & Kawamura 1977, cited in Reilly et al. 2008b).

Southern right whale

The Southern Hemisphere population of southern right whale (*Eubalaena australis*) was estimated to be 55 000–70 000 individuals before the species was heavily exploited during shore-based and pelagic whaling in the 19th century. After the period of whaling, there may have been fewer than 300 individuals in the Southern Hemisphere (Reilly et al. 2008d). The most recent estimate for the Australian population is approximately 3500 individuals (Bannister 2010).

Southern right whales have been recorded in all coastal Australian waters, except the Northern Territory (Bannister et al. 1996). They migrate from their summer feeding grounds in the Southern Ocean to calve and breed in warmer coastal waters, and are present on the Australian coast between May and November.

Inshore dolphins

Indo-Pacific bottlenose dolphin (coastal bottlenose dolphin)

The most familiar of the small cetaceans, the Indo-Pacific bottlenose dolphin (*Tursiops aduncus*) has an extensive global distribution, including throughout the Temperate East Marine Region. The species was recognised relatively recently (Rice 1998) and is considered taxonomically distinct to the common bottlenose dolphin based on genetics, osteology and external morphology (Wang et al. 1999, 2000a, b). Whereas the common bottlenose dolphin is found throughout offshore waters in the Temperate East Marine Region (including Norfolk and Lord Howe islands), the Indo-Pacific bottlenose dolphin occurs mainly in riverine and coastal waters, over shallow coastal waters on the continental shelf and around oceanic islands. Known populations of the species are found in and adjacent to the Temperate East Marine Region, including Jervis Bay, Twofold Bay, Port Phillip Bay, Richmond River and Clarence River (New South Wales); and Moreton Bay, Hervey Bay and Cleveland Bay (Queensland). The species feeds on a wide variety of schooling, demersal and reef fish, as well as cephalopods (Ross 1984).

Indo-Pacific humpback dolphin

Indo-Pacific humpback dolphins (*Sousa chinensis*) are found in coastal and estuarine areas of Queensland and New South Wales (Parra & Ross 2009). They occur in a variety of inshore habitats at depths of less than 20 metres, including inshore reefs, tidal and dredged channels, mangroves and river mouths (Karczmarski et al. 2000; Parra 2006a, b). The Indo-Pacific humpback dolphin is a generalist feeder, preying on bottom-dwelling and pelagic fish and cephalopods associated with coastal and estuarine waters (Parra & Jendensjo 2009). Species are known to occur or have been sighted in the Great Sandy Strait, Moreton Bay and south of the Queensland–New South Wales border to Cabarita Beach.

Biologically important areas

Biologically important areas are areas that are particularly important to 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 humpback whale, Indo-Pacific bottlenose dolphin and Indo-Pacific humpback dolphin species. Behaviours used to identify biologically important areas for cetaceans include migratory movements, feeding and breeding. 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 cetaceans make them susceptible to a range of pressures in the marine environment. In general, they are long-lived animals that are slow to reach sexual maturity and have low fecundity (e.g. producing only one calf at a time and not necessarily calving every year). In addition to these traits, many species travel relatively long distances between breeding and feeding areas.

Inshore dolphins are particularly vulnerable to impacts from human activities because their nearshore coastal distribution overlaps with the areas of highest human use in the marine environment. They are also vulnerable because of their low population numbers and the separation of their subpopulations. For example, evidence suggests that Indo-Pacific humpback dolphin and possibly Indo-Pacific bottlenose dolphin distributions are fragmented (Parra 2006a) in at least some parts of their range. Both species exhibit site fidelity and long-term associations between individuals.

Analysis of pressures

On the basis of current information, pressures have been analysed for the nine species discussed in this report card. A summary of the pressure analysis for cetaceans 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 thisanalysis, is provided in Part 3 and Section 1.1 of Schedule 1 of the plan.

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

Pressure	Source	Species								
		Inshore dolphins		Whales						
		Indo-Pacific humpback dolphin	Indo-Pacific (coastal) bottle-nose dolphin	Dwarf minke whale	Killer whale	Sei whale	Humpback whale	Fin whale	Southern right whale	Blue whale
Sea level rise	Climate change									
Changes in sea temperature	Climate change									
Change in oceanography	Climate change									
Ocean acidification	Climate change									
Chemical pollution/ contaminants	Shipping Vessels (other)									
	Urban development Agricultural activities									
Nutrient pollution	Urban development Agricultural activities									
Marine debris	Shipping Vessels (other) Fishing boats Land-based activities									
Noise pollution	Seismic exploration									
	Shipping Vessels (other)									
	Urban development									
Light pollution	Land-based activities Shipping Vessels (other)									
Physical habitat modification	Dredging Dredge spoil									
	Fishing gear (active and derelict)									
	Urban/ coastal development									
	Storm events									
Human presence at sensitive sites	Tourism Recreational and charter fishing Research									

Legend of concern; of potential concern; of less concern; not of concern

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		Indo-Pacific humpback dolphin	Indo-Pacific (coastal) bottle-nose dolphin	Dwarf minke whale	Killer whale	Sei whale	Humpback whale	Fin whale	Southern right whale	Blue whale
Extraction of living resources	Commercial fishing (domestic)									
	Recreational and charter fishing									
	Indigenous harvest									
Bycatch	Commercial fishing (domestic)									
	Recreational and charter fishing									
	Illegal, unregulated and unreported fishing									
	Bather protection programs									
Oil pollution	Shipping Vessels (other)									
	Oil rigs									
Collision with vessels	Shipping Tourism Fishing									
Invasive species	Shipping Fishing vessels Land-based activities									
Changes in hydrological regimes	Climate change									

Legend of concern; of potential concern; of less concern; not of concern

Sea level rise—climate change

Sea level rise associated with climate change has been assessed as being *of potential concern* to both species of inshore dolphin on the basis of the predicted impacts on their preferred seagrass habitat. Global sea levels have risen by 20 centimetres between 1870 and 2004, and predictions estimate a further rise of 5–15 centimetres by 2030, relative to 1990 levels (Church et al. 2009). Longer term predictions estimate increases of 0.5 to 1 metre by 2100, relative to 2000 levels (Climate Commission 2011). Seagrass abundance and extent is predicted to decline as a result of sea level rise, due to a decrease in light available for photosynthesis (Ralph et al. 2007, cited in Connolly 2009). Consequently, inshore dolphin populations are considered vulnerable to the predicted changes in seagrass associated with rising sea levels.

Changes in sea temperature—climate change

Changes in sea temperature associated with climate change have been assessed as *of potential concern* to all cetacean 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). The assessment for inshore dolphins is driven by expected impacts on their preferred habitat (seagrass), which is considered vulnerable to rising sea temperatures (Connolly 2009; Parra & Corkeron, 2001; Parra et al. 2002). Temperature is a key factor that determines seagrass distribution (Poloczanska et al. 2007, cited in Connolly 2009), and shallow, subtidal species are considered at risk from warming ocean and air temperatures (Seddon et al. 2000, cited in Connolly 2009). Inshore dolphin populations are therefore considered vulnerable to the predicted declines in seagrass abundance and extent associated with warming sea temperatures.

Climate variability may also affect other cetaceans. For example, research on climate variability and reproduction in southern right whales suggests that warming events have a detrimental impact on reproductive success (Pirzl et al. 2008). Environmental fluctuations may change foraging conditions, impacting on reproduction by affecting body condition and health. Krill availability in the summer feeding grounds also influences reproductive success the following winter (Trathan & Murphy 2002; Trathan et al. 2003).

Changes in oceanography—climate change

Changes in oceanography associated with climate change have been assessed as *of potential concern* to all cetacean species through impacts on the distribution and availability of suitable habitat and prey. Oceanographic changes in the Temperate East Marine Region will be primarily driven by the East Australian Current. Studies indicate that this major boundary current has been strengthening, pushing warmer, saltier water up to 350 kilometres southward along the east coast (Ridgway & Hill 2009). Circulation effects will also arise from expected

changes to the El Niño–Southern Oscillation. Potential consequences for ocean circulation patterns arising from these changes include a change in the bifurcation point of the East Australian Current, leading to changes in upwelling current direction, changes to upwelling events, increased thermal stratification, increased eddy activity and a shift in the thermocline depth (Chin et al. 2010). For cetaceans, these changes may influence the availability of prey, migration patterns and calving site selection (Chin et al. 2010).

Ocean acidification—climate change

Ocean acidification associated with climate change has been assessed as *of potential concern* to all cetacean species. Driven by increasing levels of atmospheric CO_2 and subsequent chemical changes in the ocean, ocean acidification is already underway and detectable. 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). For cetaceans, the most marked impact of ocean acidification is likely to be the distribution and availability of prey. There are no observed impacts of climate change on zooplankton in Australian waters; however, based on knowledge of impacts elsewhere, Australia is likely to begin losing calcifying zooplankton from its southern waters (Richardson et al. 2009). Recent research on the effects of ocean acidification on Antarctic krill has found that increased carbon dioxide concentrations kill their embryos (Kawaguchi et al. 2011). The Southern Ocean is expected to be severely affected by ocean acidification because cold water readily absorbs carbon dioxide. Southern Ocean carbon dioxide concentrations at depths could rise to 1400 parts per million by 2100 (Kawaguchi et al. 2011). Because Antarctic krill is the key species of the Southern Ocean ecosystem, the effect of increases in carbon dioxide would be widespread.

Chemical pollution/contaminants—urban development; agricultural activities

Chemical pollution/contaminants have been assessed as *of potential concern* to both species of inshore dolphin. More than 80 per cent of people in south-east Queensland and New South Wales live close to the coast (ABS 2001). Coastal dolphin species are vulnerable to pollution from municipal and industrial wastewater and agricultural pesticide and fertiliser run-off (Cosser 1997; Hale 1997; Kemper et al. 1994) because they depend on coastal and riverine habitats that are likely be affected by contaminants. Inshore dolphins are also vulnerable to bioaccumulation of contaminants. Dolphins have been found in the Gold Coast with higher levels of polychlorinated biphenyls (PCBs) in their bodies than dolphins from anywhere else in Australia; high levels of PCBs have been linked to impaired reproductive capacity in dolphins (Gaus et al. 2001).

Nutrient pollution—urban development; agricultural activities

Nutrient pollution has been assessed as *of potential concern* for both species of inshore dolphin, particularly for Queensland populations (including populations within the region). High rainfall and increased catchment run-off associated with storm and flood events increase dolphins' exposure to toxins (Lawler et al. 2007). This can occur by dolphins' being exposed to algae outbreaks associated with increased nutrient loads, absorbing toxins from water, ingesting algal cells or eating prey that contains toxins (Carmago & Alonso 2006).

Marine debris—shipping; vessels (other); fishing boats; land-based activities

Marine debris has been assessed as of potential concern to all cetacean species. Marine debris is defined as any persistent, manufactured or processed solid material discarded, disposed of, or abandoned, in the marine and coastal environment (UNEP 2005). Whales and dolphins are considered vulnerable to entanglement in marine debris, particularly derelict fishing gear; however, there is limited information about the prevalence of ingestion of plastics by cetaceans (Ceccarelli 2009).

Since 1998, there have been 104 records of cetaceans in Australian waters impacted by plastic debris through entanglement or ingestion, with the majority (92.2 per cent) relating to entanglement (Ceccarelli 2009). In particular, the potential for marine debris to overlap with inshore dolphin habitat is high due to the high proportion of the human population that lives adjacent to the coast (ABS 2001), the popularity of recreational fishing, and the number of commercial fisheries operating in and adjacent to the region (DEWHA 2009a). Marine debris has been listed as a key threatening process under the EPBC Act because of the threat it poses to all marine life. The Australian Government has developed a threat abatement plan that provides a coordinated national approach to prevent and mitigate the effects of harmful marine debris on marine life (DEWHA 2009b).

Noise pollution—shipping; urban development

Noise pollution caused by a range of activities (including dredging, pile driving and vessel movement) has been assessed as of potential concern for both species of inshore dolphin. Numerous coastal development projects in and adjacent to the region are either underway or planned, including a number of important ports and associated shipping activity. Noise from these developments may result in physical or behavioural effects on inshore dolphins by interfering with their ability to communicate, displacing them from preferred habitat, or resulting in physical trauma or damage to sensory systems (Bejder & Samuels 2003; Mattson et al. 2005; Nowacek et al. 2007; Richardson et al. 1995). Evidence of changes in behaviour can be found in Moreton Bay, where the rate of whistling by humpback dolphins increases in the presence of travelling boats, particularly in mother–calf pairs (Van Parijs & Corkeron 2001). Because of their strong site fidelity and particular habitat preferences (Parra 2006b), it is possible that inshore dolphins exposed to high levels of human-made noise may not have the flexibility to move to other areas, which increases the potential for physical trauma.

Physical habitat modification—urban/coastal development; fishing gear; dredging/dredge spoil; storm events

Physical habitat modification associated with urban/coastal development has been assessed as *of concern* for both species of inshore dolphin. Physical habitat modification from dredging activities and storm events is considered to be *of potential concern* for both species. These pressures impact indirectly on dolphins through degradation or loss of habitat.

Urban/coastal development occurs extensively along the south-east Queensland and New South Wales coastline. Dredging activities occur in association with development projects for a number of reasons, including to aid navigation, for extractive purposes, and to install pipelines and cables. Dredging modifies nearshore habitats by removing or smothering benthic flora and fauna, and changing water flows (GBRMPA 2004). Studies on coastal and riverine cetaceans worldwide indicate that habitat degradation is a serious threat that fragments populations and, in some cases, eliminates habitat (Reeves & Smith 1999). The overlap in coastal development and inshore dolphin habitats makes these dolphins vulnerable to this pressure. The Indo-Pacific humpback dolphin populations are particularly susceptible because they are highly localised, occur in small subpopulations and are extremely sensitive to disturbance in their preferred habitats (Corkeron et al. 1997; Parra et al. 2006b).

An increase in both the frequency and intensity of extreme weather events such as storms, and associated changes in turbidity, has been assessed as *of potential concern* to both species of inshore dolphin. An increase in the intensity of storm events, combined with rising sea levels, is predicted to cause shoreline erosion, thereby increasing turbidity of shallow coastal waters (Cabaco et al. 2008; Hennessy et al. 2007; Waycott et al. 2007, cited in Connolly 2009). Increased turbidity in nearshore environments is likely to reduce the amount of light available for photosynthesis in seagrasses (Connolly 2009). Increases in turbidity within mangroves may also reduce the efficiency of predators (Abrahams & Kattenfeld 1997, cited in Huxham et al. 2004), including inshore dolphins.

Bycatch—commercial fishing (domestic)

Bycatch from Australian commercial fisheries has been assessed as *of concern* for both species of inshore dolphin, and the killer whale.

For inshore dolphin species, a global proliferation of synthetic gillnets has seen bycatch emerge as the main threat to their survival (D'Agrosa et al. 2000; Northridge 1991; Rojas-Bracho & Taylor 1999). High bycatch rates occur wherever cetacean distribution and gillnet fisheries overlap (Jefferson & Curry 1994; Perrin et al. 1994). Australian net fisheries catch is typically taken close to the coast at depths of less than 50 metres (Kearney et al. 1996) and there is evidence that coastal dolphin bycatch occurs in these fisheries (Corkeron et al. 1997).

For example, the outcome of the Australian Fisheries Management Authority ecological risk assessment for the Small Pelagic Fishery (purse seine) assessed both the Indo-Pacific (coastal) bottlenose and Indo-Pacific humpback dolphins as at high risk of capture. The Small Pelagic Fishery bycatch action plan and the voluntary industry code of practice are intended to reduce bycatch in this fishery.

The rating assigned for the killer whale has been led by the outcomes of the ecological risk assessment undertaken by the Australian Fisheries Management Authority's which assessed the killer whale as having a high risk of capture within the Eastern Skipjack Tuna Fishery. Australia's Tuna Purse Seine Fisheries bycatch action plan is intended to reduce bycatch and associated impacts in the Commonwealth tuna purse seine fisheries.

Bycatch—bather protection programs

Bather protection, or shark meshing, occurs in both New South Wales and Queensland, and has been assessed as *of concern* for both inshore dolphin species, and *of potential concern* for the humpback whale. Bather protection programs deploy nets and drumlines to protect swimmers from the risk of shark attacks, and have been in operation for more than 70 years. As of August 2009, there were 35 shark nets and 378 drumlines in use along beaches adjacent to the region. These operations are known to lead to the incidental catch of marine species, including inshore dolphins. Between 1995 and 2009, a total of 257 dolphins were caught in nets and drumlines associated with shark control programs (228 were caught in nets and 29 on drumlines); 47 were bottlenose dolphins and 26 were Indo-Pacific humpback dolphins (Nias 2011). Humpback whales are also vulnerable to entanglement in netting associated with bather protection programs, and the numbers caught in nets along the Queensland coast during migration has remained relatively constant over recent years (DERM 2009).

Oil pollution—shipping; vessels (other)

Oil pollution has been assessed as *of potential concern* to both species of inshore dolphin. Australia has a strong system for regulating industry activity that is the potential source of oil spills and this system has been strengthened further in response to the Montara oil spill. While oil spills are unpredictable events and their likelihood is low based on past experience, their consequences, especially for threatened species at important areas, could be severe. Shipping is a key activity in the region, with shipping routes servicing a number of ports adjacent to the region, and adjacent to habitat for inshore dolphins. In some oil spill incidents, dolphins have detected oil and avoided it, but at other times they have been exposed to floating oil (AMSA 2010). Inshore species are particularly vulnerable to oil spills because of their highly localised populations along the east coast.

Collision with vessels—shipping; fishing; tourism

Collision with vessels has been assessed as *of potential concern* to both species of inshore dolphin. Shipping, fishing and tourism are key activities in and adjacent to the region. Shipping routes service a number of ports adjacent to the region, and growth is predicted in the recreational boating sector (Bay Journal 2008). These activities overlap with nearshore habitats preferred by inshore dolphins. In particular, the Indo-Pacific humpback dolphin has highly localised populations in shallow coastal and estuarine areas, where vessel activities make them vulnerable to boat strike. Records of dolphin mortality attributed to boat strike elsewhere in Australia, including Victoria (DSE 2011) and South Australia (News Limited 2010) indicates the susceptibility of inshore dolphins to injury and death from collision with vessels.

3. Relevant protection measures

The Australian Whale Sanctuary was established to protect all whales and dolphins in Australian waters. The Australian Whale Sanctuary comprises the Commonwealth marine area and covers all of Australia's Exclusive Economic Zone which generally extends out to 200 nautical miles from the coast and includes the waters surrounding Australia's external territories such as Christmas, Cocos (Keeling), Norfolk, Heard and Macdonald Islands. Within the Australian Whale Sanctuary, it is an offence to kill, injure or interfere with a cetacean. Severe penalties apply to anyone convicted of such offences. More information about the Australian Whale Sanctuary can be found at **www.environment.gov.au/coasts/species/cetaceans/conservation/sanctuary.html**.

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.

EPBC Act conservation plans and action plans

- *Blue, fin and sei whale recovery plan 2005–2010* (DEH 2005a)
- *Humpback whale recovery plan 2005–2010* (DEH 2005b)
- *Southern right whale recovery plan 2005–2010* (DEH 2005c)
- *Threat abatement plan for the impacts of marine debris on vertebrate marine life* (DEWHA 2009b)
- *Action plan for Australian cetaceans* (Bannister et al. 1996)
- *Australian national guidelines for whale and dolphin watching* (DEH 2005d)
- *EPBC Act Policy Statement 2.1: Interaction between offshore seismic exploration and whales* (DEWHA 2008)

A current list of recovery plans is available at **www.environment.gov.au/biodiversity/threatened/recovery.html**

International measures

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

- Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES)—**www.cites.org**
- The Bonn Convention: Conservation of Migratory Species (CMS)—**www.cms.int**
- Convention on Biological Diversity (CBD)—**www.cbd.int/convention**
- International Whaling Commission (IWC)—**www.iwcoffice.org/commission/convention.htm**

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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ATTACHMENT 1: CETACEAN SPECIES OCCURRING IN THE TEMPERATE EAST MARINE REGION

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

Species (common name/scientific name)	Conservation status
Dolphins	
Bottlenose dolphin (*Tursiops truncatus*)	Cetacean
Common dolphin (*Delphinus delphis*)	Cetacean
Fraser's dolphin (*Lagenodelphis hosei*)	Cetacean
Indo-Pacific bottlenose dolphin (*Tursiops aduncus*)	Cetacean
Indo-Pacific humpback dolphin (*Sousa chinensis*)	Migratory, cetacean
Pantropical spotted dolphin (*Stenella attenuata*)	Cetacean
Risso's dolphin (*Grampus griseus*)	Cetacean
Rough-toothed dolphin (*Steno bredanensis*)	Cetacean
Southern right whale dolphin (*Lissodelphis peronii*)	Cetacean
Spinner dolphin (*Stenella longirostris*)	Cetacean
Striped dolphin (*Stenella coeruleoalba*)	Cetacean
Whales	
Andrew's beaked whale (*Mesoplodon bowdoini*)	Cetacean
Antarctic minke whale (*Balaenoptera bonaerensis*)	Migratory, cetacean
Arnoux's beaked whale (*Berardius arnuxii*)	Cetacean
Blainville's beaked whale (*Mesoplodon densirostris*)	Cetacean
Blue whale (*Balaenoptera musculus*)	Endangered, migratory, cetacean
Bryde's whale (*Balaenoptera edeni*)	Migratory, cetacean

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

Species (common name/scientific name)	Conservation status
Cuvier's beaked whale (*Ziphius cavirostris*)	Cetacean
Dwarf minke whale (*Balaenoptera acutorostrata*)	Cetacean
Dwarf sperm whale (*Kogia simus*)	Cetacean
False killer whale (*Pseudorca crassidens*)	Cetacean
Whales	
Fin whale (*Balaenoptera physalus*)	Vulnerable, migratory, cetacean ,
Ginkgo-toothed beaked whale (*Mesoplodon ginkgodens*)	Cetacean
Gray's beaked whale, scamperdown whale (*Mesoplodon grayi*)	Cetacean
Hector's beaked whale (*Mesoplodon hectori*)	Cetacean
Humpback whale (*Megaptera novaeangliae*)	Vulnerable, migratory, cetacean
Killer whale, orca (*Orcinus orca*)	Migratory, cetacean
Long-finned pilot whale (*Globicephala melas*)	Cetacean
Melon-headed whale (*Peponocephala electra*)	Cetacean
Pygmy killer whale (*Feresa attenuata*)	Cetacean
Pygmy right whale (*Caperea marginata*)	Migratory, cetacean
Pygmy sperm whale (*Kogia breviceps*)	Cetacean
Sei whale (*Balaenoptera borealis*)	Vulnerable, migratory, cetacean
Shepherd's beaked whale, Tasman beaked whale (*Tasmacetus shepherdi*)	Cetacean
Short-finned pilot whale (*Globicephala macrorhynchus*)	Cetacean
Southern bottlenose whale (*Hyperoodon planifrons*)	Cetacean
Southern right whale (*Eubalaena australis*)	Endangered, migratory, cetacean
Sperm whale (*Physeter macrocephalus*)	Migratory, cetacean
Strap-toothed beaked whale, strap-toothed whale, Layard's beaked whale (*Mesoplodon layardii*)	Cetacean
True's beaked whale (*Mesoplodon mirus*)	Cetacean

Table A2: Cetacean species that may infrequently occur in the Temperate East Marine Region

Species (common name/scientific name)	Conservation status
Dusky dolphin (*Lagenorhynchus obscurus*)	Cetacean, migratory

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