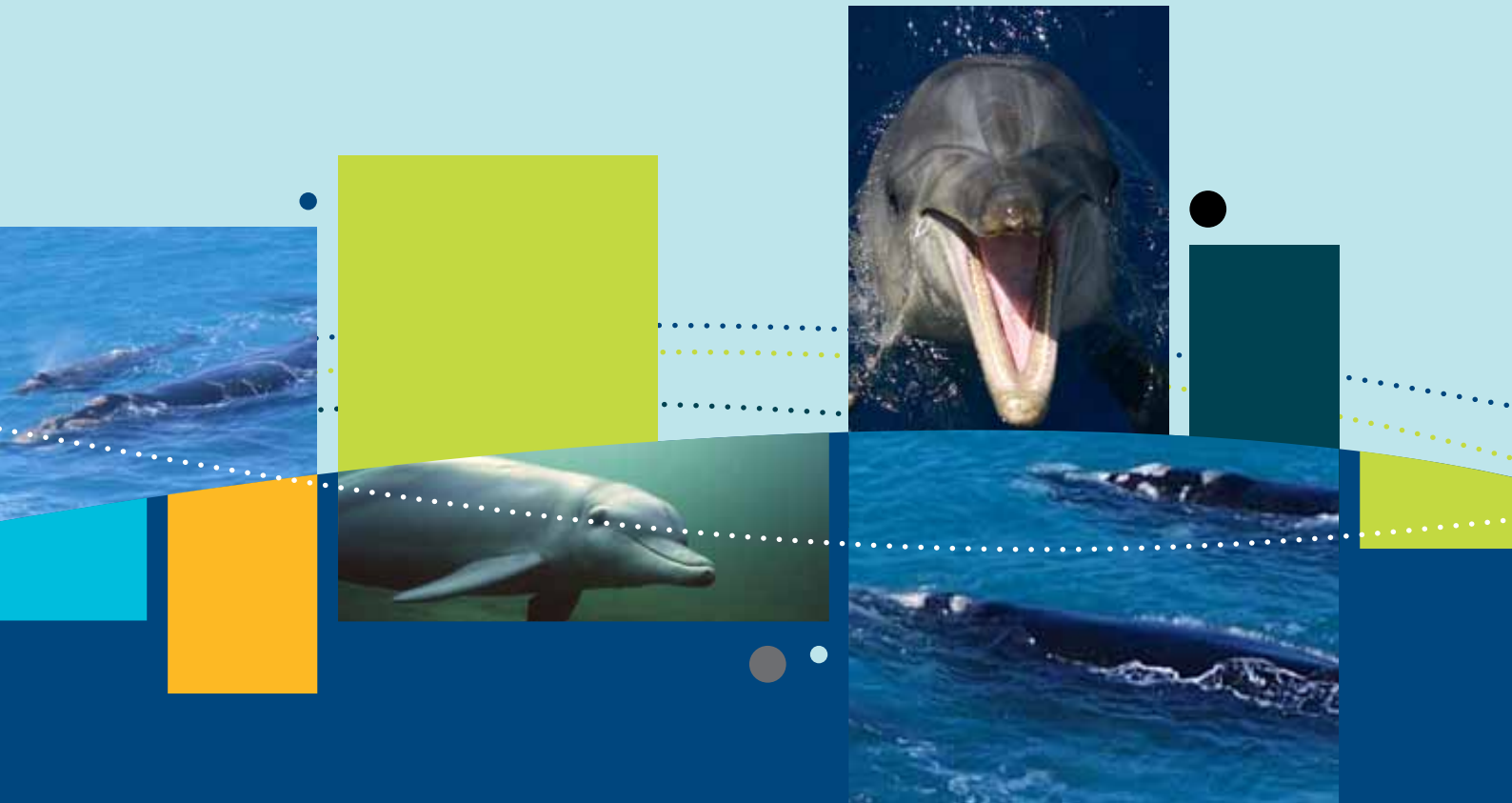




Australian Government

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



Species group report card —cetaceans

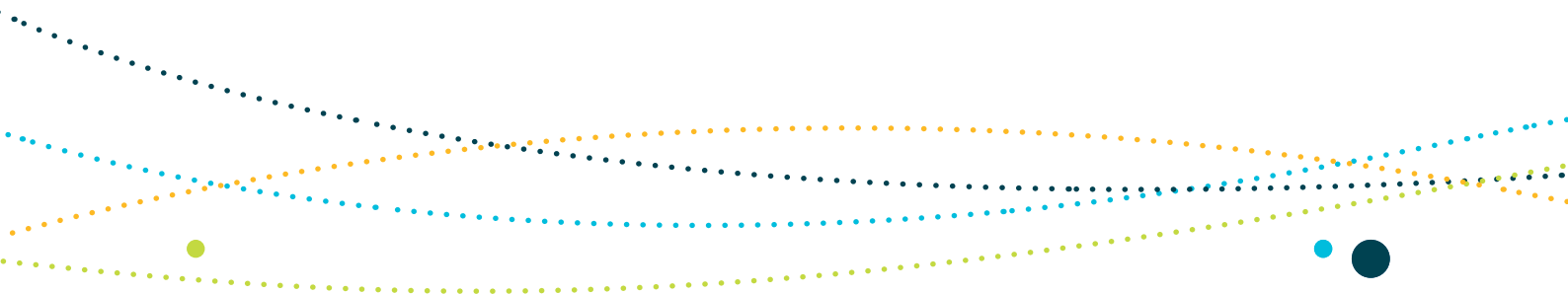
Supporting the draft marine bioregional
plan for the South-west Marine Region

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

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Species group report card—cetaceans

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Report cards

The primary objective of the report cards is to provide accessible and up-to-date 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).

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.

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 South-west Marine Region

Under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), all cetaceans (whales, dolphins and porpoises) are protected in Australian waters. Thirty-three species of cetacean protected under the EPBC Act are known to occur in the South-west Marine Region and a further nine species may occur infrequently in the region (Attachment 1).

Use of the region's marine habitats and resources varies among cetaceans. Baleen whales occurring in the region include regular visitors such as southern right, humpback and blue whales, as well as less commonly seen species such as fin, sei and pygmy right whales. Baleen whales use the region for calving (southern right), feeding (blue whale), and as a migration pathway (including resting areas) between their feeding and breeding areas (humpback whales). Toothed whales found in the region include sperm whales, killer whales and pilot whales. They feed on a wide range of prey including fish, squid and, in the case of killer whales, other marine mammals.

Beaked whales also occur in the region. Information is limited on the ecology of beaked whales, and most information about the species group has been gleaned from stranded specimens (MacLeod & Mitchell 2006). Beaked whales are generally found in deep water offshore around ocean mounts and canyons. They dive for long periods and are rarely observed. South-west Australia has been listed as one of the key areas for beaked whales worldwide, particularly Hector's, Andrew's and Cuvier's beaked whales (MacLeod & Mitchell 2006), while the most common beaked whale to strand in South Australia is the strap-toothed beaked whale (Kemper 2008).

This report card focuses on four species (blue, southern right, humpback and sperm whales) in the South-west Marine Region. These species are the focus of the report card as there is a relatively large amount of information on these species and the region is known to support biologically important behaviours (e.g. calving/nursing, migration, resting on migration, and foraging). While other species of cetacean feed, breed and calve in the region they are less well understood and are not discussed in this report card.

Blue whale

The taxonomy of blue whales is unclear but it is generally accepted that there are two subspecies in the Southern Hemisphere: Antarctic blue whale and pygmy blue whale. Antarctic blue whale is typically found south of 60° S and pygmy blue whales are found north of 55° S. As Antarctic blue whales feed predominantly in polar waters, and acoustic information indicates that Antarctic blue whales are likely to occur infrequently in the region, it has been suggested that the majority of blue whales sighted in Australian waters are pygmy blue whales (Branch et al. 2007). The following information is relevant to blue whales at the species level (*Balaenoptera musculus*), unless stated otherwise.

Antarctic blue whales are considered among the most endangered of all baleen whale populations (Clapham, Young & Brownell 1999). Branch, Matsuoka and Miyashita (2004) estimated a catastrophic decline in Antarctic blue whales due to whaling, from 239 000 individuals pre-whaling to 360 individuals by 1973. Recent estimates of Antarctic blue whale population size provide a circumpolar abundance estimate of 2280 (Branch 2008). There are no comparable data for pygmy blue whales, although they were whaled illegally after

whaling bans were in place: an estimated 11 000 catches were undeclared to the International Whaling Commission (Mikhalev 2000).

While there is not an abundance estimate available for pygmy blue whales, sighting rates of blue whales, with the large majority probably pygmy blue whales, off southern and western Australia are among the highest recorded (Branch et al. 2007). It is likely that pygmy blue whales in the area from Tasmania to Indonesia form one population (Branch et al. 2007). This hypothesis is supported by acoustic data, which indicates that blue whale calls from aggregations at the Bonney Upwelling (located in the South-east Marine Region) and the Perth Canyon are identical (McCauley et al. 2004). Also, by photo-identification matching, Jenner, Gill and Morrice (unpublished data) have demonstrated an interchange between the Bonney Upwelling and Perth Canyon.

Although the migration patterns of pygmy blue whales are poorly understood, monthly data from Australia and Indonesia suggest a migratory link for pygmy blue whales around the western coast of Australia (Branch et al. 2007). Acoustic data off Western Australia record pygmy blue whales apparently migrating northwards in June–July and southwards in November–December (RD McCauley, unpublished data, cited in Branch et al. 2007). Acoustic records from off Cape Leeuwin in July–October, however, are exclusively for Antarctic blue whales, with no pygmy blue whale call types recorded there during this time of year (McCauley et al. 2004). However, acoustic records suggest only a small number of Antarctic blue whales are likely to be present in the region.

Blue whale habitat requirements

Blue whales, principally pygmy blue whales, use the region for migration, foraging, feeding and resting. Blue whale aggregations in Australian waters appear to be determined by the location of predictable, productive feeding grounds (e.g. the Bonney Upwelling and Perth Canyon).

The Perth Canyon is a seasonally important (November–May) aggregation area for krill at depths of 200–300 m and attracts many species of krill feeders, in particular pygmy blue whales (peaking March–May). Up to 40 blue whales have been sighted in a single aerial survey in the Perth Canyon; however, numbers vary from year to year.

The Eastern Great Australian Bight Upwelling/Kangaroo Island canyons are other important foraging habitats for blue whales between November and May (peaking in December). The first aerial survey in this area (2003–04) found up to 30 blue whales feeding in the area (Gill & Morrice 2008). Aerial surveys in 2003–04, 2004–05 and 2005–06 show that blue whale relative abundance in the eastern Great Australian Bight is highly variable both between and within seasons.

Geographe Bay is thought to be an important habitat for blue whale migration and resting. Relatively high numbers of blue whales have been observed annually in Geographe Bay, during October–December surveys, since 1994. Surveys in 2003 recorded more than 100 sightings (Burton 2003). No feeding behaviour has been observed in Geographe Bay; however, small calves are regularly seen. Most whales move slowly into the bay from the north and follow the shallow bathymetry around Cape Naturaliste to the west.

Southern right whale

In 1997, the International Whaling Commission (2001) estimated that 17 per cent, or approximately 1200, of the global southern right whale (*Eubalaena australis*) population

occurred in Australia (based on a global abundance of 7000). Currently, the southern right whale population is increasing at or close to the maximum biological rate. The total current Australian population is approximately 2400 individuals (Bannister 2009).

Shore-based and pelagic whaling in the early to mid-1800s reduced the southern right whale population off Australia to a remnant population. Low-level catches continued until at least the 1930s, principally in pelagic whaling operations. A take of 3368 southern right whales by the former Soviet Union in the period 1950–71 (Tormosov et al. 1998; Yablokov 1994), despite international protection, is likely to have prevented significant recovery until more recent decades. The recovery of the species is not yet assured as the current population is likely to be less than 10 per cent of pre-exploitation abundance (IWC 2001). In addition, recovery in severely and rapidly depleted populations is likely to be affected by a loss of genetic diversity, making the species more vulnerable, for example, to a random disease event (IWC 2001).

Southern right whale habitat requirements

Southern right whales migrate from their summer feeding grounds in the Southern Ocean to calve and breed in warmer coastal waters. Southern right whales are seasonally present on the Australian coast between about May to November, and have been recorded in the coastal waters of all Australian states except the Northern Territory (Bannister, Kemper & Warneke 1996). The entire coastline from Kangaroo Island westward and south of the Perth Canyon is thought to be an important migratory pathway for the southern right whale. Principally they are found aggregating adjacent to the region, in state waters around the southern coastline off southern Western Australia and far west South Australia.

The main calving areas adjacent to the South-west Marine Region (based on observations of mothers with very young calves in multiple years) currently known for southern right whales include:

- Western Australia—Doubtful Island Bay (including the Point Ann to Point Charles area), Israelite Bay area, Twilight Cove, Flinders Bay, Albany to Cape Riche area and Yokinup Bay to Cape Arid area
- South Australia—Head of Bight, Fowlers Bay and Encounter Bay (DEH 2005a).

Southern right whales exhibit a strong tendency to return to the same breeding location (Bannister 1990; Burnell 1999; Payne 1986). This is particularly evident for reproductively mature females: Burnell (1999) reported that 92 per cent of reproductively mature females showed a tendency to return to the Head of Bight calving area. Approximately 85 per cent of calves born at the Head of Bight also exhibited fidelity to their birthing location (Burnell 1999). Individuals make long-distance coastwise movements within a breeding season (Burnell 2001; Burnell & McKenna 1996), and movement of reproductively mature females between the breeding grounds has been recorded (Australian Marine Mammal Centre 2009). While southern right whales can be considered a highly mobile species, the tendency for individuals to return to the same location may limit or delay dispersal.

Humpback whale

Humpback whales (*Megaptera novaeangliae*) were heavily exploited through commercial whaling in all areas where they are known to have been abundant and the exact figure of how many whales were killed is uncertain (Baker & Clapham 2004; Yablokov 1994). It is thought that 95 per cent of the population was eliminated (Johnson & Wolman 1985).

It is generally recognised that the Australian populations appear to be growing consistently at about 10 per cent per year (Bannister & Hedley 2001; Bryden, Kirkwood & Slade 1990; Chaloupka & Osmond 1999; Paterson, Paterson & Cato 2001, 2004). Current estimates for The Australian west coast population is currently estimated to be 21 750 (Hedley, Bannister & Dunlop 2009).

Humpback whale habitat requirements

Humpback whales migrate annually between their summer feeding grounds in Antarctica to their tropical and subtropical breeding grounds in winter. During migration, individuals travel alone or in temporary aggregations of generally non-related individuals (cow–calf pairs being the exception) (Valsecchi et al. 2002). The exact timing of the migration period can vary from year to year depending on water temperature, sea ice, predation risk, prey abundance and the location of the feeding ground (DEH 2005b). In general, humpback whales are sighted in southern Australian waters in May and migrate slowly up the east and west coasts. By October, most whales have started their southward migration and sightings are rarer after November.

Humpback whales migrate through coastal areas between Esperance and Kalbarri and rest in the following three areas:

- waters between the Houtman Abrolhos Islands and the coast near Geraldton
- waters from Geographe Bay to Rottnest Island
- waters to the east of Augusta.

Recent satellite tracking data collected by the Australian Marine Mammal Centre, however, also indicates that some humpback whales on the west coast of Australia migrate well offshore.

Sperm whale

Assessments of sperm whale (*Physeter macrocephalus*) abundance have historically been based on the analysis of whaling data. More recently, surveys have been done in 24 per cent of sperm whales' global habitat and have produced population estimates of 300 000–450 000 (Whitehead 2002). Although these estimates are based on extrapolating surveyed areas to non-surveyed areas, without a systematic survey design, these are probably the best available and most current estimates of global sperm whale abundance (National Marine Fisheries Service 2006).

In contrast, an estimate of the pre-whaling (1712) sperm whale population size is approximately 1 267 000 individuals (Whitehead 2002). This suggests that the current population is about 32 per cent of the pre-whaling level and is therefore considerably depleted. The greatest sperm whale catches have occurred since the 'modern' era of whaling with engine-powered whaling vessels, harpoon guns and other technical aids, but have almost ceased since the 1986 International Whaling Commission moratorium on commercial whaling. Despite the high level of take (approximately 900 000), the sperm whale remains the most abundant of the large whale species. Given that current and potential threats to the sperm whale are limited, it is likely that the global population of sperm whales is increasing.

Sperm whale habitat requirements

Sperm whales tend to inhabit offshore areas with a water depth of 600 m or more, and are uncommon in waters less than 300 m deep (NOAA 2006). Female sperm whales are

generally found in deep waters (at least 1000 m). Female and young male sperm whales appear to be restricted to warmer waters north of about 45° S in the Southern Hemisphere, while adult males travel to and from colder waters of Antarctica (Bannister, Kemper & Warneke 1996). Immature males will stay with females in tropical and subtropical waters until they begin to slowly migrate towards the poles, at anywhere between the ages of 4 and 21 years old.

Concentrations of sperm whales are found where the seabed rises steeply from great depth, and are probably associated with concentrations of major food in areas of upwelling (Bannister, Kemper & Warneke 1996). In Australian waters, sperm whales seem to be concentrated in a narrow area only a few miles wide at the shelf edge off Albany, Western Australia, moving westwards through the year (Bannister, Kemper & Warneke 1996).

The Albany Canyon group and waters to the south of Kangaroo Island have been identified as foraging areas for the sperm whale.

Biologically important areas

Biologically important areas (BIAs) are areas where aggregations of individuals of a species display biologically important behaviours. Based on available information, BIAs have been identified for the blue whale, southern right whale, humpback whale and sperm whale. Behaviours that have been used to define BIAs for cetaceans include aggregating, resting, foraging, migrating, breeding and calving. Table 1 identifies the behaviours that define the BIAs identified in the region. Maps of these biologically important areas are available in the South-west marine conservation values atlas at www.environment.gov.au/coasts/mbp/south-west/index.html

Table 1. Cetaceans for which biologically important areas have been defined in the South-west Marine Region

Species	Conservation status	Behaviour
Pygmy blue whale (<i>Balaenoptera musculus</i>)	Endangered, migratory, cetacean	Foraging, migrating, resting
Southern right whale (<i>Eubalaena australis</i>)	Endangered, migratory, cetacean	Aggregating, migrating, calving
Humpback whale (<i>Megaptera novaeangliae</i>)	Vulnerable, migratory, cetacean	Resting, migrating
Sperm whale (<i>Physeter macrocephalus</i>)	Migratory, cetacean	Foraging

2. Vulnerabilities and pressures

Vulnerabilities

During the early 1800s, whaling was an important industry in the region. Semipermanent camps were set up on the Eyre Peninsula, Kangaroo Island, the Esperance area of Western Australia and as far north as Shark Bay, to target a range of the larger species.

Overexploitation and dramatic declines in whale numbers eventually led to the demise of the industry. Australia's last whaling station, at Cheynes Beach near Albany, closed in 1978. In 1979, Australia adopted a pro-conservation policy, putting a permanent end to whaling in Australian waters.

Although a global moratorium on commercial whaling has been in place since 1986, populations of all species are still below pre-whaling estimates—most considerably so. Two populations of targeted species have been recovering—the southern right whale and the west coast population of the humpback whale are increasing at rates close to their biological capacities. While not a current threat to most species, whaling is still listed as the most threatening anthropogenic activity in all five threatened cetacean recovery plans under the EPBC Act.

The life history characteristics of cetaceans make them susceptible to a range of pressures in the marine environment. They are long-lived animals that are generally slow to reach sexual maturity and have low fecundity (e.g. only producing one calf at a time and not necessarily calving every year). For example, female southern right whales do not reach sexual maturity until five or six years of age and generally have one calf at three-year intervals. In addition to these traits, many species travel relatively long distances to reach resting, foraging and breeding areas. Consequently, cetaceans are considered susceptible to anthropogenic impacts, as evidenced by the devastating impact that past commercial whaling had on populations of cetaceans in the region.

Assessment of pressures

Pressures on the pygmy blue whale, southern right whale, humpback whale and sperm whale have been assessed in the region on the basis of current information. A description of the pressure assessment process, including the definition of substantial impact used in this assessment is provided in the *Overview of marine bioregional plans* available at www.environment.gov.au/coasts/mbp/index.html

A summary of the pressure assessment for cetaceans is provided in Figure 1. No pressures have been assessed as *of concern* for these four species in the South-west Marine Region. Pressures that have been ranked *of potential concern* are discussed in further detail below.

Protected species	Pressures																			
	Sea level rise	Changes in sea temperature	Change in oceanography	Ocean acidification	Chemical pollution or contaminants	Nutrient pollution	Changes in turbidity	Marine debris	Noise pollution	Light pollution	Physical habitat modification	Human presence at sensitive sites	Nuisance species	Extraction of living resources	Bycatch	Oil pollution	Collisions with vessels	Collision/entanglement with infrastructure	Disease	Invasive species
Blue whale																				
Humpback whale																				
Southern right whale																				
Sperm whale																				

Figure 1 Assessment of the level of concern associated with the effects of pressures on selected cetacean species of the South-west Marine Region

Legend:		of concern		of potential concern		of less or no concern
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Climate change (changes in sea temperature)

Changes in sea temperature have been assessed as *of potential concern* to blue whales through changes in distribution associated with the availability of suitable habitat. Sea surface temperatures around Australia are expected to increase by 1–2 °C by 2030 and 2–3 °C by 2070 (Hobday et al. 2006). South-west Western Australia is considered one of three hotspots in the Indian Ocean where rising temperature trends exceed the Indian Ocean basin average (Feng, Weller & Hill 2009). Changes in sea temperature are likely to result in changes to zooplankton communities with implications for dependent species, such as the blue whale (Richardson, McKinnon & Swadling 2009). The blue whale is the only one of the baleen whales assessed that feeds in the region.

Climate change (changes in oceanography)

Changes in oceanography have been assessed as *of potential concern* to blue whale, southern right whale, humpback whale and sperm whale, through impacts on distribution associated with the availability of suitable habitat and prey (e.g. breeding and feeding). The Leeuwin Current's southward flow has weakened slightly since 1970 (Feng, Weller & Hill 2009). The recovery plans 2005–10 for Australia's threatened whales: humpback, southern right, blue, fin and sei indicate that some habitat may become unsuitable for feeding or calving (DEH 2005a, 2005b, 2005c) due to changes in the distribution of prey. For example, calving site selection may be influenced by factors such as ocean currents and water temperature and, given the possible changes in oceanography, existing calving sites may become smaller in size or rendered unsuitable in the future (DEH 2005a, 2005b, 2005c).

Ocean acidification

Ocean acidification has been assessed as *of potential concern* to blue, southern right, humpback and sperm whales through impacts on prey availability. There are no observed impacts of climate change on zooplankton in Australian waters. However, based on knowledge of impacts elsewhere, Australia is likely to start losing calcifying zooplankton from its southern waters (Richardson, McKinnon & Swadling 2009). Recent research on the effects of ocean acidification on Antarctic krill has found that increased levels of carbon dioxide kill their embryos (Kawaguchi et al. 2010). The Southern Ocean is expected to be severely affected by ocean acidification, with cold water readily taking up carbon dioxide. Southern Ocean carbon dioxide levels at depths could rise to 1400 parts per million by the year 2100 (Kawaguchi et al. 2010). As Antarctic krill is the key species of the Southern Ocean ecosystem, effects of such increases in carbon dioxide would be widespread, including affecting baleen whales that visit Australian waters.

Marine debris

Marine debris has been assessed as *of potential concern* for the southern right, blue, humpback and sperm whales. Plastic garbage washed or blown from land into the sea, fishing gear abandoned by recreational and commercial fishers, and solid non-biodegradable floating materials (such as plastics) disposed of by ships at sea are all considered to be harmful marine debris. Plastic bags are known to contribute to the death of cetaceans. In addition, whales can become entangled in derelict fishing gear such as lost nets and pots. The impact of entanglement in marine debris is difficult to measure, because animals may die at sea and not be detected.

Marine debris is listed as a key threatening process under the EPBC Act because of the threat it poses to all marine life, especially to species listed as threatened under the EPBC Act. 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 vertebrate marine life (DEWHA 2009). This threat abatement plan lists a number of cetaceans, including the southern right whale, blue whale and humpback whale as being

adversely affected by ingestion of or entanglement in harmful marine debris (DEWHA 2009). Whale recovery plans for humpback, southern right, blue, fin and sei whales (DEH 2005a, 2005b, 2005c) identify entanglement in derelict fishing gear and ingestion of plastics at sea as pressures.

Based on recorded strandings and sightings, the ingestion of marine debris causes most deaths in sperm whales, while entanglement is recorded most often in humpback whales (Ceccarelli 2009). There is limited information about the distribution and quantity of marine debris in the region. Deaths of southern right whales in the region involving entanglement, most commonly in discarded fishing gear, appear to be increasing relative to the number of carcasses reported (Kemper et al. 2008).

Noise pollution

Noise pollution from a wide range of activities including shipping, seismic survey, sonar, industrial activities and naval exercises has been assessed as *of potential concern* to blue, southern right, humpback and sperm whales. There is growing concern that man-made noise impacts marine life, particularly cetaceans, because it may result in physical and/or behavioural effects on these species (DEWHA 2008a). All sources of man-made noise in the region—shipping, marine infrastructure construction and operation, and seismic surveys—are predicted to increase (Clifton et al. 2007). Defence naval exercises also occur in the region. Guidelines under the EPBC Act are in place to mitigate the effect of noise generated by seismic survey on whales; similarly, the Royal Australian Navy implements operational procedures to minimise environmental impacts.

Anthropogenic noise may affect cetaceans by masking sounds that are vital for their essential activities and behaviours, including navigation, identifying the location of prey and predators, announcing location and territory, establishing dominance, attracting mates, and maintaining group cohesion and social interactions (Richardson et al. 1995; Simmonds, Dolman & Weilgart 2004). Noise pollution can also modify behaviour through attraction and avoidance to sound. Close exposure to noise can cause temporary or permanent physical injury.

Oil and gas exploration and other geophysical surveys involve the use of seismic ‘air-guns’, which generate a rapid release of air under high pressure to obtain a geologic profile of the sea floor and substrate. This activity creates the noise signal that can have physical and behavioural effects on some species of cetaceans (DEWHA 2008a). For example, it may cause baleen whales (e.g. humpback and blue whales) and large toothed whales (e.g. sperm whales) to detour away from migration routes or from feeding or breeding areas. Extremely close encounters may damage their ears. The EPBC Act Policy Statement 2.1 provides guidance on seismic survey implications for cetaceans (DEWHA 2008b).

The Western Australian Exercise Area (WAXA) extends over the Perth Canyon, which is known to be an important seasonal feeding aggregation area for pygmy blue whales. The Department of Defence conducts a range of activities that create noise in the WAXA, such as the use of active sonar to locate targets and the use of live ammunition. The Department of Defence operates in accordance with an environmental management plan, supported by planning guides and procedural tools, aimed at mitigating impacts on the marine environment and marine species.

Shipping is a major activity in South-west Marine Region waters, transporting goods through the region and to and from ports in the region. Shipping traffic in the region is predicted to increase (Clifton et al. 2007), particularly in line with new port improvements and developments earmarked for Albany and Oakajee near Geraldton. In other parts of the

world where the issue has been investigated, the increased traffic of faster and larger ships has led to rising concerns over associated effects on cetaceans (e.g. Hatch et al. 2007).

Physical habitat modification

Habitat modification has been assessed as being *of potential concern* to the southern right whale. Inshore habitat degradation is considered a threat to the recovery of the southern right whale because this species uses inshore areas for calving, some of which are close to populated centres (DEH 2005a). Swimming further to avoid degraded habitat might compromise reproductive success. This pressure is greater for the small proportion of southern right whales that calve east of Adelaide, because of the higher population density and use of coastal areas along the south-east of Australia. However, coastal and inshore habitat degradation is also of potential concern in the south-west region, due to the anticipated expansion of coastal infrastructure and urban development (Clifton et al. 2007).

Bycatch

Bycatch has been assessed as being *of potential concern* to the humpback whale, southern right whale and sperm whale. Southern right whales may be particularly vulnerable to entanglement in the ropes and lines associated with trapping crustaceans in coastal waters (Kemper 2008). The number of southern right whale mortalities involving entanglement appears to be increasing relative to the number of carcasses reported (Kemper et al. 2008). The likelihood of entanglement may increase as the southern right whale population recovers. There have also been reports of sperm and humpback whales being entangled in fishing gear (Kemper et al. 2008), and interactions are likely to increase as the populations of these species recover.

Oil pollution

Oil pollution has been assessed as *of potential concern* to blue, southern right, humpback and sperm whales. While oil spills are unpredictable events and their likelihood is low—particularly in the context of the international and domestic regulatory mitigation measures that apply in Australia—their consequences, especially for threatened species at important areas, could be severe. The intensity and distribution of activities implicated in oil spills—such as oil production and transport—are likely to increase in the region. Baleen whales are particularly vulnerable to oil pollution as the oil is likely to stick to the baleen plates while whales filter-feed on plankton and krill near oil slicks (AMSA 2010). Where an oil spill coincides with calving and nursing events, it may affect breeding success (DEH 2005a, 2005b, 2005c). Southern right whales are listed as endangered and the effects of an oil spill, particularly in calving areas, could interfere with the recovery of the species.

Collision with vessels

Collision with vessels has been assessed as *of potential concern* for the blue and southern right whales, with reference to locations where their biologically important areas overlap with shipping lanes). Southern right whales are particularly vulnerable to vessel collision because they spend about half of each year in coastal waters where human activities are often intense. Fatal ship strikes have been recorded in the region, involving southern right and blue whales (Kemper et al. 2008; Australian Government 2007). The relative importance of this source of mortality is unknown, but it is not likely to impact the species at the population level; however, it is possible that a number of events are undetected, especially those that occur well offshore (Kemper 2008). A review of ship strike records around the world (but not including Australia) found that, in some areas and for small populations, ship strikes are a significant source of mortality (Laist et al. 2001). Shipping traffic, particularly of large vessels, is expected to increase (Clifton et al. 2007), and shipping routes in the region overlap with some biologically important areas for these species.

Collision or entanglement with infrastructure

Collision or entanglement with infrastructure has been assessed as *of potential concern* to the southern right whale as the nature of the interaction can be fatal, and the species is particularly susceptible because it spends about half of each year in coastal waters, where human activities are more intense (Kemper et al. 2008). Interactions between southern right whales and fish farm cages have been reported (Kemper et al. 2003; Kemper 2008). The relative importance of this source of mortality is not known, but it is not likely to be significant at present; however, marine aquaculture and renewable energy infrastructure in the region are predicted to increase. Open-ocean aquaculture and commercial-scale offshore renewable energy technologies are emerging industries, and entail uncertainties regarding their potential scale, technology and impacts (Dolman, Green & Simmonds 2007).

3. Current protection measures

All cetaceans are protected under the EPBC Act by virtue of the Australian Whale Sanctuary, established to protect all whales and dolphins found in Australian waters. The sanctuary includes all Commonwealth waters from the three-nautical-mile state waters limit to the boundary of the exclusive economic zone (i.e. out to 200 nautical miles and further in some places). Within the sanctuary it is an offence to kill, injure or interfere with a cetacean. Severe penalties apply to anyone convicted of such offences. All states and territories also protect whales and dolphins within their 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 and that are relevant to the conservation values described in this Report Card are listed below.

EPBC Act conservation plans and action plans

- Southern Right Whale Recovery Plan 2005–2010 (DEH 2005a)
- Humpback Whale Recovery Plan 2005–2010 (DEH 2005b)
- Blue, Fin and Sei Whale Recovery Plan 2005–2010 (DEH 2005c)
- Threat Abatement Plan for the Impacts of Marine Debris on Vertebrate Marine Life (DEWHA 2009)
- Action Plan for Australian Cetaceans (Bannister, Kemper & Warneke 1996)
- Australian National Guidelines For Whale And Dolphin Watching (DEH 2006)
- EPBC Act Policy Statement 2.1: Interaction between offshore seismic exploration and whales (DEWHA 2008b)
- Great Australian Bight Marine Park (Commonwealth waters), includes a marine mammal protection zone that aims to provide protection for southern right whales.

International agreements

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

- International Whaling Commission (IWC)—www.iwcoffice.org/commission/convention.htm
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)—www.cites.org

- Convention on the Conservation of Migratory Species of Wild Animals (CMS)—www.cms.int
- Convention on Biological Diversity (CBD)—www.cbd.int/convention.

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 and ecological communities)
- www.environment.gov.au/epbc/protect/migratory.html (listed migratory species).

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Attachment 1. Cetaceans in the South-west Marine Region

Table 1. Cetacean species known to occur in the region

Species (common name/scientific name)	Conservation status
Blue whale (<i>Balaenoptera musculus</i>) ^a	Cetacean, endangered, migratory—listed under CITES (Appendix I) and CMS (Appendix I)
Southern right whale (<i>Eubalaena australis</i>)	Cetacean, endangered, migratory—listed under CITES (Appendix I) and CMS (Appendix I)
Fin whale (<i>Balaenoptera physalus</i>)	Cetacean, vulnerable, migratory—listed under CITES (Appendix I) and CMS (Appendix I and II)
Humpback whale (<i>Megaptera novaeangliae</i>)	Cetacean, vulnerable, migratory—listed under CITES (Appendix I) and CMS (Appendix I)
Sei whale (<i>Balaenoptera borealis</i>)	Cetacean, vulnerable, migratory—listed under CITES (Appendix I) and CMS (Appendix I and II)
Antarctic minke whale, dark-shoulder minke whale (<i>Balaenoptera bonaerensis</i>)	Cetacean, migratory—listed under CITES (Appendix I) and CMS (Appendix II)
Bryde's whale (<i>Balaenoptera edeni</i>)	Cetacean, migratory—listed under CITES (Appendix I) and CMS (Appendix II)
Killer whale, orca (<i>Orcinus orca</i>)	Cetacean, migratory—listed under CITES (Appendix II) and CMS (Appendix II)
Pygmy right whale (<i>Caperea marginata</i>)	Cetacean, migratory—listed under CITES (Appendix I) and CMS (Appendix II)
Sperm whale (<i>Physeter macrocephalus</i>)	Cetacean, migratory—listed under CITES (Appendix I) and CMS (Appendix I and II)
Andrew's beaked whale (<i>Mesoplodon bowdoini</i>)	Cetacean
Arnoux's beaked whale (<i>Berardius arnuxii</i>)	Cetacean
Cuvier's beaked whale, goose-beaked whale (<i>Ziphius cavirostris</i>)	Cetacean
Gray's beaked whale, scamperdown whale (<i>Mesoplodon grayi</i>)	Cetacean
Hector's beaked whale (<i>Mesoplodon hectori</i>)	Cetacean
Shepherd's beaked whale, Tasman beaked whale (<i>Tasmacetus shepherdi</i>)	Cetacean
Strap-toothed beaked whale, strap-toothed whale, Layard's beaked whale (<i>Mesoplodon layardii</i>)	Cetacean
True's beaked whale (<i>Mesoplodon mirus</i>)	Cetacean
Dwarf sperm whale (<i>Kogia simus</i>)	Cetacean

Species (common name/scientific name)	Conservation status
Pygmy sperm whale (<i>Kogia breviceps</i>)	Cetacean
False killer whale (<i>Pseudorca crassidens</i>)	Cetacean
Minke whale, dwarf minke whale (<i>Balaenoptera acutorostrata</i>)	Cetacean
Southern bottlenose whale (<i>Hyperoodon planifrons</i>)	Cetacean
Long-finned pilot whale (<i>Globicephala melas</i>)	Cetacean
Short-finned pilot whale (<i>Globicephala macrorhynchus</i>)	Cetacean
Bottlenose dolphin (<i>Tursiops truncatus</i>)	Cetacean
Common dolphin (<i>Delphinus delphis</i>)	Cetacean
Long-snouted spinner dolphin (<i>Stenella longirostris</i>)	Cetacean
Risso's dolphin, grampus (<i>Grampus griseus</i>)	Cetacean
Southern right whale dolphin (<i>Lissodelphis peronii</i>)	Cetacean
Spotted bottlenose dolphin, Indo-Pacific bottlenose dolphin (<i>Tursiops aduncus</i>)	Cetacean
Spotted dolphin, pantropical spotted dolphin (<i>Stenella attenuata</i>)	Cetacean
Striped dolphin, euphrosyne dolphin (<i>Stenella coeruleoalba</i>)	Cetacean

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

^a The taxonomy of blue whales is unclear; however, it is generally accepted that there are two subspecies in the Southern Hemisphere: the 'true' Antarctic blue whale, *Brevicauda musculus intermedia*, and the pygmy blue whale, *B. m. breviceps*. Both subspecies are thought to occur in the South-west Marine Region, although their respective distributions are uncertain. One notable difference is that during the Southern Hemisphere summer, 'true' blues are usually found south of 60° S, while 'pygmy' blues are usually found north of 55° S. Blue whales are listed under the EPBC Act at the species level; however, where possible, we distinguish between subspecies. Where subspecies cannot be identified, both subspecies are referred to collectively as 'blue whales'.

Table 2. Cetacean species that may occur infrequently in the region

Species (common name/scientific name)	Conservation status
Dusky dolphin (<i>Lagenorhynchus obscurus</i>)	Cetacean, migratory—listed under CITES (Appendix II) and CMS (Appendix II)
Spectacled porpoise, spectacled dolphin (<i>Phocoena dioptrica</i>)	Cetacean, migratory—listed under CITES (Appendix II) and CMS (Appendix II)
Blainville's beaked whale, dense-beaked whale (<i>Mesoplodon densirostris</i>)	Cetacean
Ginkgo-toothed beaked whale, ginkgo-toothed whale, ginkgo beaked whale (<i>Mesoplodon ginkgodens</i>)	Cetacean
Melon-headed whale (<i>Peponocephala electra</i>)	Cetacean
Omura's whale (<i>Balaenoptera omurai</i>) ^a	Cetacean
Pygmy killer whale (<i>Feresa attenuata</i>)	Cetacean
Rough-toothed dolphin (<i>Steno bredanensis</i>)	Cetacean
Fraser's dolphin, Sarawak dolphin (<i>Lagenodelphis hosei</i>)	Cetacean

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

^a There is some contention as to whether *Balaenoptera omurai* is a distinct species.

