[1] "\r\n\r\n\t\r\n\r\n\r\n \r\n \r\n \r\n Orcinus orca\r\n — Killer Whale, Orca\r\n \r\n \r\n \r\n \r\n \r\n Glossary\r\n \r\n\r\n\r\n\r\n\r\n\r\n \r\n SPRAT\r\n Profile\r\n \r\n\r\nFor information to assist regulatory considerations, refer to Policy Statements and Guidelines, the Conservation Advice, the Listing Advice and/or the Recovery Plan. \r\n\r\n\r\n\r\n \r\n EPBC Legal Status and Documents\r\n \r\n \r\n Top\r\n \r\n\r\n\r\nEPBC Act Listing Status\r\n \r\n\t \r\n\t\t\t\r\n\t\t\t Cetacean\r\n\t\t\t \r\n\t\t\t \r\n\t\t\t \r\n\t\t\t\r\n\t\t\t\r\n\t\t\t Listed migratory -\r\n\t\t\t \r\n\t\t\t\tEPBC Act, \r\n\t\t\t \r\n\t\t\t\tBonn\r\n\t\t\t \r\n\t\t\t\r\n\t\t\t\r\n\t\t\t\r\n\t\t\r\n\t\t\r\n \r\n \r\n\t\t Approved Conservation Advice\r\n\t\t\r\n\t\t\r\n\t\t \r\n\t\t\tThere is no approved Conservation Advice for this species\r\n\t\t \t \r\n\t\t\r\n \r\n\t\t Listing Advice\r\n\t\t\r\n\t\t\r\n\t\t\t\r\n\t\t\t\r\n\t\t\tThere is no Listing Advice for this species\r\n\t\t\t\r\n\t\t\r\n\t\t\r\n \r\n\t\t Adopted/Made Recovery Plans\r\n\t\t\r\n\t\t\r\n\t\t \r\n\t\t\tThere is no adopted or made Recovery Plan for this species\r\n \r\n\t\t\r\n \r\n\t\t Adopted/Made Threat Abatement Plans\r\n\t\t\r\n\t\t\r\n\t\t\t\r\n\t\t\t \r\n\t\t\t \r\n\t\t\t\tDepartment of the Environment and Energy (2018). 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In effect under the EPBC Act from 27-Aug-2012.\r\n\t\t\t \r\n\t\t\t \r\n\t\t\r\n \r\n\t \r\n\t\tOther Commonwealth Documents\r\n\t \r\n\t \r\n\t\tTop\r\n\t \r\n\t\r\n\r\n\r\n\t\r\n\t\r\n\t\t Other EPBC Act Plans\r\n\t\t\r\n\t\t\r\n\t\t \r\n\t\t \r\n\t\t \r\n\t\t\tSouth-east marine region profile: A description of the ecosystems, conservation values and uses of the South-east Marine Region (Commonwealth of Australia, 2015) [Information Sheet].\r\n\t\t\t \r\n\t\t\t \r\n\t\t\r\n \r\n\t Policy Statements and Guidelines\r\n\t\r\n\t\r\n\t \r\n\t \r\n\t Australian National Guidelines for Whale and Dolphin Watching 2017 (Department of the Environment and Energy, 2017) [Admin Guideline].\r\n\t \r\n\t \r\n\t Industry Guidelines on the Interaction between offshore seismic exploration and whales (Department of the Environment and Water Resources (DEW), 2007) [Admin Guideline].\r\n\t \r\n\t \r\n\t\r\n \r\n\t Federal Register of Legislative Instruments\r\n\t\r\n\t\t\r\n\t\t\tMigratory:Environment Protection and Biodiversity Conservation Act 1999 - Amendment to the List of Migratory Species (03/12/2002) (Commonwealth of Australia, 2002d) [Legislative Instrument]Threat Abatement Plan:Instrument under section 270B of the Environment Protection and Biodiversity Conservation Act 1999 to make a Threat Abatement Plan (Commonwealth of Australia, 2018i) [Legislative Instrument]\r\n Non-statutory Listing Status\r\n\t \r\n\t IUCN:\r\n\t\t\t\r\n\t\t\t\tListed as Data Deficient\r\n\t\t\t\t (Global Status: IUCN Red List of Threatened Species: 2020.2 list)\r\n\t\t\t\r\n\t\t\t\r\n\t\t NGO:\r\n\t\t\t\r\n\t\t\t\tListed as Data Deficient\r\n\t\t\t\t (The action plan for Australian mammals 2012)\r\n\t\t\t\r\n\t\t\t\r\n\t\t \r\n \r\n \r\n Naming\r\n \r\n \r\n Top\r\n \r\n\r\n\r\nScientific name\r\n \r\n Orcinus orca [46]\r\n \r\n Family\r\n \r\n Delphinidae:Cetacea:Mammalia:Chordata:Animalia\r\n \r\n \r\n Species author\r\n (Linnaeus,1758)\r\n \r\n Infraspecies author\r\n \r\n Reference\r\n \r\n \r\n \r\n Distribution Map\r\n \r\n \r\n Top\r\n \r\n\r\n\r\nDistribution map\r\n \r\n \r\n\t\tThe distribution shown is generalised from the Departments Species of National Environmental Significance dataset. This is an indicative distribution map of the present distribution of the species based on best available knowledge. Some species information is withheld in line with sensitive species polices. See map caveat for more information.\r\n\r\n \r\n \r\n \r\n Illustrations\r\n \r\n \r\n Top\r\n \r\n\r\n\r\n\r\n\r\nIllustrations\r\n \r\n Google Images\r\n \r\n \r\n Other Links, Including Superseded Commonwealth Documents\r\n \r\n \r\n Top\r\n \r\n \r\n \r\n \r\n Commonwealth of Australia (2002d). Environment Protection and Biodiversity Conservation Act 1999 - Amendment to the List of Migratory Species (03/12/2002). F2007B00765. Canberra: Federal Register of Legislative Instruments. Available from: http://www.comlaw.gov.au/Details/F2007B00765.\r\n \r\n Department of the Environment and Heritage (2005e). Australian National Guidelines for Whale and Dolphin Watching. Available from: http://www.environment.gov.au/resource/australian-national-guidelines-whale-and-dolphin-watching-2005.\r\n \r\n Department of the Environment and Heritage (2006rz). Orcinus orca in Species Profile and Threats (SPRAT) database. Canberra: DEH. Available from: http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=46.\r\n \r\n

\r\n\r\n\r\n\t\r\n\r\n\r\n \r\n Newsletters\r\n \r\n \r\n Top\r\n \r\n\r\n\r\n\r\n\r\n\r\nEPBC Act email updates can be received via the Communities for Communities newsletter and the EPBC Act newsletter.\r\n\r\n\r\n\r\n\r\n \r\n Caveat\r\n \r\n \r\n Top\r\n \r\n\r\n\r\n\r\nThis database is designed to provide statutory, biological and ecological\r\ninformation on species and ecological communities, migratory species, marine\r\nspecies, and species and species products subject to international trade and\r\ncommercial use protected under the Environment Protection and Biodiversity\r\nConservation Act 1999 (the EPBC\r\nAct). It has been compiled from a range of sources including\r\nlisting advice, recovery plans, published literature and individual experts.\r\nWhile reasonable efforts have been made to ensure the accuracy of the\r\ninformation, no guarantee is given, nor responsibility taken, by the\r\nCommonwealth for its accuracy, currency or completeness. The Commonwealth\r\ndoes not accept any responsibility for any loss or damage that may be\r\noccasioned directly or indirectly through the use of, or reliance on, the\r\ninformation contained in this database. The information contained in this\r\ndatabase does not necessarily represent the views of the Commonwealth. This\r\ndatabase is not intended to be a complete source of information on the\r\nmatters it deals with. Individuals and organisations should consider all the\r\navailable information, including that available from other sources, in\r\ndeciding whether there is a need to make a referral or apply for a permit or\r\nexemption under the EPBC\r\nAct.\r\n\r\n\r\nCitation: Department of the Environment\r\n(2022).\r\nOrcinus orca in Species Profile and Threats Database,\r\nDepartment of the Environment,\r\nCanberra.\r\nAvailable from:\r\nhttps://www.environment.gov.au/sprat.\r\nAccessed Tue, 18 Jan 2022 21:31:03 +1100.\r\n\r\n\r\n\r\n\r\n\r\nWhere available the sections below provide a biological profile for the species. Biological profiles vary in age and content across species, some are no longer being updated and are retained as archival content. These profiles are still displayed as they contain valuable information for many species. The Profile Update section below indicates when the biological profile was last updated for some species. For information to assist regulatory considerations, please refer to Conservation Advice, the Recovery Plan, Policy Statements and Guidelines.\r\n\r\n\r\n\r\n \r\n \r\n \r\n Taxonomy\r\n \r\n \r\n Top\r\n \r\n \r\n \r\n Scientific name: Orcinus orca Common name: Killer WhaleOther names: Orca whaleThe Killer Whale was described as Delphinus orca by Linnaeus in 1758. This species has 22 synonyms (alternative names), primarily the result of individual and geographic variation in colour pattern and size. Two synonyms are based on Australasian specimens: Orca tasmanica, described by J. Gray in 1871; and Grampus orca, described by Iredale and Troughton (1933) (Bannister et al. 1996).\nThere are no widely accepted subspecies. However, a possible subspecies of \"dwarf\" or \"yellow\" Killer Whale, Orcinus glacialis, was described from the ice edge in the Indian Ocean sector of the Antarctic from 60° E to 141° E. The skulls, especially the teeth, of the six specimens that were collected differ noticeably from those of most other Killer Whales. During the summer, at least, these small animals are said to range in the same waters as typical Killer Whales but not to mix in the same schools. The small and large forms are also said to select different prey; fish and mammals respectively. However, further studies are needed to ascertain whether these small form Killer Whales warrant recognition as a separate species or subspecies (Rice 1998).\n\r\n \r\n \r\n \r\n Description\r\n \r\n \r\n Top\r\n \r\n \r\n \r\n Killer Whales are the largest member of the dolphin family and are recognisable by their distinctive black, white and grey coloration. The head is rounded, with no distinct beak. A white eye patch, or spot, is located just above and behind the eye. Just behind the dorsal fin is a grey saddle patch. The Killer Whale's belly, lower jaw and the underside of the tail flukes are white. The rest of the body is black. The wide, tall dorsal fin is curved backwards in females and is more upright and triangular-shaped in males. The pectoral flippers are paddle-shaped. In addition to sexual size dimorphism, male Killer Whale appendages are disproportionately larger than in females (Dahlheim & Heyning 1999).\nAdult male and female Killer Whales attain weights exceeding 4000 kg and 3100 kg, and lengths of 9.8 m and 8.5\u00969.2 m, respectively (Dahlheim & Heyning 1999).\nAlthough groups of up to several hundred individuals have been observed, group size is usually less than 30, and several studies outside Australian waters have reported mean pod sizes of less than 10. Off southern Australia, group size can be up to 52 individuals, although most sightings report less than 10. Long-term studies in the north-western Pacific have shown that pod composition appears to remain consistent over time; about 20% are adult males, 40\u009650% adult females and 30\u009640% immatures and juveniles. A social hierarchy exists within the pod (Dahlheim & Heyning 1999).\n\r\n \r\n \r\n \r\n Australian Distribution\r\n \r\n \r\n Top\r\n \r\n \r\n \r\n In Australia, Killer Whales are recorded from all states, with concentrations reported around Tasmania. Sightings are also frequent in South Australia and Victoria (Ling 1991). A sighting at Yirrkala in April 1999 provides evidence that they also occur in Northern Territory waters (Chatto & Warneke 2000). Killer Whales are frequently seen in the Antarctic south of 60° S and have been recorded from Heard

and Macquarie Islands (Gill & Thiele 1997; Kasamatsu et al. 1988; Parker 1978). Macquarie Island appears to be a key locality, with Killer Whales regularly reported there (Morrice & Van den Hoff 1999).\n\nThe current extent of occurrence for Killer Whale is estimated to be greater than 20 000 km² (based on the Australian Economic Exclusion Zone (EEZ)) (200 nm, including subantarctic waters and Antarctica down to below 60° S) (Peddemors & Harcourt 2006, pers. comm.). Increasing ocean temperatures predicted by climate change scenarios could potentially decrease the extent of occurrence of the Killer Whale, because of warmer water extending southwards.\n\nThe area of occupancy of Killer Whales, in Australia, is likely to be greater than 2000 km² (Peddemors & Harcourt 2006, pers. comm.). Future expansion of high-seas pelagic fisheries may result in increased interactions with Killer Whales, including incidental catches and injury, potentially depleting local waters and leading to a decrease in area of occupancy.\n\nKiller Whales are currently considered to occur in one location as there are no known unsurpassable fixed pelagic boundaries. However, a complex population structure occurs elsewhere in the world suggesting that there could be at least three separate locations within Australian territorial waters: continental Australia, subantarctic and Antarctic (Peddemors & Harcourt 2006, pers. comm.).\n\nIt is possible that Killer Whales in Australian waters occur in severely fragmented populations. Complex social structure and minimal interaction between different Killer Whale 'eco-types' in the north-east Pacific suggests that there is potential for loss of particular subpopulations, and their associated genetic diversity and social culture (Jefferson et al. 1993). Should population fragmentation occur with Killer Whales found in Australian territorial waters, similar extinction of small subpopulations could occur.\n\r\n \r\n \r\n \r\n Global Distribution\r\n \r\n \r\n Top\r\n \r\n \r\n \r\n The Killer Whale is probably the most cosmopolitan of all cetaceans and may be seen in any marine region. Killer Whales occur throughout all oceans and contiguous seas, from equatorial regions to the polar packice zones, and may even ascend rivers. However, they are most numerous in coastal waters and cooler regions where productivity is high (Dahlheim & Heyning 1999; Jefferson et al. 1993).The widespread nature of Killer Whale distribution does not enable a global estimate of population size. Abundance estimates are only available on a regional basis: North-eastern Pacific: photo-identification studies recorded at least 850 individual Killer Whales in Alaska - 117 off the Queen Charlotte Islands, 260 \"resident\" whales and 75 \"transient\" whales off eastern and southern Vancouver Island, 184 off the coasts of California, and 65 off the Mexican west coast. It should be noted that photo-identification techniques result in a minimum count of animals (Dahlheim & Heyning 1999). In a more recent estimate, Ford (2002) estimates a total population count of 1500 Killer Whales in the north-eastern Pacific. \n North Atlantic: in Norwegian coastal waters the estimate is 483–1507 Killer Whales (Dahlheim & Heyning 1999). Sightings in the eastern North Atlantic gave rough estimates of around 3100 Killer Whales for the area comprising the Norwegian and Barents Seas, and the Norwegian coastal waters. The estimate is 6600 Killer Whales for Icelandic and Faroese waters (Reyes 1991).\n North-western Pacific: off the Japanese coast the estimate is 1200 Killer Whales north of 35° N, and 700 animals south of 35° N (Dahlheim & Heyning 1999). \n Antarctic waters: the most recent estimate is 80 400 Killer Whales south of the Antarctic convergence (Kasamatsu & Joyce 1995).\n Southern Indian Ocean: estimates are not available for this region, however, Poncelet and colleagues (2002) reported a strong decline of Killer Whales in the coastal waters of Possession Island between 1988 and 2000.There are no estimates of the total Killer Whale population size, either globally or for Australia, so the proportion of the global population in Australian waters is unknown. Australian Killer Whales are not considered to be a distinct population, as no subspecies are currently recognised.\nFor the Southern-Indian Ocean, a strong decline in Killer Whales was reported by Poncelet and colleagues (2002) for the coastal waters of Possession Island between 1988 and 2000. Several factors which may have contributed to the decline were identified: \n a low and decreasing fecundity, possibly impacted by declining density\n the decline of the main prey items such large baleen whales, due to past whaling, and sealing (e.g. Southern Elephant Seals (Mirounga leonina)) from the 1970s to 1990s\n a possible mortality increase induced by recent interactions with the Patagonian Toothfish (Dissostichus eleginoides) longline fishery \n the possible dispersion of individuals or groups from the coastal waters. \nAn added impact on Killer Whales may include increased pollutant levels. A preliminary toxicological study indicates that PCB levels are considerably lower in the Southern-Indian Ocean than those found in British Columbian transient Killer Whales (Ross 2006a). The effects of PCBs on Killer Whales, at the observed concentrations, are unknown.\n\r\n \r\n \r\n \r\n Surveys Conducted\r\n \r\n \r\n Top\r\n \r\n \r\n \r\n Killer Whales are not well surveyed within Australian waters, with the exception of the Antarctic, where whale surveys have been conducted, and off Macquarie Island where more than 324 sightings were recorded between 1994 and 1999 (Morrice & Van den Hoff 1999). At Macquarie Island, photo-identification confirmed one re-sighting and other evidence suggests that these whales return to the island each southern summer. In all other areas, their distribution is primarily assumed from incidental

sightings, plus beach-cast animals. Based on limited data, the current Australian distribution of Killer Whales is believed to be a true reflection for the species.\n\r\n \r\n \r\n \r\n \r\n Population Information\r\n \r\n \r\n Top\r\n \r\n \r\n \r\n The total number of Killer Whales in Australian waters is unknown, however, it may be that the total number of mature animals within Australian waters is less than 10 000 (Peddemors & Harcourt 2006, pers. comm.). In the Antarctic, south of 60° S, a preliminary population estimate of at least 80 000 animals has been made (Kasamatsu & Joyce 1995).\nLack of taxonomic resolution, plus a lack of abundance and distribution data, do not allow definitive assessment of the number of subpopulations of Killer Whales in Australian waters. Studies in the Eastern-North Pacific, have distinguished two or three types of Killer Whale, each with differences in their genetics, coloration, external morphology and ecological preferences (Black et al. 1997; Dahlheim & Heyning 1999; Ford 2002; Hoelzel et al. 1998). Jefferson and colleagues (1993) suggest that this pattern may be universal, and thus apply to Killer Whales in Australian waters.\n\nNo key localities are known for Killer Whales within continental Australian waters, however, all populations are considered important for the species' long-term survival. In the Australian subantarctic territory, Macquarie Island may be a key locality with regular Killer Whale sightings. More than 324 sightings were recorded around Macquarie Island between 1994 and 1999, with indications that these whales return to the island each southern summer (Morrice & Van den Hoff 1999).\n\r\n \r\n \r\n \r\n \r\n Land Tenure of Populations\r\n \r\n \r\n Top\r\n \r\n \r\n \r\n All cetaceans are protected within The Australian Whale Sanctuary under the EPBC Act. The Sanctuary includes all Commonwealth waters from the three nm state waters limit out to the boundary of the Australian EEZ (i.e. out to 200 nnm and further in some places). Killer Whales are also subject to International Whaling Commission regulations and protected within the Indian Ocean Sanctuary and Southern Ocean Sanctuary.\n\r\n \r\n \r\n \r\n \r\n Habitat\r\n \r\n \r\n Top\r\n \r\n \r\n \r\n The preferred habitat of Killer Whales includes oceanic, pelagic and neritic (relatively shallow waters over the continental shelf) regions, in both warm and cold waters. They may be more common in cold, deep waters, but off Australia, Killer Whales are most often seen along the continental slope and on the shelf, particularly near seal colonies. Killer Whales have regularly been observed within the Australian territorial waters along the ice edge in summer (Thiele & Gill 1999).The habitat of Killer Whales is difficult to categorise due to the cosmopolitan nature of the species and its ability to inhabit all oceans. Although Killer Whales tend to be found at the ice edge during the Antarctic summer (Gill & Thiele 1997; Thiele et al. 2000), family groups (including calves) have been seen within the ice during winter (Thiele & Gill 1999). Subantarctic observations indicate that Killer Whales return to subantarctic Islands, such as Macquarie Island, during the summer. In the north-eastern Pacific, use of different habitats has been linked to behavioural requirements, and the movements of prey (Similae et al. 2002). This may lead to individuals/groups experiencing, and utilising, a large variety of habitats. \nTwo types of Killer Whales are distinguished in the eastern-north Pacific, from Washington State to Alaska. The two types, referred to as 'residents' and 'transients', each have different ecological preferences (Baird & Dill 1996). Some studies in other parts of the world suggest that this pattern may be universal (Jefferson et al. 1993).\nKiller Whales are not part of, nor do they rely on, a listed ecological community. However, they do prey on other listed threatened species, such as Southern Elephant Seals in the subantarctic, plus other cetaceans.\n\r\n \r\n \r\n \r\n \r\n Life Cycle\r\n \r\n \r\n Top\r\n \r\n \r\n \r\n Life history data for Killer Whales are limited, thus reproductive information is based on non-Australian data. Males reach sexual maturity at 16 years of age and 5.2\u00966.2 m in length, while females are sexually mature at about 10 years and 4.6\u00965.4 m in length. Age and size at physical maturity are unknown, but the maximum age for Killer Whales is estimated at approximately 40 years (Dahlheim & Heyning 1999). The natural mortality rate is around 5% per year (Ross 2006). The most common disease reported from wild free-ranging Killer Whales is a jaw infection resulting from tooth wear which exposes the tooth pulp cavity. Atherosclerosis has also been reported. Strandings are uncommon in Australia, however one mass stranding (nine animals) occurred in Tasmania (Bannister et al. 1996).Matrilineal groups are the basic unit of social organisation in Killer Whales, consisting of whales from two to three generations. Membership at each group level is typically stable for resident Killer Whales, incorporating births and deaths (Dahlheim & Heyning, 1999). Each pod of Killer Whales, or local group of pods, is largely endogamous (mating occurs predominately within the group) and differs in minor ways from neighbouring groups in both morphology and genetics, as well as in traditions such as migratory behaviour, prey choice, and dialects (Rice 1998).\nKiller Whale calves are born at three to eight year intervals. Although mating occurs all year round, the calving season spans several months. Gestation lasts 12\u009617 months (Ross 2006). No calving areas are known in Australian waters.\nThere are no known reproductive behaviours that may make Killer Whales vulnerable to threatening processes, however, the three to eight year calving interval leads to a slow

reproductive capacity.\n\r\n \r\n \r\n \r\n \r\n Feeding\r\n \r\n \r\n Top\r\n \r\n \r\n \r\n Killer Whales are top-level carnivores. Their diet varies seasonally and regionally. In the north-eastern Pacific, the two identified groups of Killer Whales feed on different prey. The 'resident' whales eat mostly fish, while the 'transient' whales feed on birds and mammals (Saulitis et al. 2000). The specific diet of Australian Killer Whales is not known, but there are reports of attacks on dolphins, young Humpback Whales, Blue Whales, Sperm Whales, Dugongs and Australian Sea Lions (Bannister et al. 1996). \nSmaller prey are also important. In a large sample (362) of Killer Whale stomachs from Antarctica, 60% contained fish, 31% Minke Whale, 9% pinnipeds and 100% squid (Bannister et al. 1996). In most geographical regions, Killer Whale movements may be related to the movements of their prey, potentially travelling 125\u0096200 km/day while foraging (Dahlheim & Heyning 1999; Guerrero Ruiz et al. 1998).The varied diet and cultural complexity of Killer Whales have resulted in great plasticity and specialisation in foraging behaviour (Ford et al. 1998). Limited observations have been made on Killer Whale foraging behaviour in Australian waters, particularly when hunting other cetaceans. A confirmed report from South Australia described about 13 Killer Whales attacking a pod of Sperm Whales grouped in the protective 'daisy' formation (Bannister et al. 1996). Pitman and colleagues (2001) described a similar, successful, attack by some 35 Killer Whales on nine Sperm Whales. A well-documented case records Killer Whales herding Bottlenose and Common Dolphins (Ross 2006). Ship-based observations in the Antarctic report similar pack-hunting strategies when attacking both Humpback and Minke Whales (Peddemors 2006, pers. obs.). Repeated attacks on a pair of Humpback Whales included individuals surging forward onto the backs of the Humpback Whales while the other Killer Whales surrounded the prey. During observations of an attack on an Antarctic Minke Whale, it was noted that the pack of Killer Whales were silent, with shrieks and calls only being exchanged after the Minke Whale had been captured (Peddemors 2006, pers. obs.). Antarctic Killer Whales have also been observed creating waves to wash hauled out seals off ice floes (Visser et al. 2008).\nThree different 'ecotypes' of Killer Whale have been described in the Antarctic (Pitman & Ensor 2003). Type A occurs mainly offshore and preys on Minke Whales. Type B inhabits inshore waters, pack ice and the Antarctic Peninsula Area. Seals appear to be the most important prey for Type B. Type C Antarctic Killer Whale inhabits inshore waters of East Antarctica and has been recorded feeding only on Antarctic Toothfish (Pitman & Ensor 2003).\nKiller Whales frequently scavenged from the carcasses produced by whalers. This practice was prominent with large-scale mechanical whaling in the 20th century, which created temporally and spatially clustered floating carcasses. The carcasses were often the large whale species, preferred by Killer Whales, which normally sink (after natural death) beyond their diving range. During the mid 20th century, floating whaled carcasses were more abundant than those resulting from natural mortality, and scavenging Killer Whales multiplied through shifts in diet and reprodction. During the 1970s availability of carcasses fell dramatically with the cessation of most whaling operations. Scavenging Killer Whales shifted to alternate source of nutrition and may have turned to attacking pinnipeds, living large whales, small cetaceans and sea otters more frequently (Whitehead & Reeves 2005). \n\nKiller Whale depredation of fish off longlines has been recorded throughout their range, including Tasmanian and subantarctic waters. Although there are no records of deaths as a result of this interaction, fishers have been known to shoot at the Killer Whales, potentially injuring or killing them. Killer Whales have also bent and straightened the long-line hooks, suggesting some injury to the whale may occur (Dalla Rosa & Secchi 2007)\n\r\n \r\n \r\n \r\n \r\n Movement Patterns\r\n \r\n \r\n Top\r\n \r\n \r\n \r\n Killer whales are known to make seasonal movements, and probably follow regular migratory routes. Little is known about either local or seasonal movement patterns of Antarctic Killer Whales, however, current evidence suggests that Type A is probably migratory, moving to Antarctica during the southern summer to prey on Antarctic Minke Whales, then moving back to lower altitudes during the southern winters (Kasamatsue & Joyce 1995). Less is known about the movements of Types B and C Killer Whale; both types have been photographed in New Zealand waters, suggesting they could also be migratory (Andrews et al. 2008). It appears that they return to the Macquarie Island during the southern summer (Morrice & Van den Hoff 1999). Although some Killer Whales are known to remain in the Antarctic over winter (Thiele & Gill 1999), it is probable that most move latitudinally with changing ice conditions. However, no information is available for Australian Killer Whales. \n'Transient' Killer Whale groups off British Columbia have very large home ranges when compared with 'resident' whales. Killer Whale movements from Alaska (USA) and British Columbia (Canada) to California (USA) and from California to Mexico have been documented. In most geographical regions, Killer Whale movements may be related to movements of their prey. Killer Whales travel 125\u0096200 km per day while foraging. (Culik 2002)\n\r\n \r\n \r\n \r\n \r\n Survey Guidelines\r\n \r\n \r\n Top\r\n \r\n \r\n \r\n Distinctiveness\nKiller Whales are easily recognisable. The large size of the dorsal fin (especially in adult males) and unique black and white colouration are diagnostic. At a distance, groups without adult males may be confused with Risso's

Dolphins and False Killer Whales (Jefferson et al. 1993).Detectability\nKiller Whales exhibit the usual cetacean behaviour patterns of breaching, spy-hopping, lob-tailing and flipper-slapping. Communication between Killer Whales is visual, tactile and acoustic.\nRecommended methods\nCetacean surveys are constrained by several important factors including weather (e.g. sea state and light conditions), area to be covered, aim of the survey (abundance estimate versus ecological studies), the activities of the animals themselves (e.g. travelling, resting, surface versus deep feeding), and the type of craft used for the survey.\nSurveys for oceanic cetaceans such as Killer Whales have primarily been boat-based transects. There are almost no dedicated cetacean surveys conducted in continental Australian waters, but surveys conducted in the Antarctic and sub-Antarctic have covered substantial portions of potential range of Killer Whales. During non-dedicated surveys, a minimum requirement is to record all cetacean sightings encountered with corresponding GPS position, environmental data (sea conditions and habitat) and behavioural observations. From fishing vessels, all incidentally caught animals should be recorded with corresponding GPS position, plus attempts should be made to obtain basic biological information from dead animals (Peddemors & Harcourt 2006, pers. comm.).\n\r\n \r\n \r\n \r\n \r\n Threats\r\n \r\n \r\n Top\r\n \r\n \r\n \r\n Threats to Killer Whales include pollution, targeted hunting and illegal killing, and interactions with fisheries, including the potential for incidental capture.\nHigh levels of pollutants have been reported in Killer Whales (Ross et al. 2000), although their effects are unknown (Kemper et al. 1994). There are many factors that impede the assessment of the effects in Killer Whales including ethical, logistical, and legal constraints, as well as many natural factors (age, sex, condition, disease/health) (Hickie et al. 2007; Ross 2006). Species such as Killer Whales near the top of aquatic food chains typically have high concentrations of persistent organic pollutants (POP), of which Polychlorinated biphenyl (PCB) frequently dominates (Hickie et al. 2007). Killer whales are among the most PCB-contaminated marine mammals in the world (Ross et al. 2000). PCB may affect immune systems, development, and reproduction (Hickie et al. 2007). A neonate Killer Whale that stranded in Victoria had moderate levels (28.4 ppm) of total DDT.\nHistorically, Killer Whales have been hunted in the Antarctic by whalers whose catches, between 1969 and 1980, numbered up to about 1000 per season. Killer Whales have also been seen as a competitor to fishing and sealing industries and may have been killed by fishers for that reason. Current illegal killing is of concern in some areas (e.g. Tasmania). Incidental deaths in fishing nets have not been reported in Australian waters. \nOther threats include reduction of food resources by fishing of prey species, entanglement in driftnets set outside the Australian EEZ, and in lost or discarded netting in international waters (Bannister et al. 1996).\nPotential threats may include competition from expanding commercial fisheries in higher latitudes, such as those for Orange Roughy, Patagonian Toothfish and cephalopods (squids), and from increasing pollution leading to accumulation of toxic substances in body tissues, although these latter are likely to be low (Bannister et al. 1996; Ross 2006a).\nKiller Whales that are dependent on sea ice for foraging in Antarctica, may be especially vulnerable to changes in sea ice coverage due to climate change (Andrews et al. 2008).Little is known about reproduction in Australian Killer Whales, however, it is likely that they have a low reproductive rate, producing one offspring every several years (Ross 2006). This may indicate that population recovery is a slow process.\n\r\n \r\n \r\n \r\n \r\n Threat Abatement and Recovery\r\n \r\n \r\n Top\r\n \r\n \r\n \r\n Bannister and colleagues (1996), Ross (2006), and Secchi and Vaska (1998), recommended the following actions be taken to better understand the threats to Killer Whales: Determine the distribution and monitor abundance of Killer Whales in Australian waters to assess the possible impact of threats, particularly the effect of direct and indirect fishing activities. This should be done via a sighting program to monitor numbers, particularly in southern waters. Pooling of existing sightings and strandings data to locate possible concentration areas should be considered.\n Obtain information on Killer Whale diet to determine their trophic level and assess any possible impact of the fishing industry on Odontocete food resources, especially for species such as tuna. \n Obtain basic biological information (including diet and pollutant levels) from incidentally-caught and stranded Killer Whale specimens. Ensure specimens are made available to appropriate scientific museums to enable collection of life history data and tissue samples for genetic analysis.\nCurrent projects initiated to address these threats include a requirement to report all incidental catches made within the Australian EEZ (Bannister et al. 1996). Disentanglement workshops have also been initiated, and may be particularly relevant for offshore fishers.\n\r\n \r\n \r\n \r\n \r\n Marine Bioregional Plans\r\n \r\n \r\n Top\r\n \r\n \r\n \r\n Marine bioregional plans have been developed for four of Australia's marine regions - South-west, North-west, North and Temperate East. Marine Bioregional Plans will help improve the way decisions are made under the EPBC Act, particularly in relation to the protection of marine biodiversity and the sustainable use of our oceans and their resources by our marine-based industries. Marine Bioregional Plans improve our understanding of Australia's oceans by presenting a

consolidated picture of the biophysical characteristics and diversity of marine life. They describe the marine environment and conservation values of each marine region, set out broad biodiversity objectives, identify regional priorities and outline strategies and actions to address these priorities. Click here for more information about marine bioregional plans.\nThe killer whale has been identified as a conservation value in the Temperate East (DSEWPaC 2012aa) Marine Region. The \"species group report card - cetaceans\" for the Temperate East (DSEWPaC 2012aa) Marine Region provides additional information.\n\r\n \r\n \r\n \r\n \r\n Management Documentation\r\n \r\n \r\n Top\r\n \r\n \r\n \r\n The following documents may inform protection and management:\nThe Action Plan for Australian Cetaceans (Bannister et al. 1996).Australian National Guidelines for Whale and Dolphin Watching (Department of the Environment and Heritage 2005e).Review of the Conservation Status of Australia's Smaller Whales and Dolphins (Ross 2006).Draft East Marine Bioregional Plan: Bioregional Profile: A Description of the Ecosystems, Conservation Values and Uses of the East Marine Region (DEW 2007a) Industry Guidelines on the Interaction between offshore seismic exploration and whales (DEW 2007h).The North Marine Bioregional Plan: Bioregional Profile: A Description of the Ecosystems, Conservation Values and Uses of the North Marine Region (DEWHA 2008).The South-West Marine Bioregional Plan: Bioregional Profile: A Description of the Ecosystems, Conservation Values and Uses of the South-West Marine Region (DEWHA 2008a). \n North-West Marine Bioregional Plan: Bioregional Profile: A Description of the Ecosystems, Conservation Values and Uses of the North-West Marine Region (DEWHA 2008b).Threat abatement plan for the impacts of marine debris on vertebrate marine life (DEWHA 2009t). \r\n \r\n\r\n\r\n\r\n \r\n \r\n Species Profile References\r\n \r\n \r\n Top\r\n \r\n \r\n \r\n \r\n Andrews, R.D., R.L. 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