[1] "\r\n\r\n\t\r\n\r\n\r\n \r\n \r\n \r\n Eubalaena australis\r\n — Southern Right Whale\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 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 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 Listed as Endangered\r\n\t\t\t as Eubalaena australis\r\n\t\t\t \r\n\t\t\t\t(Date effective 16-Jul-2000)\r\n\t\t\t \r\n\t\t\t Cetacean\r\n\t\t\t as Eubalaena australis\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 as Balaena glacialis australis, \r\n\t\t\t \r\n\t\t\t\tBonn as Eubalaena australis\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 \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 Recovery Plan Decision\r\n\t\t\r\n\t\t\r\n\t\t \r\n\t\t Recovery Plan required, this species had a recovery plan in force at the time the legislation provided for the Minister to decide whether or not to have a recovery plan (19/2/2007).\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\t \r\n\t\t\t Department of Sustainability, Environment, Water, Population and Communities (2012). Conservation Management Plan for the Southern Right Whale. A Recovery Plan under the Environment Protection and Biodiversity Conservation Act 1999 2011-2021. Canberra, ACT: Department of Sustainability, Environment, Water, Population and Communities. Available from: http://www.environment.gov.au/resource/conservation-management-plan-southern-right-whale-recovery-plan-under-environment. In effect under the EPBC Act from 26-Feb-2013 as Eubalaena australis.\r\n\t\t\t\t \r\n\t\t\t \r\n\t\t \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). Threat Abatement Plan for the impacts of marine debris on the vertebrate wildlife of Australia's coasts and oceans (2018). Canberra, ACT: Commonwealth of Australia. Available from: http://www.environment.gov.au/biodiversity/threatened/publications/tap/marine-debris-2018. In effect under the EPBC Act from 21-Jul-2018.\r\n\t\t\t\t \r\n\t\t\t \r\n\t\t\t \r\n\t\t\t\r\n \r\n\t\t Marine Bioregional Plans\r\n\t\t\r\n\t\t\r\n\t\t \r\n\t\t Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) (2012). Marine bioregional plan for the Temperate East Marine Region. Prepared under the Environment Protection and Biodiversity Conservation Act 1999. Available from: http://www.environment.gov.au/topics/marine/marine-bioregional-plans/temperate-east. In effect under the EPBC Act from 27-Aug-2012.\r\n\t\t\t \r\n\t\t Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) (2012). Marine bioregional plan for the South-west Marine Region. Prepared under the Environment Protection and Biodiversity Conservation Act 1999. Available from: http://www.environment.gov.au/topics/marine/marine-bioregional-plans/south-west. In effect under the EPBC Act from 27-Aug-2012.\r\n\t\t\t \r\n\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 \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 Information Sheets\r\n\t\r\n\t\r\n\t \r\n\t \r\n\t Information Sheet - Harmful marine Debris (Environment Australia, 2003) [Information Sheet].\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:List of Migratory Species (13/07/2000) (Commonwealth of Australia, 2000b) [Legislative Instrument] as Balaena glacialis australisRecovery Plan:Southern Right Whale Recovery Plan 2005-2010 (Commonwealth of Australia, 2005z) [Legislative Instrument] as Eubalaena australisRecovery Plan:Environment Protection and Biodiversity Conservation Act 1999 - section 269A - Instrument revoking and making recovery plan (Conservation Management Plan for the Southern Right Whale) (05/02/2013) (Commonwealth of Australia, 2013ak) [Legislative Instrument] as Eubalaena australisThreat 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] as Eubalaena australisThreatened:Declaration under s178, s181, and s183 of the Environment Protection and Biodiversity Conservation Act 1999 - List of threatened species, List of

threatened ecological communities and List of threatening processes (Commonwealth of Australia, 2000) [Legislative Instrument] as Eubalaena australis\r\n \r\n\t State Government Documents and Websites\r\n\t\r\n\t\r\n\t NSW:Southern Right Whale (Office of Environment & Heritage, 2014k) [Internet].NSW:Southern Right Whale - profile (Office of Environment & Heritage, 2014l) [Internet].TAS:Southern Right Whale (Department of Primary Industries, Parks, Water and Environment, 2014a) [Internet].TAS:Eubalaena australis (Southern Right Whale): Species Management Profile for Tasmania's Threatened Species Link (Threatened Species Section (TSS), 2014tm) [State Action Plan].VIC:Flora and Fauna Guarantee Action Statement 94 - Southern Right Whale Eubalaena australis (Seebeck, J., 2004) [State Action Plan].\r\n State Listing Status\r\n\t \r\n\t NSW:\r\n\t\t\t\r\n\t\t\t\tListed as Endangered\r\n\t\t\t\t (Biodiversity Conservation Act 2016 (New South Wales): February 2021 list)\r\n\t\t\t\t as Eubalaena australis\r\n\t\t \r\n\t\t SA:\r\n\t\t\t\r\n\t\t\t\tListed as Vulnerable\r\n\t\t\t\t (National Parks and Wildlife Act 1972 (South Australia): January 2020 list)\r\n\t\t\t\t as Eubalaena australis\r\n\t\t \r\n\t\t TAS:\r\n\t\t\t\r\n\t\t\t\tListed as Endangered\r\n\t\t\t\t (Threatened Species Protection Act 1995 (Tasmania): November 2020 list)\r\n\t\t\t\t as Eubalaena australis\r\n\t\t \r\n\t\t VIC:\r\n\t\t\t\r\n\t\t\t\tListed as Threatened\r\n\t\t\t\t (Flora and Fauna Guarantee Act 1988 (Victoria): January 2021 list)\r\n\t\t\t\t as Eubalaena australis\r\n\t\t \r\n\t\t WA:\r\n\t\t\t\r\n\t\t\t\tListed as Vulnerable\r\n\t\t\t\t (Biodiversity Conservation Act 2016 (Western Australia): September 2018 list)\r\n\t\t\t\t as Eubalaena australis\r\n\t\t \r\n\t\t \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 Least Concern\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 VIC:\r\n\t\t\t\r\n\t\t\t\tListed as Critically Endangered\r\n\t\t\t\t (Advisory List of Threatened Vertebrate Fauna in Victoria: 2013 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 Near Threatened\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 Eubalaena australis [40]\r\n \r\n Family\r\n \r\n Balaenidae:Cetacea:Mammalia:Chordata:Animalia\r\n \r\n \r\n Species author\r\n (Desmoulins, 1822)\r\n \r\n Infraspecies author\r\n \r\n Reference\r\n \r\n Other names\r\n \r\n \r\n Balaena glacialis australis [75529]\r\n \r\n \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 \r\n Illustrations\r\n \r\n \r\n Top\r\n \r\n\r\n\r\n\r\n\r\n\r\nIllustrations\r\n \r\n Google Imageshttp://www.abc.net.au/storm/exposure/twenty2.htm\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 (2000). Declaration under s178, s181, and s183 of the Environment Protection and Biodiversity Conservation Act 1999 - List of threatened species, List of threatened ecological communities and List of threatening processes. F2005B02653. Canberra: Federal Register of Legislative Instruments. Available from: http://www.comlaw.gov.au/Details/F2005B02653. In effect under the EPBC Act from 16-Jul-2000.\r\n \r\n Commonwealth of Australia (2000b). List of Migratory Species (13/07/2000). F2007B00750. Canberra: Federal Register of Legislative Instruments. Available from: http://www.comlaw.gov.au/Details/F2007B00750.\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 (DEH) (2005c). NON-CURRENT Southern Right Whale Recovery Plan 2005 - 2010. Department of the Environment and Heritage. Canberra, Commonwealth of Australia. Available from: http://www.environment.gov.au/archive/biodiversity/threatened/publications/recovery/e-australis/index.html. In effect under the EPBC Act from 18-May-2005. Ceased to be in effect under the EPBC Act from 25-Feb-2013.\r\n \r\n Department of the Environment, Water, Heritage and the Arts (2009t). Threat abatement plan for the impacts of marine debris on vertebrate marine life. Department of the Environment, Water, Heritage and the Arts. Available from: http://www.environment.gov.au/marine/publications/threat-abatement-plan-impacts-marine-debris-vertebrate-marine-life. In effect under the EPBC Act from 01-Jul-2009. Ceased to be in effect under the EPBC Act from 21-Jul-2018.\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\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\nEubalaena australis 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 21:02:07 +1100.\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 Profile Update\r\n \r\n Top\r\n \r\n \r\n The following detailed profile was last updated on 30 March 2016.\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 Initially described as Balaena australis by Desmoulins in 1822, the genus Eubalaena was described by Gray in 1864 and the southern right whale was reclassified as Eubalaena australis (Bannister et al. 1996). The taxonomic classification for the southern right whale is universally accepted and listed as a separate species by the Society of Marine Mammalogy (Committee on Taxonomy 2014).\nBased on genetic evidence, the Eubalaena genus is classified as three species (Rosenbaum et al. 2000):\nthe North Atlantic right whale (Eubalaena glacialis)\r\nthe North Pacific right whale (Eubalaena japonica)\r\nthe southern right whale (Eubalaena australis).\r\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 \r\n The southern right whale is a large baleen whale with a less streamlined shape than balaenopterids like the humpback whale (Megaptera novaeangliae). They grow to a maximum length of 17.5 m and weight of 80 t, with mature females often slightly larger than males (Bannister et al. 1996). The mean length of sexually mature females off the South African coast was calculated as 13.85 m (Best & Ruther 1992) and off Argentina as 13.66 m (Whitehead & Payne 1981). Mature females in Soviet catches from the Southern Ocean averaged 14.34 m (Tormosov et al. 1998). Southern Right Whales are about 5.5 m long and 1000-1500 kg at birth and physical maturity is reached at a length of 16 m (Bannister et al. 1996). Age at physical maturity is unknown (Bannister et al. 1996).\nThe vast majority of southern right whale individuals are uniformly black in colour, often with a white ventral blaze of varying size and shape centred on the umbilicus. About 2.8 % of adults are mottled dark brown to grey, having been white with varying degrees of black marking at birth (Bannister 1990). A small number of adults (1.4-3.4 %) have white dorsal blazing (Bannister 1990). The pectoral fins are short and paddle like, the flukes are uniform in colour with smooth trailing edges, and there is no dorsal fin.\nA distinctive feature is the presence of whitish or yellowish callosities on the rostrum, chin and lower jaw. These are formed as roughened patches of keratinised skin and colonised by cyamids (small crustaceans known as 'whale lice') (Cummings 1985a). Callosity patterns are present at birth and persist with minor variation through life, such that individual southern right whales can be identified by the number and configuration of callosities (Payne et al. 1983). They provide the basis for studies relying on an ability to recognise individuals from natural markings over long time frames (Best 1990e; Burnell & Bryden 1997; Payne 1986).\nThe southern right whale head is large compared to body size and the jaw line strongly arched (Jefferson et al. 1993). Baleen plates number from 205-270 and the baleen is usually, dark, very fine, and long (maximum 2.2 m) in comparison to other species (Cummings 1985a). Blubber thickness has been recorded from Soviet catch data as 14-17 cm for a 10 m whale and 23-24 cm for a 15 m whale (Tormosov et al. 1998).\n\r\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 The southern right whale is seasonally present along the Australian coast between late April and early November. It has been recorded in the coastal waters of all Australian states with the exception of the Northern Territory (Bannister et al. 1996).\nPrincipally found

around the southern coastline off southern Western Australia and far west South Australia, the southern right whale more commonly occurs between Sydney and Perth, including off Tasmania (Bannister 1979-2005; Bannister 1990; Burnell & McKenna 1996; Burnell & Bryden 1997; Kemper et al. 1997; Ling & Needham 1985-1991; Warneke 1989). Evidence suggests that fewer than 10% of reproductively mature females calving on the coast in any one year use the coast off Tasmania, Victoria, NSW and eastern South Australia (Burnell & McKenna 1996; Kemper et al. 1997). Sightings in more northern waters are relatively rare, but there have been records from Exmouth on the west coast (Bannister 2001) and Moreton Bay (Chilvers 2000), Stradbroke Island (Noad 2000) and Hervey Bay on the east coast.\nWithin their broader geographic range, the distribution of the southern right whale in Australia concentrates in certain areas to breed. Major calving areas are located in Western Australia at Doubtful Island Bay, east of Israelite Bay; and in South Australia at Head of Bight (Bannister 1979-2005; Burnell 1999).\nSmaller numbers of calving females are regularly seen in Victoria at Warrnambool; in South Australia at Encounter Bay and Fowlers Bay; and in Western Australia at Twilight Cove, Flinders Bay, the Albany/Cape Riche area, and the Yokinup Bay/Cape Arid area (Bannister 1979-2005; Burnell & McKenna 1996; Kemper et al. 1994; Ling & Needham 1985-1991).\nAreas used intermittently include a number of locations on the Western Australian coast west of Israelite Bay between more regular calving grounds, Sleaford Bay (South Australia), Port Fairy and Portland (Victoria), Eden (NSW), and Maria Island and Bruny Island (Tasmania) (Department of the Environment and Heritage 2005c).\nFigure 1 outlines historic, established and emerging aggregations areas for the southern right whale (taken from DSEWPaC 2012). Open detailed image in browser.\n\nThe distribution of Southern Right Whales in Australian waters other than near to the coast is unknown.\nThe southern right whale experienced a massive decline in abundance in Australian waters from the early to mid 1800s (Bannister 1986; Dawbin 1986). Current sightings records and the distribution of historic whaling suggest that the extent of occurrence in coastal waters is little changed, however it is apparent that many areas that were historically important to the species remain infrequently used today (Burnell 1999). The Derwent Estuary in Tasmania represents an area rarely occupied by the southern right whale today but which, from historical accounts, was an important pre-exploitation habitat.\nThe current area of occupancy of the southern right whale cannot be quantified due to the uncertain nature of the offshore distribution of the species, and the sporadic presence in areas of unknown importance to the species within its coastal range. It can be broadly stated that the key calving aggregations of the southern right whale in near shore waters currently occupy perhaps less than 200 km². This, however, excludes coastal areas that may be crucial for habitat connectivity between calving grounds, and does not encompass other habitat components crucial to the species such as feeding or migratory areas. No data are available from which to make assessments of the area of occupancy for these habitat components.\nDespite their high level of mobility, a slight to moderately fragmented distribution may result from geographic fidelity tendencies that occur more strongly in females. It has been hypothesised that matrilineal subpopulations may exist (Burnell 1999, 2001) which, if such subpopulation structures exist, may reduce or slow the capacity of the species to colonise or recolonise important areas. The very low numbers of the species that currently occur around south eastern Tasmania in comparison to the high numbers historically present 200 years ago may exemplify slow recolonising ability. Carrol and colleagues (2015) provide evidence for population structure across a migratory network, likely driven by fidelity to migratory destinations. This type of migratory culture has been inferred to explain the spatially variable recovery of baleen whales, including the southern right whale.\n\r\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 southern right whale is distributed in the southern hemisphere generally between 20° S and 60° S, although animals occur off the coast of Brazil at 8° S (IWC 2001) and sightings have been recorded south of 60° S (Bannister et al. 1999). Coastal breeding areas are utilised during the austral winter and spring (Bannister 1990; Best 1990d; Payne et al. 1990), but little is known of the species' offshore distribution (Bannister et al. 1997).\nThe major calving grounds are located in near-shore waters off the southern coasts of Australia and South Africa, and the Argentine coast of South America, principally between 20° S and 45° S (IWC 2001). Smaller numbers of whales are found around oceanic islands including the New Zealand sub-Antarctic Auckland and Campbell Islands and around Tristan da Cuhna and Gough Island in the South Atlantic (IWC 2001).\nDistribution in presumed southern hemisphere feeding grounds occurs across a broad latitudinal range between about 32° S and 65° S, with the main feeding areas thought to occur between 40° S and 55° S (Bannister et al. 1997, 1999; Best et al. 2002; Goodall & Galeazzi 1986; Ohsumi & Kasamatsu 1986; Tormosov et al. 1998). Feeding areas have been inferred mostly from records of historic whaling grounds (Townsend 1935). However some data has been gathered from contemporary sightings (Bannister et al. 1997, 1999; Goodall & Galeazzi 1986; Ohsumi & Kasamatsu 1986), Soviet whaling during 1950-1970 (Tormosov et al. 1998), and a single satellite telemetry study off South Africa (Best et al. 2002). The location

of feeding grounds is likely to be highly dependent on oceanic and ecosystem processes affecting prey distribution and abundance as has been observed for congeners in the northern hemisphere (Baumgartner & Mate 2003).\nStock differentiation analyses are incomplete, but at least four biologically distinct populations exist, wintering off the coasts of Australia, South Africa, Argentina and sub-Antarctic New Zealand (IWC 2001). Australian stocks may be further differentiated into a western and eastern stock (Carroll et al. 2011). The breeding areas of these four major populations are geographically separate. A low level of gene flow between populations is evidenced by both mitochondrial DNA analysis and photo-identification resights (Environment Australia 2002, 2004; Best et al. 1993; Patenaude & Harcourt 2002). These data indicate inter-mixing of the Australian population with the sub-Antarctic New Zealand population through the occasional exchange of breeding areas (Environment Australia 2002, 2004). The degree of geographic overlap of feeding areas and any inter-mixing of the Australian populations with others there is unknown.\n\r\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 The species distribution and abundance in its winter breeding habitat has been well surveyed. It is likely that its current known range in Australian coastal waters is reflective of its actual range, although surveys do not cover the whole coast. Its actual distribution in other than near shore waters is not known.\nAerial surveys of the southern right whale have been conducted annually since 1976 along the south coast, from Western Australia (Cape Leeuwin) to the east coast (Twilight Cove) (Bannister 2008, 2011a, 2011b).\nThe species was sighted (n=52) most often between May-September during aerial surveys conducted between 2002-2013 in South Australia (Gill et al. 2015).\nAerial surveys of the southern right whale were conducted in 2013 and 2014 along the south-east using the same aerial survey methodology conducted in the south-west (Watson et al. 2014). The long-term aim for this three-year project (2013-2015) is to gain an understanding of the population abundance estimate for the south-east Australian population and identify areas of importance. Photo-identification were also conducted during the surveys contributing to the South East Australian Southern Right Whale Photo-Identification Catalogue (SEA SRW PIC) (Watson et al. 2014).\nIn 2013, the development of a new aerial survey program from Head of Bight to Fowlers Bay trialled standardised repeatable aerial surveys in order to estimate southern right whale abundance and distribution within the area (Mackay & Goldsworthy 2014). This pilot study found aerial surveys effective for collecting information regarding southern right whale abundance, distribution and reproductive status of individuals (Mackay & Goldsworthy 2014).\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 Reserves: The Australian southern right whale population does not occur in its entirety within any reserve system.\nWithin Australian jurisdiction, the Great Australian Bight Marine Park (GABMP) at the Head of the Bight in South Australia, is the single marine protected area within which a defined calving ground occurs. The aims and management prescriptions of the GABMP are specifically related to southern right whale protection (DEH, SA 1998; DEH 1999). There is a provision for seasonal closure of the area to vessels to protect calving habitat, and statements relating to measuring the success of management prescriptions with regard to the southern right whale (DEH, SA 1998; DEH 1999).\nThere is a seasonal closure to vessels in the immediate vicinity of the southern right whale calving area at Warrnambool, Victoria, however this is not within an Marine Park Authority context. Individuals of the species may sporadically occur within any marine protected area within their Australian range.\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 Feeding Habitat\nThe feeding habitat of the southern right whale is very poorly known and there have been no dedicated studies in feeding areas. Based on sightings information, most feeding areas are thought to be in deeper offshore waters ranging from sub-Antarctic areas to locations south of 60° S (Bannister et al. 1997, 1999; Goodall & Galeazzi 1986; Ohsumi & Kasamatsu 1986; Tormosov et al. 1998) in areas probably associated with climatic and environmental conditions generating high productivity. A single coastal feeding area has been identified off the west coast of Africa where upwelling and thermocline development is apparent, and oceanographic conditions are thought to provide suitable feeding conditions (Best et al. 2002).\nBreeding Habitat\nDifferential use of habitat by calving and non-calving whales has been noted off Australia (Burnell & Bryden 1997), South Africa (Best 1981) and Argentina (Payne 1986), perhaps implying habitat selection within calving grounds.\nThe southern right whale prefers near-shore, shallow water depths and being in close proximity to other individuals whilst on calving grounds in Australian waters (Pirzl 2008). In breeding areas, non-calving whales are highly social whilst calving whales remain apart from robust socialising groups (Pirzl 2008). Habitat selection and habitat use on Australian calving grounds is influenced by breeding status and/or the type of calving ground, in addition to other environmental factors such as swell height (Pirzl 2008).\nThe southern right whale is constrained in their ability to colonise unused areas of potentially suitable habitat due to a high degree of site fidelity (individuals returning to the same breeding site each year). This combined with previous exploitation history suggesting extirpation of migratory

traditions to these sites (Carroll et al. 2015; Pirzl 2008).\nMigratory Habitat\nMigratory habitat parameters are unknown.\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 expectancy is unknown, but thought to be 50+ years (Bannister et al. 1996). A North Atlantic right whale was known to be at least 65 years old (Hamilton et al. 1998) and recent evidence from the closely related bowhead whale (Balaena mysticetus) indicates they can live to over 150 years (George et al. 1999).\nNatural mortality is unknown for adult whales, but is possibly fairly low. Adult female survival rates for the South African population were estimated to be 0.98 (Best et al. 2001a). Mortality of calves, juveniles, or weakened or sick adult whales may result from shark attack, although healthy adult whales are unlikely to be vulnerable. Bite marks and scars consistent with shark attack have been photographed on calves and calving females, and direct attacks on a sub-adult and an entangled adult whale have been observed (Burnell 1998-2000; Burnell 1999; Pirzl & Burnell 2001-2005). Calves and possibly adults may be vulnerable to killer whale (Orcinus orca) predation, particularly during migration and in high latitudes (Bannister et al. 1996). Adults rarely strand (Bannister et al. 1996). Calves are occasionally found dead stranded and neonatal mortality at Head of Bight was observed to be at least 3% during the first three months of life (Burnell 1999)\nAge at sexual maturity for southern right females is 5-6 years but is unknown for males (Payne 1986). The estimated age of first reproduction is 8 years (Taylor et al. 2007) and body length at sexual maturity is 13-16 m (Kenney 2009). Whales generally have one calf at three year intervals (Bannister 1990; Best 1981; Burnell 2001; Payne et al. 1990). A mean calving interval of 3.64 amounting to a calf production rate of 0.275 calves per year per mature female (Burnell 2001). The mean interval for Australian right whales is comparable with intervals of 3.7 years for the Argentine population (Payne 1986), and 3.12 years for the South African population (Best et al. 2001a). A smaller but significant proportion of mature females calve on a four-year cycle. Two, five and six or more year inter-calf intervals have been documented and are likely to be attributable to the loss of a young calf, reducing the breeding interval, and/or to the combination of several shorter intervals that went undetected (Best et al. 2001a; Burnell 2001; Cooke et al. 2001; Payne 1986). Generation length for this species is estimated to be 28.8 years (Pirzl 2008)\nSouthern right whale calving grounds are found at mid to lower latitudes and are occupied during the austral winter and early-mid spring. Mating occurs within these breeding grounds as evidenced by many observations of intromission and mating behaviours (Burnell et al. 1990; Burnell & Bryden 1997; Donnelly 1967; Payne 1986). In Australia, peak periods for mating are from mid-July through August as documented in population biology studies at Head of Bight, South Australia (Burnell 1999). Group mating behaviour and the large size of southern right whale testes have resulted in the proposition of polygamous mating in which sperm competition plays a role as important reproductive strategies (Brownell Jr & Ralls 1986). Mating frequently involves energetic surface active behaviour. Large groups of ten or more males jostling for position alongside a female can form (Kraus & Hatch 2001).\nThe southern right whale exhibits a strong tendency to return to the same breeding location (Bannister 1990; Burnell 1999; Payne 1986). This is particularly evident for reproductively mature females, where 92 % showed a tendency to return to the Head of Bight calving area (Burnell 1999). Around 85 % of calves born at Head of Bight also exhibited fidelity to their birthing location (Burnell 1999). Site fidelity is not, however, complete. Individuals do make long distance coastwise movements within a breeding season (Burnell 2001; Burnell & McKenna 1996), and movement of reproductively mature females between the breeding grounds of two separate populations has been recorded (Environment Australia 2002). While considered a highly mobile species, the tendency for individuals to return to the same location may limit or delay dispersion.\nGestation has been calculated from data from the Head of Bight calving ground as approximately 355 days for Australian right whales (Burnell 1999) and 357-396 days for the South African population (Best 1994). However, females are rarely seen at calving grounds in the year prior to birthing (Best 1994; Burnell & Bryden 1997; Payne 1986) when mating is occurring, as would be expected if gestation lasted 11-12 months. This may be explained by only a brief coastal residency by the female in the year prior to giving birth, and thus a reduced chance of being observed by identification studies (Best 1994; Payne 1986) or by mating also occurring in offshore waters (Best 1994; Brownell Jr & Ralls 1986; Payne 1986). It is also possible that gestation lasts up to two years, or that fertilisation or implantation are delayed (Payne 1986).\nIndividual identification studies in Australia have documented females on calving grounds that are shortly thereafter photographed with a neonate calf, indicating that birthing takes place in near shore waters (Burnell & Bryden 1997). Photogrammetry techniques have been used in South Africa to calculate a calf growth rate of 2.78 (0.71 cm per day) (Best & Ruther 1992). Although females are occasionally accompanied by yearlings, photo-identification resights show that calves are usually weaned within 12 months (Burnell 2001). Data from catches of Southern Right Whales by the former Soviet Union suggested that lactation lasts at least 7-8 months (Tormosov et al. 1998).\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 Knowledge of southern right whale prey

items has been gained primarily from stomach contents data collected from the until recently unreported Soviet whaling in the Southern Ocean during the 1950s-1970s (Tormosov et al. 1998). The southern right whale was found to feed on both euphausids and copepods, with a latitudinal variation in diet (Matthews 1938b; Tormosov et al. 1998). The predominant prey item north of 40° S was copepods, but these were replaced by krill south of 50° S (Tormosov et al. 1998). South of Australia, observations of suspected feeding behaviour suggested that the species also feeds on amphipod crustaceans (Bannister et al. 1997). The northern right whale is known to consume the larval Munida gregaria (Cummings 1985a), larval cirripedes (barnacles) (Mayo & Marx 1990) and copepods of the genus Calanaus and Pseduocalanaus (Murison & Gaskin 1989).\nData from sightings and a satellite telemetry study show that feeding grounds of the southern right whale probably lies between about 32° S and 65° S (Bannister et al. 1997; Best et al. 2002; Goodall & Galeazzi 1986; Ohsumi & Kasamatsu 1986; Tormosov et al. 1998). They are generally thought to be in offshore waters, however a coastal feeding area on the west African coast has recently been identified using satellite telemetry (Best et al. 2002).\nFeeding is thought to occur principally during the austral summer, but most likely extends into spring and autumn. This information is based on a direct observation of southern right whale feeding (Bannister et al. 1997) and the seasonality of stomach contents sampled from Soviet whaling ships (Tormosov et al. 1998). As might be expected from the prey distribution, foraging is not generally observed on winter breeding grounds, although opportunistic feeding has been reported at Peninsula Valdes, Argentina (Thomas 1987). Whether feeding occurs elsewhere in winter is unknown.\nMost observations of the southern right whale feeding have been made in the northern hemisphere. When skim feeding, the northern right whale swims at the surface of the water with its mouth open, capturing prey items against the baleen (Mayo & Marx 1990). Foraging dives are relatively shallow in comparison to some other cetacean species and have been reported from tag data as an average of 7.9 m to a maximum of 85.3 m (Winn et al. 1995), with a more recent study showing consistent dives to a depth of 80-175 m (Baumgartner & Mate 2003). The depth of foraging dives are associated with the distribution and concentration of zooplankton and stratification of the water column (Baumgartner & Mate 2003; Baumgartner et al. 2003b; Winn et al. 1995).\nFeeding areas for the northern right whale coincide with oceanographic fronts along which prey concentrate (Baumgartner et al. 2003a; Murison & Gaskin 1989). There is evidence from aerial surveys that Northern Right Whales preferentially select areas of highest prey concentration and will alter swim direction to remain within those areas (Watkins & Schevill 1979). It is possible that they target slower moving copepods in preference to faster moving euphausids (Murison & Gaskin 1989).\nIt seems likely that the general form of foraging behaviour of the southern right whale would be similar to the northern right whale, although strategies may vary where different prey items are targeted or where the oceanographic conditions influencing prey aggregation are different.\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 Migratory and long-distance offshore movements\nIn Australia, the southern right whale migrates seasonally between higher latitudes and mid latitudes. They are regularly present on the Australian coast from about mid-May to mid-November. Isolated sightings of individuals may also be made outside the periods of regular presence, although summer occurrence would be highly unusual. The general timing of migratory arrivals and departures varies slightly on an inter-annual basis (Bannister 1979-2005; Burnell 1998-2000; Pirzl & Burnell 2001-2005). Although the specific triggers for migratory movements are unknown, Burnell and Bryden (1997) propose several potential triggers for migration away from the Australian coast at the end of the breeding season.\nAlthough migration is not as extensive as for some baleen whale species (Dawbin 1966), long distance migratory movements of several thousand kilometres have been reported from photo-identification re-sighting data of Australian and South Atlantic southern right whales, where movements from 32° S to 64° S and over 2272 km respectively were made (Bannister et al. 1999; Best et al. 1993). Other long distance movements of up to 4424 km have been reported for the South Atlantic right whale (Best et al. 1993), and movements between the Australian and New Zealand calving grounds of 3629 km have been documented (Environment Australia 2002, 2004). Migration speeds are unknown but medium range coastal movements indicate sustained travel at 1.1-3.7 km/hr (Burnell 2001) and female-calf pairs leaving the Head of Bight calving ground maintained speeds of 2.7-4.2 km/hr over 24 hours (Burnell unpublished data). Swimming speed near shore is generally slow, but they are capable of 15+ km/hr over short distances (Bannister et al. 1996).\nMigratory pathways are not well known (Bannister et al. 1997). A circular, anticlockwise migration pattern south of the Australian continent was proposed by Hart and colleagues (1842) based on the seasonal location of whaling activity. This generalised migratory pattern is further supported by the majority of within year coastal movements being in a westerly direction and between year coastal movements being in an easterly direction (Burnell 2001). Within such an overall pattern it is likely that the majority of individual whales make direct approaches to the coast as the relative

infrequency of sightings outside major calving areas is not consistent with a widely used near-shore migratory pathway.\nMovements within coastal calving habitat\nData on coastal movements in Australian waters have been has been accumulated from the comparison of Australian photo-identification catalogues. The southern right whale undertakes long range coastwise movements showing use of widely separated areas within a single season (Burnell 2001). Of 18 within-year movements greater than 200 km made by whales identified at the Head of Bight (South Australia), the distance travelled ranged from 211 km to 1490 km (Burnell 2001). Most were made by unaccompanied adults (only one movement (704 km) made by a female with calf) (Burnell 2001), implying greater mobility of this population class within coastal habitat. Sexually mature females were recorded altering location between subsequent calving events on 13 occasions, with the most widely separated calving locations being Halsell Bay (Western Australia) to Fowlers Bay (South Australia) (Burnell 2001).\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 The Conservation Management Plan for the Southern Right Whale - 2011-2021 (DSEWPaC 2012) (a recovery plan under the EPBC Act) has identified a number of threats facing the southern right whale within Australian waters.\nKnown threats affecting the southern right whale in Australian waters are:\nA. Entanglement - Entanglement can harm or kill individual whales, and can reduce the fitness of an individual by restricting mobility and impairing breathing, swimming or feeding ability. Entanglement causes physical damage, e.g. nets and lines cutting through the skin and blubber thus exposing the animal to infection and amputation or death. Entanglements in Australian waters primarily come from commercial fishery equipment and marine debris.\nB. Vessel Disturbance - Vessel disturbance can occur in the form of collisions or by disrupting the behaviour of animals. The southern right whale appears to be the primary whale species involved in vessel collisions in the southern hemisphere. They accounted for 50 % of whale mortalities resulting from vessel collisions in a rapid assessment of data on vessel collisions with cetaceans in the southern hemisphere. Vessel collision can lead to mortality or significant injury. Chronic disturbance leading to increased energetic costs or disruption of critical social behaviours as individual animals try to avoid vessels may result from activities such as boat-based whale watching, particularly from recreational boats.\nThreats potentially affecting the Australian population of the southern right whale are:\nC. Whaling - The impacts of commercial hunting on the species have been well documented. While currently banned under the IWC moratorium on commercial whaling and due to classification by the IWC of all southern right whale populations as Protected Stocks, the potential for other countries to recommence commercial whaling exists and pressure may well increase as the population recovers.\nD. Climate Variability and Change - There is evidence that climate variability affects reproductive output in the species. Much is unknown about the impact of climate change on the food webs on which the southern right whale relies. However, research to date suggests detrimental impacts on reproductive output from warming events are possible. Changes to climate and oceanographic processes may also lead to decreased productivity and different patterns of prey distribution and availability.\nE. Noise Interference - Loud noises or long exposure may lead to avoidance of important habitat areas, interruption to communication and, in some situations, physical damage, including permanent or temporary hearing loss. Potential forms of harmful noise interference in Australian waters include seismic surveys, other industrial activities such as drilling, pile driving, blasting and dredging, defence activities, vessel noise, and aircraft operating at low altitude.\nF. Habitat Modification - Habitat modification through the development of infrastructure such as ports, marinas, aquaculture facilities, and ocean/marine energy production facilities could lead to the physical displacement of the southern right whale from their preferred habitats or disruption to normal behaviour. Animals may also encounter chemical pollution in the form of sewage and industrial discharges, run off from onshore activities, and accidental spills. In their feeding grounds they are most at risk from bioaccumulation of human-made chemicals such as organochlorines.\nG. Overharvesting of Prey - Depletion of prey through over-harvesting may be a potential future threat. Changes to climate and oceanographic processes may also lead to decreased productivity and different patterns of prey distribution and availability.\nRisk Assessment of Threats\nDue to the smaller size of the south-east subpopulation of the southern right whale the risk posed by these threats can be greater than for the south-west subpopulation. Table 1 below outlines the level of risk associated with each threat for the two subpopulations (taken from the Conservation Management Plan for the Southern Right Whale (a recovery plan under the EPBC Act) (DSEWPaC 2012). These ratings were determined assuming existing mitigation measures are implemented.\nTable 1 - Level of risk posed by threats to the south-east and south-west southern right whale subpopulations.\nThreat\r\nRisk to south-east Australian subpopulation\r\nRisk to south-west Australian subpopulation\r\nClimate variability and change\r\nVery High\r\nVery High\r\nSeismic surveys\r\nVery High\r\nVery High\r\nWhaling\r\nHigh\r\nHigh\r\nCommercial fisheries or aquaculture equipment\r\nHigh\r\nModerate\r\nChronic industrial noise\r\nHigh\r\nModerate\r\nInfrastructure/coastal

development\r\nHigh\r\nModerate\r\nVessel collisions\r\nHigh\r\nModerate\r\nAcute industrial noise\r\nHigh\r\nModerate\r\nWhale watching\r\nModerate\r\nModerate\r\nShipping noise\r\nModerate\r\nModerate\r\nMarine debris\r\nModerate\r\nModerate\r\nAircraft noise\r\nModerate\r\nModerate\r\nOverharvesting of prey\r\nModerate\r\nModerate\r\nChronic chemical pollution\r\nLow\r\nLow\r\nAcute chemical discharge\r\nLow\r\nLow\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 The Conservation Management Plan for the Southern Right Whale - 2011-2021 (DSEWPaC 2012) (a recovery plan under the EPBC Act) identified actions that were prioritised to deliver tangible results to meet the Interim Recovery Objectives over time. There are a number of action areas identified in the Conservation Management Plan that address the 'very high' and 'high' risk threats to the species. Actions that support measuring population recovery, distribution and identification of migration patterns were also prioritised. These actions and their ratings are summarised in Table 2.\nTable 2. Summary of actions and priority ratings identified in the Conservation Management Plan for the Southern Right Whale (DSEWPaC 2012).\nAction\r\nPriority rating\r\nAssessing and addressing threats\r\nMaintain and improve existing legal and management protection\r\nVery High\r\nAssessing and addressing anthropogenic noise: shipping, industrial and seismic surveys\r\nVery High\r\nReducing commercial fishing entanglements\r\nVery High\r\nImpacts of climate variability and change\r\nHigh\r\nAddressing vessel collisions\r\nHigh\r\nAddressing infrastructure and coastal development impacts\r\nHigh\r\nEnabling and measuring recovery\r\nMeasuring and monitoring population recovery\r\nVery High\r\nInvestigating two-population model\r\nHigh\r\nUnderstanding offshore distribution and migration\r\nHigh\r\nCharacterising behaviour and movements\r\nHigh\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 southern right whale has been identified as a conservation value in the Temperate East (DSEWPaC 2012aa) and South-west (DSEWPaC 2012z) marine regions. See Schedule 2 of the South-west Marine Bioregional Plan (DSEWPaC 2012z) for regional advice. Maps of Biologically Important Areas have been developed for southern right whale in the South-west Marine Region and may provide additional relevant information. Go to the conservation values atlas to view the locations of these Biologically Important Areas. The \"species group report card - cetaceans\" for the Temperate East (DSEWPaC 2012aa) and South-west (DSEWPaC 2012z) marine regions provide additional information.\nMarine bioregional plans have not been developed for the Great Barrier Reef Marine Park, the Coral Sea Commonwealth Marine Reserve, the South East marine bioregion or the Torres Strait. Preliminary work may have been undertaken to identify conservation values, Key Ecological Features and Biologically Important Areas in these areas, but these data are currently not available.\n\r\n \r\n \r\n \r\n \r\n Major Studies\r\n \r\n \r\n Top\r\n \r\n \r\n \r\n Studies of the southern right whale underway or undertaken in Australia include:\nAerial surveys of south-western and south-central Australia, population estimates and south-west Australia photo-identification catalogue maintenance - J. Bannister, Western Australian Museum (ongoing since 1976).\r\nSouthern right whale habitat preference study - R. Pirzl, Deakin University (2002 to present).\r\nPopulation biology of the southern right whale at Head of Bight, South Australia and south-central Australia photo-identification catalogue (ongoing since 1991) - S. Burnell and R. Pirzl, Eubalaena Pty Ltd.\r\nGenetic study in south-east Australia - N. Patenaude and R. Harcourt, Macquarie University.\r\nSouth-east Australia photo-identification curation - M. Watson, Victorian Department of Sustainability and Environment.\r\nSummary of mortalities and human interactions - C. Kemper and S. Gibbs, South Australian Museum.\r\nDevelopment of the National Vessel Strike Strategy by the Australian Government Department of the Environment.\r\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 Commonwealth:\nConservation Management Plan for the Southern Right Whale (DSEWPAC 2012).\r\nAustralian National Guidelines for Whale and Dolphin Watching (DEH 2005c).\r\nGuidelines on the application of the Environment Protection and Biodiversity Conservation Act to interactions between offshore seismic operations and larger cetaceans (EA 2001k).\r\nThe Great Australian Bight Marine Park (Commonwealth) Management Plan (DEH 1999) contains objectives and provisions relating to the protection of the southern right whale and their calving habitat.\r\nInformation Sheet - Harmful Marine Debris (EA

2003ac)\r\nVictoria:\nAn Action Statement has been prepared under state legislation (Seebeck 2004) to further protect the southern right whale.South Australia:\nThe Management Plan for the Great Australian Bight Marine Park (DEH, SA 1998) aims to prevent vessel access to the Head of Bight calving area seasonally. It contains objectives and provisions relating to the protection of the species and its calving habitat.\n\r\n \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 Bannister, J. (2008). Population trend in right whales off southern Australia 1993-2007. Unpublished report (SC/60/BRG14) presented to the Scientific Committee of the International Whaling Commission, Cambridge, UK.\r\n \r\n Bannister, J. (2011). Population Trend in right whales off southern Australia 1933-2010. Paper SC/S11/RW10 presented to the IWC Scientific Committee, 2011.\r\n \r\n Bannister, J. (2011a). Southern right whale aerial survey, southern Australian coast, August, 2010. Final Report on work funded by the Australian Government through the Australian Marine Mammal Centre.\r\n \r\n Bannister, J.L. (1979-2005). Annual Reports on aerial surveys of Southern Right Whales on the southern Australian coastline. Western Australian Museum, Perth.\r\n \r\n Bannister, J.L. (1986). Notes on nineteenth century catches of Southern Right Whales (Eubalaena australis) off the southern coasts of Western Australia. Report to the International Whaling Commission. Page(s) 255-259.\r\n \r\n Bannister, J.L. (1990). Southern Right Whales off Western Australia. Report of the International Whaling Commission (Special Issue 12). Page(s) 279-288.\r\n \r\n Bannister, J.L. (2001). Status of southern right whales (Eubalaena australis) off southern Australia. Journal of Cetacean Research and Management (Special Issue 2). Page(s) 103-110.\r\n \r\n Bannister, J.L., C.M. Kemper & R.M. Warneke (1996). The Action Plan for Australian Cetaceans. Canberra: Australian Nature Conservation Agency. Available from: http://www.environment.gov.au/resource/action-plan-australian-cetaceans.\r\n \r\n Bannister, J.L., L.A. Pastene & S.R. Burnell (1999). First records of southern right whales movement between warm water breeding grounds and the Antarctic Ocean, south of 60°S. Marine Mammal Science. 15(4):1337-1342.\r\n \r\n Bannister, J.L., S. Burnell, C. Burton & H. Kato (1997). Right whales off Southern Australia:Direct evidence for a link between onshore breeding gounds and offshore probable feeding grounds. Report of the International Whaling Commission. 47:441-444.\r\n \r\n Baumgartner, M.F. & B.R. Mate (2003). Summertime foraging ecology of North Atlantic right whales. Marine Ecology-Progress Series. Page(s) 123-135.\r\n \r\n Baumgartner, M.F., T.V.N. Cole, P.J. Clapham & B.R. Mate (2003a). North Atlantic right whale habitat in the lower Bay of Fundy and on the SW Scotian Shelf during 1999-2001. Marine Ecology-Progress Series. Page(s) 137-154.\r\n \r\n Baumgartner, M.F., T.V.N. Cole, R.G. Campbell, G.J. Teegarden & E.G. Durbin (2003b). Associations between North Atlantic right whales and their prey, Calanus finmarchicus, over diel and tidal time scales. Marine Ecology-Progress Series. Page(s) 155-166.\r\n \r\n Best, P.B. (1981). The status of right whales (Eubaleana glacialis) off South Africa, 1969-1979. Investigational Report of the Sea Fisheries Institute, South Africa. 123:1-44.\r\n \r\n Best, P.B. (1990d). Natural markings and their use in determining calving intervals in right whales off South Africa. South African Journal of Zoology. 25(2):114-123.\r\n \r\n Best, P.B. (1990e). Trends in the Inshore Right Whale Population off South Africa, 1969-1987. Marine Mammal Science. 6(2):93-108.\r\n \r\n Best, P.B. (1994). Seasonality of reproduction and the length of gestation in southern right whales Eubalaena australis. Journal of Zoology. 232:175-189. London.\r\n \r\n Best, P.B. & H. Ruther (1992). Aerial photgrammetry of southern right whales, Eubalaena australis. Journal of Zoology. 228:595-614. London.\r\n \r\n Best, P.B., A. Brandao & D.S. Butterworth (2001a). Demographic parameters of Southern Right Whales of South Africa. Journal of Cetacean Research and Management. Page(s) 161-169.\r\n \r\n Best, P.B., B. Mate, J. Barendse, S. Elwen, M. Thornton & H. Verheye (2002). Evidence for a summer feeding ground for right whales on the west coast of South Africa SC/54/BRG8. International Whaling Commission.\r\n \r\n Best, P.B., R. Payne, V. Rowntree, J.T. Palazzo & M. Do Carmo Both (1993). Long-range movements of South Atlantic right whales, Eubalaena australis. Marine Mammal Science. 9:227-234.\r\n \r\n Braham, H.W. & D.W. Rice (1984). The right whale, Balaena glacialis. Breiwick, J.M. & H.W. Braham, eds. The Status of Endangered Whales: Marine Fisheries Review. 46(4):38-44.\r\n \r\n Brownell, R.L. Jr. & K. Ralls (1986). Potential for sperm competition in baleen whales. Report of the International Whaling Commission Special Issue. 8:97-112.\r\n \r\n Burnell A, S.R. Burnell & M. Tagg (1990). Observations on an apparent mating sequence in three Southern Right Whales, Eubalaena australis (Cetacea: Balaenidae). Australian Mammalogy. Page(s) 33-34.\r\n \r\n Burnell, S. & T. McKenna (1996). An incidental flight network for the photo-identification of southern right whales off south-eastern Australia. Report to BHP Petroleum Pty Ltd. Unpublished.\r\n \r\n Burnell, S.R. (1999). The population biology of southern right whales in southern Australian waters. Unpublished Ph.D. Thesis. Ph.D. Thesis. University of Sydney, Sydney, Australia.\r\n \r\n Burnell, S.R. (2001). Aspects of the reproductive biology, movements and

site fidelity of right whales off Australia. Journal of Cetacean Research and Management (Special Issue 2). Page(s) 89-102.\r\n \r\n Burnell, S.R. & M.M. Bryden (1997). Coastal residence periods and reproductive timing in southern right whales, Eubalaena australis. Journal of Zoology. 241(4):613-621. London.\r\n \r\n Carroll, E., N. Patenaude, A. Alexander, D. Steel, R. Harcourt, S. Childerhouse, S. Smith, J. Bannister, R. Constantine & C. Scott Baker (2011). Population structure and individual movement of southern right whales around New Zealand and Australia. Marine Ecology Progress Series. 432:257-68.\r\n \r\n Carroll, E.L., C.S. Baker, M. Watson, R. Alderman, J. Bannister, O.E. Gaggiotti, D.R. Gröcke, N. Patenaude & R. Harcourt (2015). Cultural traditions across a migratory network shape the genetic structure of southern right whales around Australia and New Zealand. Scientific Reports. 5:16182. doi: 10.1038/srep16182.\r\n \r\n Cassini, M.H. & B.L. Vila (1990). Cluster analysis of group types in Southern Right Whale (Eubalaena australis). Marine Mammal Science. 6:17-24.\r\n \r\n Chilvers, B.L. (2000). Southern Right Whales Eubalaena australis (Desmoulins, 1822) in Moreton Bay, Queensland. Memoirs of the Queensland Museum. 45:576.\r\n \r\n Committee on Taxonomy (2014). List of marine mammal species and subspecies. Society for Marine Mammalogy. Available from: http://www.marinemammalscience.org.\r\n \r\n Cooke, J.G., V.J. Rowntree & R. Payne (2001). Estimates of demographic parameters for Southern Right Whales (Eubalaena australis) observed off Peninsula Valdes, Argentina. Journal of Cetacean Research and Management. Page(s) 125-132.\r\n \r\n Cummings, W.C. (1985a). Right whales Eubalaena glacialis (Muller, 1776) and Eubalaena australis (Desmoulins, 1822). In: Ridgway, S.H. and R. Harrison, eds. Handbook of Marine Mammals Vol. 3: Chapter 10 The Sirenians and Baleen Whales. Page(s) 275-304. London: Academic Press.\r\n \r\n Dawbin, W.H. (1966). The Seasonal Migratory Cycle of Humpback Whales. In: Norris, K.R., ed. Whales, Dolphins and Porpoises. Page(s) 145-170. Berkeley and Los Angeles: University of California Press.\r\n \r\n Dawbin, W.H. (1986). Right whales Caught in Waters around South-eastern Australia and New Zealand during the Nineteenth and early Twentieth centuries. Report of the International Whaling Commission (Special Issue 10). Page(s) 261-268.\r\n \r\n Department of Environment and Heritage, South Australia (DEH, SA) (1998). Great Australian Bight Marine Park Management Plan Part A (Management Prescriptions) and Part B (Resource Information). Department of Environment and Heritage, Adelaide.\r\n \r\n Department of Sustainability, Environment, Water, Population and Communities (2012b). Conservation Management Plan for the Southern Right Whale. A Recovery Plan under the Environment Protection and Biodiversity Conservation Act 1999 2011-2021. Canberra, ACT: Department of Sustainability, Environment, Water, Population and Communities. Available from: http://www.environment.gov.au/resource/conservation-management-plan-southern-right-whale-recovery-plan-under-environment. In effect under the EPBC Act from 26-Feb-2013.\r\n \r\n Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) (2012aa). Marine bioregional plan for the Temperate East Marine Region. Prepared under the Environment Protection and Biodiversity Conservation Act 1999. Available from: http://www.environment.gov.au/topics/marine/marine-bioregional-plans/temperate-east. In effect under the EPBC Act from 27-Aug-2012.\r\n \r\n Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) (2012z). Marine bioregional plan for the South-west Marine Region. Prepared under the Environment Protection and Biodiversity Conservation Act 1999. Available from: http://www.environment.gov.au/topics/marine/marine-bioregional-plans/south-west. In effect under the EPBC Act from 27-Aug-2012.\r\n \r\n Department of the Environment and Heritage (DEH) (1999). Great Australian Bight Marine Park Management Plan (Commonwealth waters). Australian Government Department of the Environment and Heritage, Canberra. Available from: http://www.environment.gov.au/coasts/mpa/publications/gab-plan.html.\r\n \r\n Department of the Environment and Heritage (DEH) (2005c). NON-CURRENT Southern Right Whale Recovery Plan 2005 - 2010. Department of the Environment and Heritage. Canberra, Commonwealth of Australia. Available from: http://www.environment.gov.au/archive/biodiversity/threatened/publications/recovery/e-australis/index.html. In effect under the EPBC Act from 18-May-2005. Ceased to be in effect under the EPBC Act from 25-Feb-2013.\r\n \r\n Donnelly, B.G. (1967). Observations on the mating behaviour of the Southern Right Whale Eubalaena australis. South African Journal of Science. 63:176-181.\r\n \r\n Environment Australia (2001k). Guidelines on the application of the Environment Protection and Biodiversity Conservation Act to interactions between offshore seismic operations and larger cetaceans. Available from: http://www.environment.gov.au/epbc/policy/seismic/index.html.\r\n \r\n Environment Australia (2003ac). Information Sheet - Harmful marine Debris. Available from: http://www.environment.gov.au/biodiversity/threatened/publications/marine-debris.html.\r\n \r\n Environment Australia (EA) (2002). Report on the seminar/workshop on photo-identification comparison of

Australasian right whales. Adelaide, South Australia, March 22-25, 2002. Department of the Environment and Heritage, Canberra.\r\n \r\n Environment Australia (EA) (2004). Report of the workshop on photo-identification comparison of Australasian right whales. Adelaide, South Australia. Department of the Environment and Heritage, Canberra.\r\n \r\n George, J.C., J. Bada, J. Zeh, L. Scott, S.E. Brown, T. O'Hara & R. Suydam (1999). Age and growth estimates of bowhead whales (Balaena mysticetus) via aspartic acid racemization. Canadian Journal of Zoology. 77:571-580.\r\n \r\n Gill, P.C., R. Pirzl, M.G. Morrice & K. Lawton (2015). Cetacean diversity of the continental shelf and slope off southern Australia. The Journal of Wildlife Management.\r\n \r\n Goodall, R.N.P. & A.R. Galeazzi (1986). Recent sightings and strandings of southern right whales off subantarctic South America and the Antarctic Peninsula. Report to the International Whaling Commission (Special Issue 10). Page(s) 173-176.\r\n \r\n Hamilton, P.K., A.R. Knowlton, M.K. Marx & S.D. Kraus (1998). Age structure and longevity in North Atlantic right whales Eubalaena glacialis and their relation to reproduction. Marine Ecology Progress Series. 171:285-292.\r\n \r\n Harcourt, R., E. Carroll, M. Watson & R. Alderman (2015). Genetic distinctiveness and fine-scale population structure of the southeast Australian southern right whale wintering ground. Final Report to The Australian Marine Mammal Centre 13/37.\r\n \r\n Hart, Hagan & Baker (1842). Report on Whaling in South Australia. Proceedings of the Royal Geographical Society. 22:22-34.\r\n \r\n International Whaling Commission (IWC) (2001). Report of the workshop on the comprehensive assessment of right whales: A worldwide comparison. Journal of Cetacean Research and Management. Page(s) 1-60.\r\n \r\n International Whaling Commission (IWC) (2013). Report of the IWC Workshop on the Assessment of Southern Right whales. Journal of Cetacean Research and Management. 14(Supp.):439-461.\r\n \r\n Jefferson, T.A., S. Leatherwood & M.A. Webber (1993). FAO species identification guide. Marine Mammals of the World. Rome: United Nations Environment Programme, Food and Agricultural Organization. Available from: ftp://ftp.fao.org/docrep/fao/009/t0725e/t0725e00.pdf. [Accessed: 15-Aug-2007].\r\n \r\n Kemper, C.M., J. Mole, R.M. Warneke, J.K. Ling, D.J. Needham & J.E. Wapstra (1994). Southern Right Whales in south-eastern Australia during 1991-1993. BHP Petroleum Ltd, Melbourne.\r\n \r\n Kemper, C.M., J. Mole, R.M. Warneke, J.K. Ling, D.J. Needham & J.E. Wapstra (1997). Southern Right Whales in south-eastern Australia - aerial surveys during 1991-93 and incidental information from 1904. In: Hindell, M & C. Kemper, eds. Marine Mammal Research in the Southern Hemisphere. 1. Chipping Norton, Melbourne, Australia: Surrey Beatty and Sons.\r\n \r\n Kenney, R.D. (2009). Right whales Eubalaena glacialis, E. japonica, and E. australis. In: Perrin, W.F., B. Würsig & J.G.M. Thewissen, eds. Encyclopedia of marine mammals 2nd Edition.\r\n \r\n Kraus, S.D. & J.J. Hatch (2001). Mating strategies in the North Atlantic right whale (Eubalaena glacialis). Journal of Cetacean Research and Management. Page(s) 237-244.\r\n \r\n Ling, J.K. & D.J. Needham (1985-91). Annual reports on Southern Right Whale surveys, South Australia. Australian National Parks and Wildlife Service, Canberra.\r\n \r\n Mackay, A.I., & S.D. Goldsworthy (2014). Development and Implementation of a New Survey Protocol for Monitoring Southern Right whales in the Great Australian Bight. South Australian Research and Development Institute (Aquatic Sciences), Adelaide. SARDI Publication No. F2014/000052-1. SARDI Research Report Series No. 756.\r\n \r\n Matthews, L.H. (1938b). Notes on the southern right whale Eubalaena australis. Discovery Reports. 17:169-182.\r\n \r\n Mayo, C.A. & M.K. Marx (1990). Surface foraging behaviour of the North Atlantic right whale, Eubalaena glacialis, and associated zooplankton characteristics. Canadian Journal of Zoology. 68:2214-2220.\r\n \r\n Murison, L.D. & D.E. Gaskin (1989). The disbribution of right whales and zooplankton in the Bay of Fundy, Canada. Canadian Journal of Botany. 67:1411-1420.\r\n \r\n Noad, M.J. (2000). A Southern Right Whale Eubalaena australis (Desmoulins, 1822) in southern Queensland waters. Scientific Reports of the Whales Research Institute, Tokyo. 45:556.\r\n \r\n Ohsumi, S. & F. Kasamatsu (1986). Recent off-shore distribution of the Southern Right Whale in summer. Report to the International Whaling Commission (Special Issue 10). Page(s) 177-184.\r\n \r\n Patenaude, N.J. & R. Harcourt (2002). Genetic stock identification of Southern Right Whales off south-east Australia. Final Report to Environment Australia. Macquarie University, Sydney.\r\n \r\n Patenaude, N.J. & R. Harcourt (2006). Stock Identification of southern right whales in Australia. Marine Mammal Research Group Macquarie University. National Whale and Dolphin Research Conference, Adelaide. Available from: http://www.environment.gov.au/coasts/species/cetaceans/conference/pubs/srw-patenaude.pdf.\r\n \r\n Payne R., O. Brazier, E.M. Dorsey, J.S. Perkins, V.J. Rowntree & A. Titus (1983). External features in Southern Right Whales (Eubalaena australis) and their use in identifying individuals. In: Payne R., ed. Communication and Behaviour of Whales. Page(s) 371-445. Westview Press, Boulder.\r\n \r\n Payne, R. (1986). Long term behavioral studies of the southern right whale (Eubalaena australis). Report to the International Whaling Commission (special issue 10). Page(s) 161-167.\r\n \r\n Payne, R., V. Rowntree, J.S. Perkins, J. Cooke & K. Lankester (1990). Population Size, Trends and Reproductive

Parameters of Right Whales (Eubalaena australis) off Peninsula Valdes, Argentina. Reports of the International Whaling Commission (Special Issue 12). Page(s) 271-278.\r\n \r\n Pirzl, R. (2008). Spatial ecology of E. australis: habitat selection at multiple scales. Ph.D. Thesis. School of Life and Environmental Sciences, Deakin University.\r\n \r\n Pirzl, R., N.J. Patenaude, S. Burnell & J. Bannister (2009). Movements of southern right whales (Eubalaena australis) between Australian and subantarctic New Zealand populations. Marine Mammal Science. 25:455-461.\r\n \r\n Pirzl, R.M. & S.R. Burnell (2001-2005). Behaviour and ecology of Southern Right Whales, Head of Bight, South Australia. Annual Reports 2000-2005, Hobart.\r\n \r\n Rosenbaum, H.C., R.L. Brownell, M.W. Brown, C. Schaeff, V. Portway, B.N. White, S. Malik, L.A. Pastene, N.J. Patenaude, C.S. Baker, M. Goto, P.B. Best, P.J. Clapham, P. Hamilton, M. Moore, R. Payne, V. Rowntree, C.T. Tynan, J.L. Bannister & R. Desall (2000). World-wide Genetic Differentiation of Eubalaena: Questioning the Number of Right Whale species. Molecular Ecology. 9:1793-1802.\r\n \r\n Rowntree, V.J., R.S. Payne & D.M. Schell (2001). Changing patterns of habitat use by Southern Right Whales (Eubalaena australis) on their nursery ground at Peninsula Valdes, Argentina, and in their long-range movements. Journal of Cetacean Research and Management. Page(s) 133-143.\r\n \r\n Seebeck, J. (2004). Flora and Fauna Guarantee Action Statement 94 - Southern Right Whale Eubalaena australis. Victorian Department of Sustainability and Environment. Available from: http://www.depi.vic.gov.au/environment-and-wildlife/threatened-species-and-communities/flora-and-fauna-guarantee-act-1988/action-statements.\r\n \r\n Taylor, B.L., S.J. Chivers, J. Larese & W.F. Perrin (2007). Generation length and percent mature estimates for IUCN assessments of cetaceans. Southwest Fisheries Science Center.\r\n \r\n Thomas, P.O. (1987). Social behaviour, habitat use, and interspecific interaction of Southern Right Whale, Eubalaena australis, mother-calf pairs. Ph.D. Thesis. University of California, Davis.\r\n \r\n Tormosov, D.D., Y.A. Mikhaliev, P.B. Best, V.A. Zemsky, K. Sekiguchi, & R.L. Brownell (1998). Soviet Catches of Southern Right Whales Eubalaena australis, 1951-1971. Biological Data and Conservation Implications. Biological Conservation. 86(2):185-197.\r\n \r\n Townsend, C.H. (1935). The distribution of certain whales as shown by logbook records of American whaleships. Zoologica N.Y. 19:1-50.\r\n \r\n Warneke, R.M. (1989). Review of southern right whale activity on the Victorian coast, 1942 to 1988. Unpublished Report Dept. of Conservation, Forest & Lands, Victoria, Australia.\r\n \r\n Watkins, W.A. & W.E. Schevill (1979). Aerial observation of feeding behaviour in four baleen whales: Eubalaena glacialis, Balaenoptera borealis, Megaptera novaeangliae, Balaenoptera physalus. Journal of Mammalogy. 60:155-163.\r\n \r\n Watson, M., I. Westhorpe, J. Bannister, R. Harcourt & S. Hedley (2013). Assessment of Numbers and Distribution of Southern Right whales in South-east Australia. Final Report to The Australian Marine Mammal Centre 12/29.\r\n \r\n Watson, M., I. Westhorpe, J.L. Bannister & R. Harcourt (2014). Assessment of Numbers and Distribution of Southern Right whales in South-east Australia â\u0080\u0093 Year 2. Final Report to The Australian Marine Mammal Centre 13/29.\r\n \r\n Whitehead, H. & R. Payne (1981). New techniques for assessing populations of right whales without killing them. Mammals in the seas. 3:189-209. FAO, Rome.\r\n \r\n Winn, H.C., J.D. Goodyear, R.D. Kennedy & R.O. Petricig (1995). Dive patterns of tagged right whales in the Great South Channel. Continental Shelf Research. 15:593-611.\r\n \r\n \r\n\r\n"