

Southern right whale
(*Eubalaena australis*)

5-Year Review:
Summary and Evaluation

National Marine Fisheries Service
Office of Protected Resources
Silver Spring, MD

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5-YEAR REVIEW
Southern right whale (*Eubalaena australis*)

1.0 GENERAL INFORMATION

1.1 Reviewers

Lead Regional or Headquarters Office: Office of Protected Resources, Chris Uyeda 301-713-1401 x150

1.2 Methodology used to complete the review:

The 5-year review was completed by the Office of Protected Resources and reviewed by the following experts: Dr. C. Scott Baker (Marine Mammal Program, Oregon State University), John Bannister (Western Australian Museum), Dr. Robert L. Brownell Jr. (NMFS Southwest Fisheries Science Center), Dr. Phillip Clapham (NMFS Alaska Fisheries Science Center), Dr. Randall Reeves (U.S. Marine Mammal Commission), and Dr. Victoria Rowntree (Department of Biology, University of Utah).

1.3 Background:

1.3.1 FR Notice citation announcing initiation of this review:

January 22, 2007 (72 FR 2649)

1.3.2 Listing history

Original Listing

FR notice : 35 FR 18319

Date listed: 12/02/1970

Entity listed: *Eubalaena spp.*

Classification: Endangered

In 1970, the U.S. Fish and Wildlife Service listed all members of the genus *Eubalaena* on the List of Endangered Foreign Fish and Wildlife under the Endangered Species and Conservation Act (ESCA) of 1969. In 1974, following the passage of the Endangered Species Act (ESA), all members of the genus *Eubalaena* were transferred to the List of Endangered and Threatened Wildlife under the ESA.

1.3.3 Associated rulemakings: NA

1.3.4 Review history:

S.L. Perry, D.P. DeMaster, and G.K. Silber. 1999. The Great Whales: History and Status of Six Species Listed as Endangered Under the U.S. Endangered

Species Act of 1973. Marine Fisheries Review 61:1, pp.44-51. Department of Commerce.

1.3.5 Species' recovery priority number at start of 5-year review:

No recovery priority number has been issued for the southern right whale.

1.3.6 Recovery plan or outline

No recovery plan has been completed for the southern right whale.

Section 4(f) of the ESA requires NOAA Fisheries to develop and implement recovery plans for the conservation and survival of all endangered or threatened species, unless such a plan will not promote the conservation of the species. In general, listed species which occur entirely outside U.S. jurisdiction – such as *E. australis* – are not likely to benefit from recovery plans (55 FR 24296; June 15, 1990).

2.0 REVIEW ANALYSIS

2.1 Application of the 1996 Distinct Population Segment (DPS) policy

2.1.1 Is the species under review a vertebrate?

Yes
 No

2.1.2 Is the species under review listed as a DPS?

Yes
 No

2.1.3 Is there relevant new information for this species regarding the application of the DPS policy?

Yes
 No

Sufficient new scientific information has been published in the last ten years indicating that DPSs for the southern right whale may be warranted. Specifically, information in this review suggests that four DPSs may be warranted: western South Atlantic, eastern South Atlantic, Australia, and New Zealand. This preliminary determination is based on the information presented below and in Section 2.3. However, we recommend a full status review be conducted for the southern right whale in order to conclusively determine whether, and to what extent, DPSs determinations are appropriate.

Patenaude et al. (2007) analyzed the population structure of southern right whales on the four major winter calving grounds (Argentina, South Africa, Western Australia and New Zealand) and indicated there are two clades that differ in frequency between oceans with significant differentiation between the four calving grounds. Mitochondrial DNA samples were collected from 146 individual whales from the four calving grounds and two summer feeding grounds (South Georgia and south of Western Australia). Analysis of molecular variance (AMOVA) results confirmed significant differentiation among all four calving grounds at both the haplotype and nucleotide level. Additional statistical tests (F_{ST} and χ^2) were not significant for the South Africa and Argentina populations; However, the results do not necessarily suggest a high level of gene flow between these populations (Patenaude et al., 2007).

Genetic and physical differences between western and eastern Atlantic populations may fulfill the discreteness requirement under the 1996 DPS policy. Comparison of mitochondrial DNA (mtDNA) haplotype frequencies between species in South Africa (n=21), Argentina (n=20), and South Georgia (n=8) found significant genetic differentiation between the two populations. The results indicate restricted gene flow between the western and eastern Atlantic, and the authors conclude the two populations should be considered “genetically distinct” for the purposes of management and conservation (Portway et al., 1998 and Rowntree et al., 2001). Differences in the dorsal color markings between populations also suggest limited nuclear gene flow between the western and eastern Atlantic (Schaeff et al., 1999). Physical evidence further suggests these two populations are discrete. Nearly one third of wintering whales in Argentina have scars from kelp gulls whereas none of the 484 females examined in South Africa have been documented with these marks. Lastly, the International Whaling Commission (IWC) Scientific Committee agrees that whales off South Africa and Argentina represent separate stocks and they should be considered separate management units (IWC, 2001). While the best available science suggests populations in the western and eastern Atlantic are discrete, additional genetic research using more sensitive nuclear markers, such as microsatellites, would better measure biparental gene flow and confirm these findings.

The discreteness of the Australia and New Zealand DPSs is supported by physical, behavioral and genetic data. Movements of *E. australis* along Australia and New Zealand suggest the two populations do not mix. Studies by Bannister (2001) and Burnell (2001) both conclude the movements of *E. australis* along the southern coastline of Australia are indicative of a single, undivided population. Participants at the IWC Workshop on the Comprehensive Assessment of Right Whales also agreed that the Australian population should be considered a single management unit and likely represents a true biological population (IWC, 2001). Recent observations of movements between the Auckland and Campbell Islands confirm wintering whales in sub-Antarctic New Zealand are part of a single, intermingling population (Patenaude et al., 2001). Lastly, the results of an AMOVA analysis comparing mtDNA samples between whales in New Zealand (n=20) and Australia (n=20) found significant genetic differentiation between the two populations (Baker et al., 1999). However, three recently recorded movements of animals between South Australia and the Auckland Islands (Anon, 2004) suggest there may be a limited amount of mixing between sub-Antarctic New Zealand and Australian populations. These findings represent the best available science, but additional research using satellite-linked

radio tags and more sensitive nuclear markers would better define the genetic relationship of these populations and the relationship to southeast Australia and Tasmania.

There is also some evidence that the sub-Antarctic New Zealand and mainland New Zealand populations represent discrete stocks. Population growth rates for these two populations are different with little recovery around the mainland, and there has been no documented movement between these areas. However, genetic research is limited, and it is still unclear if these populations are maternally or reproductively isolated (Patenaude, 2003 and Patenaude et al., 2007). It is possible that the New Zealand population should be subdivided into a mainland and sub-Antarctic population, but further research is needed to confirm whether they are discrete population segments.

Lastly, very little information has been published regarding *E. australis* off Chile/Peru, however, small numbers of right whales are known to occur in this area and there is some evidence suggesting the population may warrant a DPS determination. For example, the Cetacean Specialist Group of the World Conservation Union (IUCN) Species Survival Commission is currently considering a proposal to list a putative Chile/Peru “sub-population” of *E. australis* as a separate stock on the Red List of Threatened Species. The IWC Scientific Committee briefly considered the status of right whales off Chile and Peru during the 2007 IWC Meeting in Anchorage (IWC, 2007) and agreed to consider the population further during the 2008 IWC Meeting in Santiago, Chile (IWC, 2007b).

The western South Atlantic, eastern South Atlantic, Australia and New Zealand populations may also meet the significance criterion of the 1996 DPS Policy because the loss of any one of them might result in a substantial loss in the range of the species. See Section 2.3.1 for further information on the range of the southern right whale.

Based on the above information, we recommend a full status review be conducted for the southern right whale in order to conclusively determine whether, and to what extent, DPS delineations are appropriate.

2.2 Recovery Criteria

2.2.1 Does the species have a final, approved recovery plan containing objective, measurable criteria?

Yes
 No

Section 4(f) of the ESA requires NOAA Fisheries to develop and implement recovery plans for the conservation and survival of all endangered or threatened species, unless such a plan will not promote the conservation of the species. In general, listed species which occur entirely outside U.S. jurisdiction – such as *E. australis* – are not likely to benefit from recovery plans (55 FR 24296; June 15, 1990).

2.3 Updated Information and Current Species Status

2.3.1 Biology and Habitat

2.3.1.1 New information on the species' biology and life history:

Knowledge of the basic biology and life history of *E. australis* has not substantially changed since the last review in 1999.

Adult females of *E. australis* range from 12.5 to 15.5m in length and average about 14m, with males probably being somewhat smaller. Maximum mass is about 60 tons. The body has a robust shape where the girth can be 60% of the total length. Body coloration is mostly black with ventral patches of white. The head of *E. australis* is large, comprising up to a quarter of the whale's body length, and the lower jaw is strongly bowed. As one of five species belonging to the Balaenidae family, *E. australis* is distinguished from rorqual whales by their lack of throat grooves, lack of dorsal fin, V-shaped blow, broad body shape, and unique callosity patterns.

Like other baleen whales, *E. australis* is a migratory species. Its habitat includes a range of waters between 20° and 60°S, though they have been recorded beyond these latitudes. During the winter, they calve and nurse in temperate latitudes and in sub-Antarctic New Zealand and then migrate south in the summer to polar latitudes where they feed primarily on euphausiids (krill) and copepods. Major wintering grounds have been identified off South America, Australia, New Zealand and South Africa. The location of summer feeding grounds is known with lesser certainty; however, feeding right whales have been recorded at *ca* 45°S south of Western Australia, around South Georgia, and near the Antarctic Peninsula. The IWC has also identified five feeding areas: (1) Brazil, False Banks, and Falkland Islands (30° - 55°S), (2) South Georgia and Shag Rocks (*ca* 53°S), (3) Tristan da Cunha (*ca* 40°S), (4) South of 50°S, (5) Antarctic Peninsula (60° - 70°S). Preferred winter habitat includes calm, shallow waters near the coast for nursing. Preferred summer habitat includes areas where oceanographic and bathymetric features such as steep bottom topography, relatively cool water temperature, water column stratification, and ocean currents concentrate zooplankton (Kenney, 2002).

Cows reach sexual maturity around nine years of age and will typically calve every three years. Gestation and weaning both take approximately one year and newborn calves average 5.5 – 6m in length (Best, 1994). Cows show signs of site fidelity to calving and nursing areas (Burnell, 2001).

New research since 1999 largely confirms the results of previous studies regarding biology and habitat of *E. australis* and provides more accurate estimates of biological statistics. These updates are summarized below.

Reproduction

Three-year calf intervals continue to be the most frequently observed for *E. australis*. Most recent studies from Australia estimate a mean calving interval of 3.33 years (n=57) and 3.64 years (n=117) (Burnell, 2001). Similar studies for both South Africa and Argentina found mean calf intervals of 3.12 years and 3.42 years respectively (Best et al., 2001 and Cooke and

Rowntree, 2003). Four-year calving intervals were common and two-year and five-year intervals were infrequently observed. Researchers suspect that the anomalous two-year and five-year calving intervals are the result of early calf loss and calf mortality (Burnell, 2001).

Based on observation of Australian stocks (n=18), weaning takes 303 – 419 days (Burnell, 2001). The average age of first parturition estimated from whales off Argentina is 9.1 years (Cooke and Rowntree, 2003) and 8.5 years for whales off South Africa (Best et al., 2001). Further, 50% of females were found to have calved by the median age of 7.88 years (Best et al., 2001). The best estimate of gestation period is still approximately 12-13 months (Best, 1994 and Burnell, 2001).

It is still unclear where and when conception occurs for southern right whales (Payne, 1986), although it is likely that conception and birth take place near the same general wintering grounds. Investigations and scientific knowledge of courtship behavior is also lacking due to the difficulties in determining the sex of individual whales. Recent studies off South Africa by Best et al. (2003) suggest that southern right whales are most socially active during the winter in coastal waters where they engage in courtship behavior. Right whales were observed in surface-active groups composed of two to seven individuals where the majority of whales were male but the focal animal was female. This behavior may reflect a female breeding strategy in order to maximize her chances of conceiving with a large male (Best et al., 2003).

Lastly, recent research has suggested that the variability in reproductive success for females may be influenced by the relationships between environmental factors such as global climate signals and the ecological conditions of feeding grounds prior to calving (Cooke and Rowntree, 2003 and Leaper et al., 2006). However, further research is needed in this area.

Movement

Studies of the movements, migrations, and destinations of *E. australis* indicate their seasonal migrations, like other baleen whales, cover thousands of kilometers. Long range movements for *E. australis* have been recorded between Gough Island and South Africa, and between Argentina and Tristan da Cunha, Brazil and South Georgia (Best et al., 1993). Migrations range from 210-2,287 km and average 1,036 km (Burnell, 2001), but individual whales have been documented traveling as far as 4,424 km and 3,150 km (Best et al., 1993 and Bannister et al., 1999). Movements made within a calendar year range from 211-1,490 km over a period of 3-59 days and average 730 km over 34 days (n=18). Minimum average traveling speeds for within-year movements were estimated at 1.1 – 3.66 km/h (Burnell, 2001).

As part of its movement pattern, *E. australis* shows strong signs of site fidelity.¹ In a study of 61 females off the Australian Head of the Bight, 92% were found to return to the same site in separate years. Both accompanied females (ie. females with a calf) and unaccompanied females displayed the same levels of site fidelity. However, significantly fewer males showed signs of site fidelity. It is hypothesized the peripatetic behavior of males may provide dispersal and genetic mixing of the population. Although males display distinct movement patterns from

¹ An individual whale is determined to display some level of site fidelity if the whale (1) has been seen at the site in at least two separate years and (2) the individual whale has been seen at the site on more occasions than the number of sightings at all other localities combined.

females during the winter season, no differences have been detected by sex for movements made between calendar years (Burnell, 2001).

Behavior

Behavioral observations have been limited to calving grounds since the locations of feeding grounds are unknown or not frequently visited by researchers. The behavioral development of southern right whale calves and mother-calf relationships has been studied on nursery grounds in Argentina. In general, these studies indicate that calf development and mother-calf relationships occur in five distinct stages over the course of up to 13 months. Stages one through three occur during the first four months, when mothers and their newborn calves remain on the nursery ground. Stage four begins when mother-calf pairs migrate to feeding grounds for the summer. Little is known about their behavior during this time. Finally, in stage five, six months after leaving the nursing ground some mothers and their nursing yearlings return to the nursery and remain together for two to six weeks before finally separating (Taber and Thomas, 1982 and Thomas and Taber, 1984).

More recent research has documented wintering populations off the sub-Antarctic Auckland Islands of New Zealand spending the majority of their time resting or engaging in social interactions regardless of their group type (e.g. single whale, group, cow-calf pair). 36 percent of cow-calf pairs were seen traveling (Patenaude and Baker, 2001).

E. australis is known to spend long periods at the surface and occasionally approaches research vessels. Little is known about right whale behavior in front of large ships, which continue to be a major threat (IWC, 2001).

2.3.1.2 Abundance, demographics, and population trends:

Worldwide

According to the most recent estimate, worldwide abundance of *E. australis* was about 7,000 in 1997 and some breeding stocks have been recovering at annual rates of *ca* 7% (IWC, 2001; Best et al., 2001; Cooke et al., 2001; Bannister, 2001 and Patenaude, 2003). However, the current population size represents only a fraction of the historical abundance which was estimated to be *ca* 60,000 in 1997 (IWC, 2001). Baker and Clapham (2004) estimated that given the observed growth rates and stability in habitat conditions *E. australis* would likely take 50 to 100 years to grow to pre-exploitation levels of about 60,000 whales (IWC 2001). However, they note that this estimate depends on the accuracy of current models and estimated growth parameters.

Although the best available science indicates *E. australis* is showing signs of recovery both worldwide and on a regional basis, there is considerable uncertainty surrounding the global estimates for abundance, population trends and historical size. Current models used by the IWC to calculate pre-exploitation abundance require historical catch records, estimates of intrinsic rates of growth and current abundance estimates all of which involve their own uncertainties. While significant population increase has been demonstrated recently off South America, South Africa and Australia, and some evidence of range repopulation in Australia has been observed, continued and increased research is needed to better determine these statistics and improve our understanding of current abundance and recovery trends.

Estimates for worldwide abundance and population trends are based on information for different breeding stocks. The status of *E. australis* by putative breeding stock is provided below.

South Africa

The 2003 estimated abundance for the South African breeding stock of *E. australis* is 3,400 (Best et al., 2005). According to the population models of the IWC, this is currently the largest breeding stock in the Southern Hemisphere (IWC, 2001). Annual instantaneous population increase is 6.8% and 7.1%. The abundance estimate represents the population size in 1997 and growth rates are based on aerial survey data collected from 1971 to 1988 over the southern coastline of South Africa (Best et al., 2001).

Argentina / South America

The second largest population of southern right whales occurs in waters off Argentina. The most recent estimate in 1997 calculated abundance at 2,577 individuals (IWC, 2001) and the population has been increasing at an annual rate of 6.8% (Cooke and Rowntree, 2003). 1,828 distinct individuals have been photo identified from 1971 to 2000 off Península Valdés (Cooke and Rowntree, 2003) and the number of breeding females has increased from 92 in 1971 to 697 in 2000 (Cooke et al., 2001 and Cooke and Rowntree, 20003).

E. australis has been observed by researchers off Argentina since the 1970's and is the focus of a substantial research program. These estimates are based on data that have been collected through these programs over the last three decades.

Australia

Current total population size for the Australian breeding stock of *E. australis* is estimated to be *ca* 2,400 as of 2006 (Bannister, 2007). Population increase rates were calculated for cow-calf pairs, unaccompanied adults and for total population for three separate regions. Growth rates varied between 7-13% with confidence intervals at or near 7%. Estimates are based on data collected from aerial surveys since 1976 along the southern coastline of Australia between Cape Leewin and Twilight Cove and later expanded to Ceduna (Bannister, 2001). The increase rate for cow-calf pairs from 1993 to 2006 was 7.56% (95% CI: 4.61-10.51). These growth rate estimates are consistent with the increase in abundance estimates from 1,197 in 2001 (IWC, 2001) to *ca* 2,400 in 2007 (Bannister, 2007).

New Zealand

Abundances and population trends for right whales in waters off New Zealand are separated into two major regions: mainland New Zealand and the sub-Antarctic Islands.

Populations around mainland New Zealand are severely depleted and show little signs of recovery (Stewart and Todd, 2001). Since 1976 only 110 right whales have been sighted and only 23 photo-identified (Patenaude, 2003). Fewer than 30 individuals were reported along the coast of New Zealand from 1991 to 2001 and no observations have been made from stations at the Kermadec islands, which lie north of mainland New Zealand, in the last decade (Patenaude and Baker, 2001). The current population likely contains 4-11 reproductive females and total population may be 30-50 although its abundance and trends have not been modeled by the IWC

(Suisted and Neale, 2004). Despite these low numbers, between 1988 and 2001 the number of annual sightings off mainland New Zealand significantly increased from less than five in the late eighties to around 15 in 2001. Increase rates were not calculated due to inconsistencies in surveying effort but preliminary results suggest the population may be increasing at some unknown rate (Patenaude, 2003).

The New Zealand sub-Antarctic islands lie several hundred kilometers to the south of mainland New Zealand and occur between 47° and 52°S. The area includes the Snares, Bounty, Antipodes, Auckland, and Campbell Islands with most right whales occurring in waters off the latter two islands. Abundance of *E. australis* off the sub-Antarctic islands is greater than off mainland New Zealand but specific estimates vary. Patenaude and Baker (2001) photo-identified 217 individual whales off the Auckland coastline and Stewart and Todd (2001) identified 75 individual whales off the Campbell Islands. As of 2002, the current population is estimated to be *ca* 900 individuals (Patenaude, 2002) and is likely recovering. The rate of recovery is unknown but a 2006 count of cow-calf pairs at Aucklands Islands (34) was nearly twice the number counted in 1997 (18) (IWC, 2007d).

Like populations worldwide, abundance of *E. australis* from New Zealand (mainland and sub-Antarctic) is likely only a fraction of its historic size which is estimated to be anywhere from 10,000 to 17,000 (Patenaude and Baker, 2001; Suisted and Neale, 2004; Patenaude, 2002; Richards, 1994).

Other areas

In addition to the four major breeding areas above, additional regions where significant numbers of right whales are seen are recognized by the IWC off Tristan da Cunha, Brazil, Namibia, Mozambique, and South Georgia. Less is known about the whales in these areas as their populations are smaller, sightings are infrequent, and little research has been done. Right whales have been studied off southern Brazil since 1981 and have been aerial surveyed and photographically identified in this area since 1987. As of 2003, researchers have identified 315 individual whales. Since 1987, the number of reproductive females has increased annually by 14%, however, this rate of increase is far above the maximum possible for this species, so other factors must be at least partly responsible. While there is substantial interchange of right whales between Brazil and Argentina, resightings of females suggest that right whales may use the area off southern Brazil as a calving ground (Groch et al., 2005).

Wintering populations of southern right whales off Tristan da Cunha have been estimated at 226. Sightings for the remaining areas are so infrequent that their populations are considered zero (IWC, 2001). Still these areas may be important to *E. australis* recovery. For example, a compilation of various data regarding whale sightings off South Georgia found *E. australis* to be the most frequently sighted (Moore et al., 1999), and confirmed calving in Namibia waters represents the northernmost established breeding population in the southeast Atlantic (Roux et al., 2001). There have also been sightings of southern right whales along the coast of Uruguay since the 1970's. There are no abundance estimates for this area but systematic surveys conducted between 2001 and 2003 sighted 149 individuals. Based on the proportion of mother-calf pairs observed it is unlikely that Uruguay is intensively used as a calving ground (Costa et al., 2003).

Southern right whales have also been sighted off of Peru and Chile. Right whales are known to occur in coastal waters off southern Chile to central Peru during the austral winter and spring and off southernmost Chile in the fall and summer. Between 1964 and 1991 16 cow-calf pairs were recorded off Chile and three off of Peru. No abundance estimates have been carried out for this population and there is very little historical abundance information for right whales in the eastern South Pacific. The IWC Scientific and Conservation Committee has written the population may be as low as 50 animals (IWC, 2007 and IWC, 2007b). Whaling records document thousands of right whales taken in the 19th century in the eastern South Pacific but no known major catches during the 20th century. Since the end of modern whaling there has been no observed increase in the Chile and Peru population (IWC, 2007 and IWC, 2007b).

During the 2007 meeting of the IWC Scientific Committee, the Committee noted that the last major review of the species was conducted in 1998 (IWC, 2001) but that little information was available for the Eastern South Pacific and agreed to consider the Chile/Peru population of southern right whales during the 2008 IWC Meeting in Santiago. In addition, the IWC Conservation Committee noted that Chile will conduct a review of historical catch data for Chilean waters, analyze sightings data for right whales through existing networks, and organize an independent workshop on the status of the Chile/Peru population of *E. australis* (IWC, 2007b).

2.3.1.3 Genetics:

The following genetic research was not included in the last review for southern right whales. Schaeff et al. (1999) compared phenotypes for dorsal skin color markings between whales in South Africa and Argentina to conclude nuclear gene flow is limited between the two populations. Portway et al. (1998) found significant genetic differentiation between populations in South Africa and Argentina based on comparisons of mtDNA haplotype frequencies. A similar genetic study also found significant genetic differentiation between whales in New Zealand and Australia (Baker et al., 1999). These studies as they relate to the 1996 DPS policy are discussed in Section 2.1. Genetic research regarding *E. australis* populations off sub-Antarctic New Zealand has also been completed by Carroll (2006), however, this study has not yet been published.

2.3.1.4 Taxonomic classification or changes in nomenclature:

In 1970 all members of the genus *Eubalaena* were listed as endangered under the Endangered Species and Conservation Act (ESCA) of 1969 and were later included under the Endangered Species Act of 1973. Right whales were originally listed as *Eubalaena spp.* on the list of Endangered and Threatened Wildlife and Plants (50 CFR 17.11) and continue to be listed as *Eubalaena spp.* under the NMFS list of Endangered Marine and Anadromous Species (50 CFR 224.10). The NMFS has consistently interpreted the *Eubalaena spp.* listing to include two species of right whales: northern right whale (*E. glacialis*) and southern right whale (*E. australis*). The IWC has recently recognized three species of *Eubalaena*: *E. glacialis* (North Atlantic), *E. japonica* (North Pacific) and *E. australis* (Southern Hemisphere). The classification of *E. australis* as a single species reflects the best available science (e.g.,

Rosenbaum et al., 2000). However, NMFS has proposed recognizing *E. japonica* and *E. australis* as separate species and adding them to the list of threatened and endangered species and removing *Eubalaena spp.*.

2.3.1.5 Spatial distribution:

E. australis is generally distributed from 20° - 60°S throughout the Southern Hemisphere but observations have been made south of 60°S (Bannister et al., 1999 and Tormosov et al., 1998) and there is some evidence that *E. australis* infrequently travels north of 20°S (Roux et al., 2001 and Cesar de Oliveira Santos et al., 2001). Within this range, *E. australis* migrates between low-latitude winter breeding grounds and higher latitude summer feeding grounds.

Based on whaling records of catch positions the IWC has identified the following areas as summer feeding grounds (IWC, 2001 and Tormosov et al., 1998):

- Brazil, False Banks, and Falkland Islands (30° - 55°S)
- South Georgia and Shag Rocks (ca 53°S)
- Tristan da Cunha (ca 40°S)
- South of 50°S
- Antarctic Península (60° - 70°S)

The distribution of winter breeding, calving and nursing grounds is known with greater certainty. The four wintering areas which have been best studied – New Zealand, Australia, South Africa, and Argentina – and a handful of additional areas where less information is available are discussed below.

New Zealand

Based on whaling records, *E. australis* was likely distributed throughout all New Zealand waters including those areas off the Kermadec Islands (ca 30° S, 800 km northeast of mainland New Zealand), the sub-Antarctic Islands (ca 50° S, over 400 km south of mainland New Zealand), and both the North and South Islands of mainland New Zealand. This distribution spanned nearly 20 degrees of latitude.

Today, the distribution of *E. australis* has been reduced to a fraction of its historic range. The species is considered extirpated around the Kermadec islands and is only rarely observed off the coast of mainland New Zealand. A larger population is only found off the sub-Antarctic Islands. This distribution is consistent with whaling efforts which were greatest in mainland New Zealand but largely unsuccessful in the sub-Antarctic (Patenaude and Baker, 2001).

Within sub-Antarctic New Zealand, the two primary winter concentrations occur off the Auckland Islands and Campbell Islands. Although these islands are located at high-latitudes typically associated with feeding grounds, they are considered the primary calving area and represent one of the few breeding grounds remaining in the South Pacific (IWC, 2001). Wintering whales at Auckland Island concentrate around Port Ross located on the northeast shore and whales at Campbell Island have been observed from Perseverance Harbor and Northwest Bay located on the eastern and western shoreline, respectively. Observations began

regularly in the early 90's and continued throughout the decade (Pautenade and Baker, 2001) and were renewed in 2006.

Although once abundant along mainland New Zealand, there were fewer than 30 sightings from 1993 to 2003. From 1976 to 2003, *E. australis* has been sighted or resighted off 11 of the 12 Department of Conservation conservancy boundaries. Sightings were more frequent along the eastern shoreline of both the North and South Island and particularly near Hawke Bay, Otago, Cook Strait, and Southland (Pautenade, 2003).

Australia

The main aggregation areas are found along the southern coast when abundance peaks around September. The greatest concentrations are observed along the southwestern coast from Albany, Western Australia to the Head of the Bight, South Australia and sightings are also common off the southeastern coast of Tasmania. Smaller concentrations are known to occur along the coasts of South Australia and Victoria between Port Lincoln and Warrnambool (Bannister, 2001) and off the southeastern coast of Tasmania. There have been sightings in coastal waters of all States but none in the Northern Territory (Department of the Environment and Heritage, 2005).

In general, observations north of 34°S are infrequent. However, in recent years there has been an increase in sightings of *E. australis* in northern, sub-tropical waters along the eastern and western coasts. This trend suggests the range of *E. australis* is expanding and may be connected with population recovery. It is still unclear whether the expansion represents a re-population of the species' historic distribution (Allen and Bejder, 2003).

Studies also indicate that the distribution of *E. australis* follows a circular, counter-clockwise seasonal pattern. During the winter season whales travel westward along the southern coastline, then south towards summer feeding grounds, then eastward in the sub-polar latitudes and then finally north again to their wintering grounds (Burnell, 2001).

South Africa

E. australis is predominantly found along the Cape coast of South Africa between the areas of Muizenberg and Woody Cape. These observations are based on over three decades of aerial surveys conducted annually (Elwen and Best, 2004). Fine scale distribution patterns show three main concentration areas within the southern Cape coastline: St. Sebastian Bay, De Hoop and Walker Bay. Elwen and Best (2004b) found 73% of cow-calf pairs and 49% of unaccompanied adults congregated in these three areas.

The distribution of *E. australis* in South Africa has been linked to environmental factors at both large and fine scales. Broad scale patterns show whales prefer shallow, calm waters with sandy bottoms. This applies to both cow-calf pairs and unaccompanied adults although cow-calf pairs are more likely to avoid rocky exposed areas than are unaccompanied adults (Elwen and Best, 2004). At the within-bay level, the correlation of whale distribution with environmental factors is not as strong. However, goodness of fit tests show cow-calf pairs are found more often than expected near shallow waters, sandy and gently sloping beaches, and protected areas than a random distribution would predict (Elwen and Best, 2004b).

The preference for these environmental factors has been found for other breeding areas in New Zealand, Argentina and Australia. It is not known for certain why *E. australis* prefers these conditions but it is likely related to energy conservation, predator avoidance, and reduced exposure to elements of the open ocean which enhances calf survival.

Argentina

The major nursery and calving ground for *E. australis* in waters off South America is Península Valdés. Located along the central Argentinean coastline (42°S), the Península has two major bays (Golfo Nuevo and Golfo San José) where whales congregate. Whales occurring in this area have been well studied since 1970 (Payne, 1986).

E. australis concentrates in distinct regions of the Península, however, these regions have changed over the last 30 years. Specifically, Rowntree et al. (2001) observed whales have essentially abandoned their concentration areas along the outer coast of the Península and shifted into the bays. In addition, whales have shifted from Golfo San José to Golfo Nuevo and a much larger percentage of the population now congregates in Golfo Nuevo despite the fact that development pressures are greater in Golfo Nuevo and Golfo San José has been protected as a marine park since 1974.

The causes of these shifts are still unknown. There have been no observed negative impacts on population growth due to the shift. Instead, the change in distribution may indicate *E. australis* is capable of behavioral and ecological flexibility (Rowntree et al., 2001).

Other areas

Less is known about the distribution of *E. australis* outside of the four major wintering areas discussed above. As mentioned, little is known about the location of summer feeding grounds and even less is known about the distribution and behavior of *E. australis* at these feeding grounds. Information that is available is largely based on historic and contemporary whaling records (Townsend, 1935 and Tormosov et al., 1998).

Of the five feeding grounds recognized by the IWC, only two have been linked to calving grounds through photo identification – South Georgia with Argentina and South of 50°S with South Africa. Probable feeding whales at ca 45°S south of Western Australia have also been linked to calving grounds off that coast (Bannister et al., 1997). Research analyzing stable isotopes from baleen plates and mtDNA both suggest that some whales from South Africa and Argentina feed at similar locations (IWC, 2001, Moore et al., 1999 and Rowntree et al., 2001).

Recently, new information has been published regarding the potential importance of Brazil, Madagascar and Namibia to recovering *E. australis* populations. In Brazil, *E. australis* has been increasingly sighted in the southeastern region between São Paulo and Espírito Santo (18°S - 25°S) despite being rarely observed throughout the early 20th century. Due to increases in research efforts it is difficult to determine whether increases in number of sightings is related to increased sighting effort or population growth but the area is still recognized as an important calving area (Cesar de Oliveira Santos et al., 2001 and IWC, 2001).

In 1997 and 1999 three sightings of *E. australis* were made off the eastern coast of Madagascar in Antongil Bay (ca 15°S) and south of Fort Dauphin (ca 25°S). *E. australis* is rarely observed near Madagascar and there are no whaling records documenting a strong historical presence. It is also unclear whether the recent sightings represent a long-range migration from South Africa or a remnant population from the pre-whaling era (Rosenbaum et al., 2001). The observation in Antongil Bay is one of the northernmost sightings of *E. australis* in the Southern Hemisphere.

Lastly, there were 36 incidental sightings of *E. australis* off the Namibian coastline since 1971, and calving was recorded between 1996 and 1999. Unlike off Madagascar, *E. australis* is known to have occurred along this shoreline historically, and was hunted there in the early 1800s to near extinction. Sightings of right whales off Namibia have been as far north as 17°S and represent the northernmost calving area for the southeastern Atlantic (Roux et al., 2001).

2.3.1.6 Habitat or ecosystem conditions:

The habitat of *E. australis* includes coastal and open ocean waters in the Southern Hemisphere primarily between 20°S - 60°S. In winter their habitat includes shallow, protected, and nearshore waters off Australia, New Zealand, South America, Southern Africa and various mid-oceanic islands. During the summer, *E. australis* is currently recognized to feed in productive coastal and open ocean waters in at least five high-latitude feeding grounds.

E. australis habitat includes a diversity of coastal and open ocean waters and covers an extensive range. As a result the condition of *E. australis* habitat varies. At the national, state, and provincial levels, governments have established a number of marine protected areas (MPA) and implemented legislation to protect and conserve *E. australis* habitat. Although some critical breeding areas off Australia, New Zealand, Argentina, and South Africa are protected as MPAs, these protected areas cover only a fraction of the total range of *E. australis*. In addition, global factors such as climate change are likely altering habitat conditions with unknown consequences.

The situation in Argentina best demonstrates the variability in habitat conditions. As discussed previously, during its winter migration to Península Valdés, *E. australis* congregates in two neighboring bays: Golfo Nuevo and Golfo San José. The bays are separated by a strip of land only five miles wide, but their habitat conditions are drastically different. The northernmost bay, Golfo San José, was designated a Provincial Marine Park in 1975 by the Provincial Chubut government (Provincial Law 1238). The purpose of the park is to provide protection to a critical breeding area for *E. australis*. In 1979, the government modified the original law (Decree 1713) to allow multiple uses within the park. Some commercial activities are allowed within the park, primarily fishing and some aquaculture, but the park provides strong protections for wintering right whales (Rivarola, et al., 2001; Rowntree et al., 2001 and Hoyt, 2005).

In contrast, most of Golfo Nuevo to the south receives less protection from the Provincial government and faces large development pressures. An intangible zone where vessel traffic is not allowed was set along the northern shore of Golfo Nuevo, including the beaches along El Doradillo Municipal Reserve where most right whales concentrate (Sironi, 2007). Puerto Madryn, in Golfo Nuevo, is one of the most industrial ports and fastest growing cities in Patagonia. Sewage facilities release waste water into the Gulf, industrial fish and aluminum

processing plants generate pollution, fishing gear introduces obstacles that can entangle migrating whales, and large ship traffic and small boat activities in the water are common and are expected to increase in the coming years (Payne, 1995, Rivarola, 2001, Hoyt, 2005 and Rowntree, 2007). All of these anthropogenic factors may degrade habitat.

In 2001, the Provincial Chubut government created the Península Valdés Protected Natural Area² (Law 4722), and the Organismo Provincial de Turismo³ developed and approved a management plan for the area. Two additional MPAs exist in the Chubut Province of Argentina and provide some protection of *E. australis* habitat. These include the Punta Loma Faunal Reserve, designated in 1967 by Provincial Law 697 and the Punta Piramide Nature Reserve, designated in 1974 by Ministerial Resolution 9 (Sironi, 2007).

Throughout the rest of the Southern Hemisphere habitat conditions also vary both within and between nations. A summary of habitat protection by country is provided below and threats are addressed in Section 2.3.2.1.

Australia

Several MPAs have been established in state waters that afford *E. australis* habitat some level of protection. The largest and most significant is the Great Australian Bight Marine National Park, which protects over 1200 square kilometers of coastal waters for wintering southern right whales. The State of South Australia established the Park in 1996, and the park was extended into Commonwealth waters in 1998. The park excludes activities that conflict with whales and prohibits mining from certain areas but allows fishing and boating access. There are over a dozen smaller MPAs along the Australian coastline that offer some degree of protection for southern right whales and their habitat (Hoyt, 2005).

No MPAs have been established in territorial waters (beyond 3nm) as wintering whales are observed most commonly in state waters. For the same reason no critical habitat has been designated for *E. australis* under Australia's Environmental Protection and Biodiversity Conservation Act.

New Zealand

In New Zealand *E. australis* habitat is protected by two pieces of national legislation – the Marine Mammal Protection Act (MMPA) and the Marine Reserves Act (MRA). Both of these statutes allow the minister to develop MPAs for the purpose of habitat protection and conservation.

The most important MPA is the Auckland Islands Marine Mammal Sanctuary, established under the MMPA. The Sanctuary includes all waters within 12 nautical miles of the mean low water mark of each island and rock of the Auckland Islands (4840 km²) and is managed as an IUCN Category 1a protected area for science and wilderness protection (Hoyt, 2005). Within the Sanctuary, all commercial fishing is prohibited (McConnell, 2007). In addition, several research

² The Península Valdés Protected Natural Area is part of the Provincial System of Protected Natural Areas in Chubut. The Provincial Chubut government created the System in 2000 by Law 4617.

³ Provincial Decree 1814 gives the Organismo Provincial de Turismo application authority over the Provincial System of Protected Natural Areas (ie. Law 4617).

projects, including photo-ID, genetics, and population studies, have been conducted within the Sanctuary. In addition, in 2002 a moratorium on issuing marine mammal viewing permits for the purpose of viewing southern right whales went into effect as authorized by Regulation 15 of Marine Mammal Protection Regulations 1992. The moratorium bans all commercial operations⁴ within the Sanctuary from April to October for a term of ten years.

Southern right whales and their habitat may also be protected under the Marine Reserves Act (MRA) of 1971. The Act authorizes the Minister of the Department of Conservation to designate any area within the territorial waters of New Zealand a marine reserve and to develop conservation management strategies and conservation management plans for these reserves (Sec.4, Sec.7, Sec.8). In 2003, the area of the Auckland Islands Marine Mammal Sanctuary was also designated a Marine Reserve under the MRA. The Reserve prohibits the taking of all marine life within this area. However, protection for the southern right whale is limited under the MRA for two reasons. First, the overwhelming majority of reserves are located in areas where *E. australis* has been essentially extirpated. Currently, less than 0.1% of territorial waters (waters within 12 nautical miles of the shoreline) where right whales have been recorded are designated as reserves. Second, the MRA's primary focus is on conservation for scientific study rather than species or habitat protection and conservation (Department of Conservation, 2000).

South Africa

South Africa has established over a dozen MPAs protecting *E. australis* habitat under its primary legislation regulating natural resources, the Marine Living Resources Act (MLRA). Under Section 43 of the MLRA the Minister of the Department of Environmental Affairs and Tourism (DEAT) may designate waters as MPAs for the conservation and protection of species and their habitat. MPAs designated under the MLRA prohibit any activity that may adversely impact the ecosystem such as fishing, dredging, or construction, unless such activity has been permitted by the Minister.

Nineteen MPAs have been established under the MLRA. Combined, the MPAs cover over 1800 square kilometers of marine area and nearly 20% of the South African coastline. Individual MPAs range from 2.5 – 414 km² and nearly all of them include areas where *E. australis* has been observed. Regulations within the MPAs vary; eight are completely no-take areas, and the remaining 11 are multiple-use zones with various levels of protection.⁵

Of particular importance to *E. australis* are the De Hoop MPA and Walker Bay Whale Sanctuary. These areas protect two of the primary wintering grounds where southern right whales have been observed in high concentrations (Elwen and Best, 2004). The De Hoop MPA covers 315 km² of marine waters and fishing is prohibited in certain areas. Diving and boating activities are not regulated, but, as of 2003, little to no at-sea tourist activities were taking place. Land based whale watching remains popular in the area.

⁴ Defined as an operation carried on for any form of hire or reward in which persons are transported, conveyed, conducted, or guided where a purpose is to view or come into contact with any marine mammal in New Zealand or New Zealand fisheries waters.

⁵ For details on the regulations within each MPA see Appendix 4 of Lemm and Attwood, 2003.

In 2003, the Minister of DEAT established the Walker Bay Whale Sanctuary with the primary purpose to protect *E. australis*. The Sanctuary is not officially listed as an MPA under the MLRA but provides strong seasonal protections for migrating whales. From July 1 to December 15, the Sanctuary is closed to fishing and all watercraft with the exception of permitted whale watching boats and other permitted vessels (Hoyt, 2005).

In addition to MPAs, Section 77 of the MLRA allows the Minister to designate closed areas by regulation. Closed areas strongly regulate fishing or prohibit these activities completely. There are ten designated closed areas. Typically these areas either prohibit the setting of rock lobster traps, which are one of the leading causes of whale entanglements, or only allow shore fishing from limited areas.

Despite the number and extent of MPAs, the protection for *E. australis* and its habitat may be limited. A recent assessment of MPAs in South Africa concluded that many of the parks lack a management plan, trained staff, adequate enforcement capabilities or a budget and, as a result, are unable to effectively manage or protect their resources. Many of these problems have been linked to (1) the MLRA's focus on fisheries enforcement rather than ecosystem conservation and (2) the lack of communication and coordination between the Marine and Coastal Management Branch of the DEAT, which holds legislative authority over MPAs, and the regional conservation agencies that are responsible for day-to-day management (Lemm and Attwood, 2003).

Other areas

Habitat conditions in the remaining countries where *E. australis* has been infrequently sighted also vary. In March 2001, the government of Tristan da Cunha designated all national waters of Tristan da Cunha, including Inaccessible Island and Gough Island, a Cetacean Sanctuary. The Sanctuary prohibits individuals from harming *E. australis*, and the waters of Inaccessible Island are managed as a zoned IUCN Category I nature reserve. In Brazil, there are eight⁶ MPAs spread along the southeastern coastline where *E. australis* has been observed. These include both state and federal MPAs, and sizes range from 0.3 – 1560 km². For the majority of these MPAs protection of *E. australis* habitat is ancillary. Only one, the Right Whale Environmental Protection Area, has a strong focus on the protection of *E. australis*⁷. Similarly, there are two

⁶ These include: (1) Arraial do Cabo Sustainable Reserve, (2) Laje de Santos State Marine Park, (3) Tupiniquins Ecological Station, (4) Tupinambás Ecological Station, (5) Ilhabela State Marine Park, (6) Ilha Anchieta State Marine Park, (7) Anhatomirim Environmental Protection Area, (8) Right Whale Environmental Protection Area (Hoyt, 2005).

⁷ The President of Brazil established the Right Whale Environmental Protection Area (RWEPA) by Federal Decree in 2000 as authorized by Federal Law No. 6.902 and 6.938. The RWEPA includes 1560 km² of coastal waters between Santa Catarina Island and Rincão Beach. This area is the primary aggregation area for southern right whales in Brazil (Hoyt, 2005 and Groch et al., 2005). The Decree requires the Brazilian Environmental Institute (IBAMA), Brazil's national environmental authority, to regulate a number of activities by developing a management plan for the RWEPA. These activities include motorized vessel traffic, seismic activity, construction, excavation, navy activity, urban development, fishing, aquaculture, and other activities that may degrade the environment. The Decree requires IBAMA to develop the management plan by 2005 (Article 7). However, at the time of this writing no management plan has been completed (Groch, 2007). Despite the lack of a management plan, certain activities within the RWEPA may still be regulated. For example, fishing activities may be subject to additional federal or provincial laws. Whalewatching activities, including those which occur within the RWEPA, are regulated by Edict

MPAs in Madagascar located near recent sightings of *E. australis*, but neither address right whales explicitly. No MPAs exist in Namibia (Hoyt, 2005).

2.3.1.7 Other:

No other relevant information is available.

2.3.2 Five-Factor Analysis

2.3.2.1 Present or threatened destruction, modification or curtailment of its habitat or range:

No new habitat threats have been identified since the last review of *E. australis*. The habitat of *E. australis* continues to be affected by local activities and global processes. For example, coastal and marine development, chemical pollution, climate change, and tourism may all adversely impact habitat. These habitat threats, however, are not currently a significant cause of *E. australis* mortality, but their effects may impact population recovery in the long run (IWC, 2001).

Coastal and marine development has broad implications for *E. australis* habitat. Development pressures occur in all countries where *E. australis* occurs and the impacts can be both direct and indirect. In New Zealand the Department of Conservation has identified coastal development as the main issue threatening the habitat of *E. australis* (Suisted and Neale, 2004). For example, in mainland New Zealand aquaculture applications cover nearly 50,000 hectares of coastal marine area, and these projects have the potential to directly impact habitat. In the sub-Antarctic Islands these pressures are reduced due to the islands' remote location and legal protections which prohibit certain developments.

Major developments in Argentina and Namibia near *E. australis* habitat have also been documented. As discussed in Section 2.3.1.6, Golfo Nuevo is one of the most industrialized bays in Patagonia. Sewage treatment facilities, fish processing plants, and industrial aluminum factories all are located along the coastline. In Namibia, three of the historic calving bays (Walvis Bay, Lüderitz Bay and Elizabeth Bay) have undergone major habitat alterations. Walvis and Lüderitz Bay are now major harbors, and new diamond mining operations are occurring near Elizabeth Bay. Increased vessel traffic, coastal development, oil exploration, and marine mining have also increased in the last two decades in these areas (Roux et al., 2001).

The growth of whale-based tourism is both a catalyst and product of coastal development. Major whale tourism industries operate in Argentina (Península Valdés), South Africa (Walker Bay and Hermanus), Brazil (Santa Catarina), and Australia (Head of the Bight and Warrnambool). Whale watching for *E. australis* attracts tourists from around the world and generates millions of dollars in revenue for national governments and local businesses. In Argentina, South Africa, and Australia, where shore and boat-based whale watching industries are well developed, over 800,000 tourists a year travel to watch southern right whales and generate over US \$135 million

117/1997 and certain areas have been closed to whalewatching. Lastly, any activity within the RWEPA that is subject to regulation must be approved by the EPA authorities (Groch, 2007b)

in total expenditures. In Brazil, where whale watching has lagged behind other comparable countries, nearly 1,700 whale watchers a year generate US \$40,000 in total expenditures (Hoyt, 2001). In other areas, such as New Zealand's sub-Antarctic Islands, whale tourism has been banned to protect *E. australis*. Overall, whale-based tourism provides a vast range of socioeconomic and educational benefits to communities around the world and, in most places, is expected to continue to grow and develop (Hoyt, 2001). However, little is known about the adverse impacts of tourist activities on whale populations. For example, in Argentina studies have shown that some whales move away from boats, some whales are not affected, and in some cases whales have actually moved to areas with greater boat activity (Rowntree et al., 2001, Rivarola et al., 2001, Hoyt, 2005, Suisted and Neale, 2004). Whale watching is regulated by a variety of laws, guidelines, and policies throughout the Southern Hemisphere. Nations take varied approaches to regulating whale watching within their waters. In Argentina, the Province of Chubut has passed several provincial regulations (eg. Provincial Law 2618/85, Provincial Regulation Decree 916/86, and Provincial Termination 111 OPT/97) which restrict the number, activities, and conduct of whale watching boats. In Australia, whale watching guidelines have been incorporated into federal legislation. The guidelines set national standards to minimize the impacts of these activities on whale populations and aim to help local governments develop consistent whale watching regulations. A detailed review of whale watching guidelines and regulations for Argentina, Australia, Brazil, New Zealand, South Africa and other nations within the Southern Hemisphere summary is provided in Carlson (2007).

Very few studies have investigated the impacts of chemical pollutants on *E. australis* and none have been done since the last review. No chemical trends are evident from previous studies (IWC, 2001), but this may be due to deficiencies in the methodology. New research suggests that traditional measurements of superficial blubber are not sufficient to measure effects of contaminants. First, contaminants may not bioaccumulate in the blubber of mysticetes in concentrations sufficient enough to be detected. Cytochrome P450, which is induced by the metabolism of certain deleterious hydrocarbons, may provide an alternative and more sensitive indicator of contaminant exposure (Angell et al., 2004). Second, deep core samples, versus biopsy samples of superficial blubber, may be needed to quantify levels of organochlorines and other blubber characteristics that vary with depth (Reeb and Best, 2006 and O'Shea and Brownell, 1994).

In 1997, the IWC Scientific Committee considered in depth the impacts of climate change on cetacean species and recognized climate change as a threat to the recovery of whale species. The specific impacts of climate change are unknown, and current models cannot predict the effects on cetacean populations, but it is generally recognized that climate change will substantially alter ocean conditions and cetacean habitat (IWC, 1997; Greene et al., 2003 and Greene and Pershing, 2004). For example, climate change will be accompanied by changes in sea surface temperature, salinity, ocean circulation, precipitation, upwelling, ice coverage, and sedimentation. As a result, these changes may alter food availability, migration routes, reproductive rates, and trophic relationships for whale species. More recently, research by Leaper et al. (2006) found a relationship between global climate signals and the interannual variability in whale breeding success, suggesting that changes in ocean conditions will affect *E. australis* population dynamics.

2.3.2.2 Overutilization for commercial, recreational, scientific, or educational purposes:

Commercial whaling during the 18th, 19th and early 20th century depleted the populations of *E. australis* throughout the Southern Hemisphere. Primarily hunted by French, US, and British whalers, *E. australis* was caught in large numbers off Brazil, Argentina, Southern Africa, New Zealand, Australia and Tristan da Cunha. These efforts reduced some populations of *E. australis* to near extirpation (Perry et al., 1999 and IWC, 2001).

By the beginning of the 20th century commercial whaling had reduced the population of *E. australis* to a fraction of its historic size. In 1935 *E. australis* received international protection from commercial whaling, and today, the IWC designates all right whales as a “Protection Stock” and their commercial catch quotas are set as zero. However, since 1935, illegal catches of *E. australis* have been documented in the Southern Hemisphere as recently as the 1970’s. These catches have occurred off southern Africa, Brazil, New Zealand and Argentina as well as in the southeast Atlantic, southwest Pacific and southwest Indian Ocean (IWC, 2001). The largest of these documented illegal catches was 1,335 right whales off Patagonia during the 1960s by Soviet vessels (Tormosov et al., 1998)

In addition to international protection, commercial whaling of *E. australis* is prohibited by various state and national laws. Because the take of *E. australis* is prohibited throughout the Southern Hemisphere and illegal catches have not been documented, or been known to occur, in the last thirty years, overutilization is not considered a significant threat to the species.

2.3.2.3 Disease or predation:

Little information is available regarding the threat of disease for *E. australis*. Some observations of skin lesions have been made in the Northern Hemisphere but nothing similar has been described in the Southern Hemisphere. It is unclear what threats, if any, diseases pose for *E. australis*, and further research in this area is needed (IWC, 2001).

Potential predators include killer whales and large sharks. Very few observations of attacks have been made, but analysis of scarring patterns indicates killer whales and sharks target calves and juveniles (Kenney, 2002). Predation by killer whales and large sharks is not considered a significant threat.

Off Peninsula Valdes, Argentina, pecking by kelp gulls forming dorsal skin lesions has a harassing effect and may affect calf behaviour (Rowntree et al., 1998) (see Section 2.3.2.5).

2.3.2.4 Inadequacy of existing regulatory mechanisms:

E. australis is protected and managed by a diversity of federal, national, and state laws, regulations, policies, plans, strategies, and protected areas throughout the Southern Hemisphere. The adequacy of these regulatory mechanisms varies by nation and region. In general, the

relevant management authorities have established either (a) comprehensive protection of *E. australis* or (b) a regulatory framework which could lead to comprehensive protection. These regulatory mechanisms are independent of the listing status of *E. australis* under the U.S. Endangered Species Act and would continue irrespective of a status change.

Australia

Two main federal laws protect southern right whales within Australian waters: the Environment Protection and Biodiversity Conservation Act of 1999 (EPBCA) and the Antarctic Living Marine Resources Act of 1981. Under the EPBCA *E. australis* is listed as endangered⁸ and receives the following statutory protections.

- 1) Any action that will have or is likely to have a significant impact on the southern right whale is prohibited (Sec. 229)
- 2) The Minister must develop a Recovery Plan⁹ for the southern right whale. The southern right whale recovery plan, published in 2005, outlines three recovery objectives including restoring the species to population levels that are considered secure in the wild. The plan also specifies six actions to achieve these objectives such as implementing population monitoring programs, protecting habitat, and preventing expansion of commercial and scientific whaling (Department of the Environment and Heritage, 2005).
- 3) The Minister may develop a Threat Abatement Plan for Key Threatening Processes that affect southern right whales.¹⁰ There is currently one key threatening process listed affecting the southern right whale – injury and fatality to vertebrate marine life caused by ingestion of, or entanglement in, harmful marine debris. At the time of this writing, the Department of the Environment and Water Resources is developing a Threat Abatement Plan for this process but no approved Plan exists (Iqbal, 2007).
- 4) The Minister may designate critical habitat¹¹ for listed threatened species. However, due to information gaps regarding the adaptability of southern right whales and the importance of current habitat, no critical habitat has been designated for the southern right whale. Instead, the Department of the Environment and Water Resources (formerly the Department of the Environment and Heritage) has identified habitat important to the survival of the southern

⁸ The EPBC Act provides for the identification and listing of threatened species in Section 178. Threatened species are further classified as either (1) extinct, (2) extinct in the wild, (3) critically endangered, (4) endangered, (5) vulnerable or (6) conservation dependent. Endangered is defined as any native species that is facing a very high risk of extinction in the wild in the near future (Sec.179(4)). The southern right whale was listed in July 2000.

⁹ Recovery Plans are required for all listed species and must provide a planned framework that outlines the research and management needed to support the recovery of a species. See Section 267-284 of the EPBC Act for further details on Recovery Plans.

¹⁰ A Key Threatening Process, is any process that may cause a native species to become eligible for listing as a threatened species or may cause any listed species to become eligible for a more endangered category (Section 188). The Minister is required to establish a list of all Key Threatening Processes (Section 183). Threat Abatement Plans outline and provide for the actions necessary to reduce the impact of Key Threatening Processes. The Minister may develop a Threat Abatement Plan for a key threatening process if the Minister determines the plan is a feasible, efficient, and effective way to abate the threatening process (Section 270A)

¹¹ Critical habitat is defined by the Act as habitat that is critical for the survival of a listed species (Section 207A). Any action that will significantly damage critical habitat is prohibited (Section 207B).

right whales. This includes all areas known to seasonally support significant portions of the species (Department of the Environment and Heritage, 2005 and Iqbal, 2007).

The EPBCA also authorizes the creation of the Australian Whale Sanctuary. The Sanctuary includes all commonwealth waters within the Exclusive Economic Zone, excluding coastal waters of the States and Northern Territory, and prohibits the killing or injuring of any cetacean within these waters. The Act also prohibits Australians from carrying out these actions in international waters (Sec. 229). All states and territories have enacted similar protections for whales within their coastal waters.¹²

The Antarctic Living Marine Resources Act of 1981 prohibits the harvesting of right whales in waters south of the Antarctic Convergence (Sec. 8(1A)). The Act was passed after Australia became a signatory State to the Convention on the Conservation of Antarctic Marine Living Resources.

New Zealand

Southern right whales are protected and managed by several different laws, policies, and strategies within New Zealand waters.

The 1978 Marine Mammal Protection Act (MMPA) prohibits persons from taking¹³ or attempting to take any marine mammal within New Zealand waters or from importing or exporting marine mammal products (Sec. 4). As previously discussed in Section 2.3.1.6 the MMPA also allows the Minister to designate Marine Mammal Sanctuaries. Pursuant to this authority, the Minister created the Auckland Islands Marine Mammal Sanctuary in 1993.

In 1998 the United Nations Educational, Scientific, and Cultural Organization (UNESCO) inscribed the New Zealand Sub-Antarctic Islands as a World Heritage Site. The site includes all lands and waters extending 12 nautical miles from five island groups (Snares, Bounty Islands, Antipodes Islands, Auckland Islands, and Campbell Islands) and was inscribed for its high level of biodiversity, pristine habitats, endemism, and for its conservation, scientific and natural values. Designation as a World Heritage Site does not automatically confer protections for southern right whales. Rather it encourages management agencies to address issues that adversely impact these sites. For example, in the nomination document UNESCO encouraged the Ministry of Fisheries to regulate commercial fishing within the Sub-Antarctic World Heritage Site. In 1993 New Zealand established the Auckland Island Marine Mammal Sanctuary under the MMPA and prohibited commercial fishing within 12 nautical miles of the Auckland Islands. In 2003, New Zealand created the Auckland Islands Marine Reserve under the MRA and prohibited the taking of marine life within 12 nautical miles of the Auckland Islands.

¹² The Southern Right Whale is listed as Endangered under the Tasmanian Threatened Species Protection Act 1995, as Threatened under Victoria's Flora and Fauna Guarantee Act 1988, Vulnerable under New South Wales' Threatened Species Conservation Act 1995 and South Australia's National Parks and Wildlife Act 1972 and as Fauna that is rare or likely to become extinct under Western Australia's Wildlife Conservation Act 1950 and Wildlife Conservation (Specially Protected Fauna) Notice 2005 (Iqbal, 2007).

¹³ Take includes to take, catch, kill, injure, attract, poison, tranquilize, herd, harass, disturb, possess, brand, tag, mark, flense, render down, separate any part from a carcass, or do any similar thing (Sec.1).

The New Zealand Biodiversity Strategy also has implications for the conservation of southern right whales. However, the Strategy does not provide protections for whales but rather establishes a framework to conserve New Zealand's coastal and marine biodiversity. The framework defines desired outcomes for marine biodiversity and outlines specific actions to achieve these outcomes. Actions include improving monitoring systems to better identify, understand and assess species and habitats, mitigating adverse fishing impacts, identifying protected species and developing recovery plans (Department of Conservation, 2000).

The Department of Conservation (DOC) developed the New Zealand Biodiversity Strategy in 2000 in order to fulfill its obligations under the Convention on Biological Diversity. Since then some progress has been made in implementing the plan but none substantially affecting the southern right whale. For example, in 2002 the DOC developed the New Zealand Threat Classification System in order to list native New Zealand species according to their risk of extinction. Under this system the southern right whale is classified as "nationally endangered"¹⁴ but no specific protective measures are provided to listed species. Instead, the list is a management tool to assist wildlife managers in allocating resources to species recovery and site-based management programs (Hitchmough et al., 2007 and Molloy et al., 2002).

The DOC also publishes Threatened Species Recovery Plans for certain species. Recovery Plans outline goals and objectives for management and are a tool to allocate resources and generate discussions regarding the recovery of a threatened species. However, there is no recovery plan for the southern right whale.

South Africa

Protection of *E. australis* within waters belonging to South Africa primarily falls under the 1998 Marine Living Resources Act (MLRA). By regulation, the Act prohibits the taking of whales without a permit.

E. australis may also be protected under South Africa's Biodiversity Act of 2004. However, it receives no such protection at this time. For example, the Act allows for the listing of threatened species and prohibits the carrying out of any activity that may negatively impact the survival of a threatened species (Sec. 56 – 57). In addition, the Act can protect ecosystems and habitats upon which threatened species depend through the development of bioregional plans (Sec. 40) or biodiversity management plans (Sec. 44). However, *E. australis* is not currently listed as a threatened species under the Act nor is it anticipated to be considered for listing in the near future (Foden, 2007) and no bioregional plans or biodiversity management plans have been established for its habitat (Sink, 2007).

Protection of *E. australis* could also be potentially addressed through the South African National Biodiversity Institute (SANBI). The Biodiversity Act established SANBI and charged the Institute with monitoring the status of the nation's biodiversity and the conservation status of all listed threatened or protected species (Sec. 11(1)(a)). SANBI manages a number of conservation, research, and education programs regarding biodiversity, but the majority focus on

¹⁴ A species is considered nationally endangered when it is facing a very high risk of extinction in the wild and has a small population with moderate to high recent predicted decline. The New Zealand Threat Classification System is based on the IUCN Red List Categories and Criteria but has been developed specifically for New Zealand.

terrestrial species. No programs address the conservation, protection or management of *E. australis* but the marine program is considering including this species in its efforts to establish offshore MPAs and to develop an offshore conservation plan (Sink, 2007).

Similarly, the South Africa National Biodiversity Strategy and Action Plan generally addresses the conservation of species and habitats within South Africa but does not explicitly discuss *E. australis*. The plan outlines objectives, actions and outcomes to achieve its overarching goal of conserving and managing terrestrial and aquatic biodiversity to benefit the people of South Africa. It also calls for an expansion of MPAs, especially in the offshore zone, and for a comprehensive marine fauna species assessment.

Recently, a South Africa Disentanglement Network was established to respond to whale entanglements in South African coastal waters. Entanglements are caused primarily by rock lobster ropes and shark gillnets. The Network includes research institutions, government agencies, police authorities, and other marine response groups.

Argentina

E. australis is protected at both the national and provincial level in Argentina but these regulatory mechanisms are not as extensive as those of other nations. In 1988, the Argentine National Congress declared *E. australis* a Natural Monument (Law 23094). The designation only applies in territorial waters, and the law has not been ratified by provincial governments (Rivarola et al., 2001 and Sironi et al., 2005). Locally, whale watching activities are regulated by the government of the Chubut Province. Whale watching was first regulated by the Provincial government in 1984, and is now subject to several laws and decrees.¹⁵ The Organismo Provincial de Turismo of Chubut and the Prefectura Naval Argentina are both responsible for enforcing these regulations (Rivarola, 2001). However, there is a high degree of non-compliance from the industry due to the lack of effective enforcement and the inadequacies of current regulations. Government officials have acknowledged that new regulations need to be created and that these regulations should be based on the findings of studies investigating the adverse impact of whale watching. Government officials are seeking to support such

¹⁵ These include the following (Carlson, 2007):

“Provincial Law 2381 of 1984 (as modified by Provincial Law 2618 in 1985) – Prohibits approaching, harassing, sailing, swimming or diving with any marine mammal within Provincial waters during the entire year without a provincial department permit. Permits are subject to the following: (1) maintain a minimum distance of 100m between whales and whalewatchers when engines are on and a minimum of 50m when engines are off, (2) stop engines near animals, (3) one boat per whale, (4) avoid harassing or chasing the animals, (5) avoid sudden changes in boat speed, (6) do not encircle the animals, (7) avoid flying lower than 150m over whales, (8) do not approach mothers with calves, (9) avoid activity that would alter whale behavior, (10) avoid entering the water in vicinity of whales.

Provincial Regulation Decree 916 of 1986 (as modified by Provincial Decree 1127 in 1991) – (1) Designates the authorities to enforce Law 2381, (2) creates the provincial Whale Watching Tour Operators Register and establishes the minimum requirements for their inscription, (3) allows no more than two boats per permitted operator, (4) creates the Provincial Field Naturalist register and establishes the minimum requirements for their inscription, (5) regulates the tour operator’s qualifications for carrying out whale watching activities, (6) designates Provincial Wardens as supervisors for all whale watching activities.

Provincial Decree 1127 of 1991 – Limits the number of whale watching licenses in Golfo Nuevo to five and established the length of time each license is valid.”

Provincial Termination No. 111 OPT of 1997 – Prohibits diving with marine mammals.

investigations.¹⁶ In the interim, the industry has agreed to follow a Voluntary Code of Conduct¹⁷ and Code of Ethics¹⁸ regarding whale watching until the regulations are updated (Sironi et al., 2005).

The Whale Conservation Institute/Ocean Alliance (WCI/OA) and the Wildlife Conservation Society and Fundación Patagonia Natural direct the Argentine Right Whale Stranding Project. The Project has multiple objectives including collecting data and tissue samples from stranded right whales and developing a health assessment protocol for global comparison of right whale populations (Uhart et al., 2005 and Mohamed et al., 2007). The WCI/OA began recording stranding data in 1971 and in 1994 began systematically surveying the Península. In 2003, the WCI/OA received funding from the National Marine Fisheries Service (NMFS) Office of Protected Resources to support the Project and, since then, has established a stranding network and collected data and biomedical samples from 90 right whales (Uhart et al., 2005).

In 1999 the United Nations Educational, Scientific, and Cultural Organization (UNESCO) inscribed Península Valdés as a World Heritage Site. The Península was specifically inscribed for its conservation of breeding right whales and their habitat. UNESCO also recognized the site for its in-situ conservation of biological diversity. Designation as a World Heritage Site does not automatically confer protections for southern right whales. Rather it encourages management agencies to address issues that adversely impact these sites.

Brazil

Because regular sightings of *E. australis* off Brazil are recent, management and protection is still in development. In 1995 the Governor of the State of Santa Catarina declared *E. australis* a State Natural Monument, and the species is listed under the Ministry of the Environment's National Endangered Species List. Listed species are protected by federal law from being hunted, captured or commercialized, and agencies may develop recovery plans, establish conservation areas, or stimulate research programs. The Brazilian Environmental Institute (IBAMA), Brazil's national environmental authority, is currently working on a management plan to protect *E. australis* (Hoyt, 2005).

International

At the international level, *E. australis* is protected by the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES) and the Convention on the Conservation of Migratory Species of Wild Animals (CMS). CITES regulates the international trade of

¹⁶ During 2006, a technical working group was called by the Director de Conservación from Chubut province, to review the current whale watching regulations. The group was composed of legal advisors, government officials, whale watch industry representatives, NGOs, etc. The laws were reviewed and a draft text was written and will be submitted to the provincial legislature for approval. Also, the Chubut Government funded an impact study to determine the effects of swim-with programs on the behavior of the southern right whales at Península Valdés. A technical report from the study will be used by the Dirección de Conservación to evaluate whether the activity will be legalized (Sironi, 2007).

¹⁷ In 2004, a multi-stakeholder group of whale-watch company owners, captains, government officials, and scientists from the Península Valdés area held a workshop and agreed to create and follow a Voluntary Code of Conduct. The Code regulates the conduct of whale-watch operators at sea. As of 2005, the Code was still in development.

¹⁸ The Code of Ethics was developed in 2004 by the Whale Watching Advisory Committee. It includes 13 common sense articles regulating the conduct of whale-watch operators. These articles are enumerated in Sironi et al., 2005.

endangered species to ensure their survival is not threatened. Under CITES, *E. australis* is listed as an Appendix I species, meaning the species is threatened with extinction and trade is allowed only in exceptional circumstances. There are 169 parties to the Convention including the four nations known to contain primary wintering grounds for the species (Argentina, Australia, New Zealand, and South Africa).

The CMS also aims to conserve migratory species on a global scale and promotes conservation action among nations. *E. australis* is listed as an Appendix I species, meaning it is threatened with extinction, and as a result, nations are obligated or strive to protect, conserve, and restore the species and their habitat and mitigate any threats or impacts. There are 101 parties to the CMS including South Africa, Australia, New Zealand, and Argentina.

In 1996, the southern right whale was listed in the IUCN's Red List of Threatened Species as "Lower Risk/Conservation Dependent" (LR/CD). The LR/CD status meant that the species did not satisfy the IUCN Red List criteria for threatened status (Critically Endangered, Endangered, or Vulnerable) but that it was the subject of a conservation program, the cessation of which would result in the species becoming threatened within a period of five years. The LR/CD category has been eliminated from the IUCN listing system, and the Cetacean Red List Authority is in the process of reassessing the southern right whale at the time of writing (Reeves, 2007).

Lastly, *E. australis* receives several protections from the International Whaling Commission (IWC). Under the 1946 International Convention for the Regulation of Whaling, the IWC can designate sanctuaries for the conservation of whale resources (Article V(1)(c)). In 1979 the IWC created the Indian Ocean Sanctuary, essentially closing the entire Indian Ocean to commercial whaling. Several decades later, IWC established the Southern Ocean Sanctuary, which prohibited all commercial whaling within a 50 million square kilometer area surrounding Antarctica. In addition, right whales received international protection in 1935 when the 1931 Geneva Convention for the Regulation of Whaling entered into force and prohibited the taking or killing of right whales by all nations bound by the Convention.

2.3.2.5 Other natural or manmade factors affecting its continued existence:

Ship strikes and entanglements

Collisions with vessels and entanglements in fishing gear are the leading causes of human-induced mortality for *E. australis*. According to IWC records, there were 17 recorded or suspected ship collisions with right whales in the Southern Hemisphere between 1983 and 1997. The majority were observed in South Africa and a smaller proportion in Brazil. It is unclear how many led to direct fatalities (IWC, 2001). Since 1997, six additional ship strikes have been recorded for southern right whales (Jensen and Silber, 2003; IWC, 2000, 2001b, 2002, 2003, 2004, 2005, 2006, 2007). These were observed off Australia, Argentina, and Brazil, and all resulted in mortality. At the time of this writing, no ship strikes have been documented off New Zealand or other areas within the range of *E. australis*. However, because ship strikes of right whales can go undetected or unreported it is likely the number of collisions is greater than documented (IWC, 2001; Jensen and Silber, 2003 and Laist et al., 2001).

At least 60 entanglements have been recorded in the Southern Hemisphere from 1963 to 1997, nine of which led to or possibly led to mortalities (IWC, 2001; Best et al., 2001b and Allen and Bejder, 2003). From 1997 to 2006 an additional four entanglements resulting in mortality were recorded (IWC, 2000, 2001b, 2002, 2003, 2004, 2005, 2006, 2007). The majority of entanglements have been documented in South Africa, Brazil, and Australia. Most entanglements go unreported, and data suggest most whales free themselves from entanglements (IWC, 2001).

Ship strikes are not considered an immediate problem; however, if whales repopulate the southeastern coastline of Australia where shipping traffic is more prevalent incidents are likely to increase (NMFS, 2006). In Australia, the threat of entanglements and ship strikes may also increase if *E. australis* repopulates northerly portions of the eastern and western coastline. In the last decade, sightings of *E. australis* north of 37°S off eastern and western Australia have suggested the species range is expanding. Because right whales have not been frequently observed there in the past, marine development projects often overlook the presence of right whales in the northern latitudes and fail to address the potential impacts on *E. australis* in their impact assessments. Allen and Bejder (2003) expect there will be greater interactions with nearshore aquaculture facilities, fishing gear, coastal developments, and marine traffic if right whales repopulate the eastern and western coastline and precautionary measures are not adopted by regulatory agencies. Also, population recovery for right whales in South Africa is occurring despite human caused mortalities due to ship strikes and entanglements in fishing gear (Best et al., 2001b).

Kelp gulls

In the late 1970's kelp gulls were occasionally observed feeding on the skin and blubber of *E. australis* along Península Valdés. Since then the frequency of gull attacks and the number of whales observed with lesions induced by kelp gulls has increased. In 1990, 32% of whales had lesions attributed to gull attacks and there is currently no area in the Península where whales are not harassed by gulls. It is unclear why the rate of harassment has increased, but it may be related to the presence of waste disposal sites, the decline of food sources or increased competition. The wounds inflicted do not seem to be life threatening. However, whales react negatively to attacks and alter their behavior in response to gulls. Although few studies have been done on this subject, gull harassment may be a serious threat to *E. australis* and could impact calf development and possibly cause *E. australis* to abandon its calving grounds on Península Valdés (Rowntree et al., 1998 and Rowntree et al., 2001)

Inbreeding depression

The IWC has recognized inbreeding depression as a factor potentially affecting the recovery of right whales (IWC, 2001). However, based on observed growth rates, it is unlikely that this factor affects southern right whale populations off their major breeding grounds. Since the deleterious impacts of inbreeding depression are potentially the greatest among small populations, the threats may only exist for some of the smaller breeding populations such as those off New Zealand and Chile/Peru. For example, the breeding population in the sub-Antarctic Islands of New Zealand, which was heavily reduced by whaling, is one of the least diverse baleen populations in the world in terms of mtDNA (Carroll, 2006). Still, no studies to date have identified inbreeding depression as a factor affecting the recovery of *E. australis* even

for the most depleted populations.

2.4 Synthesis:

Commercial whaling in the 18th, 19th and 20th century significantly reduced the global population of *E. australis*. The 1997 population was estimated at around 7,000 individuals, and at a growth rate of 7% it could be expected to have doubled by 2007. Nevertheless, the global population would still be a fraction of the historic size estimated to have been about 60,000 whales (IWC, 2001). The majority of these individuals are currently found wintering off the coasts of Argentina, South Africa and Australia, but smaller populations are recognized off Brazil, New Zealand, and Tristan da Cunha, and they have been occasionally sighted off Namibia, Madagascar, and other oceanic islands (eg. South Georgia). It is possible these rare and infrequent sightings represent a repopulating of the historic range of *E. australis* which was reduced by commercial exploitation.

Wintering populations at the three primary calving grounds (South Africa, Argentina and Australia) are recorded as increasing at annual rates of near 7% (Best et al., 2001, Bannister, 2001, Cooke et al., 2001 and IWC, 2001). There is evidence that the New Zealand sub-Antarctic population also may be increasing. Population trends for breeding groups off Tristan da Cunha, Brazil, Namibia, Mozambique, and South Georgia are largely unknown. Systematic research in these areas has not been carried out long enough to estimate growth rates. The populations off mainland New Zealand and Chile/Peru are the only populations so far recognized as showing little or no signs of recovery. At the current recovery rates, recovery of *E. australis* to the historical carrying capacity may take 50-100 years assuming current protections are maintained and no new threats arise. However, these predictions are based on estimates for current abundance, historical catch records, and intrinsic growth rates, all of which are surrounded by uncertainty (Baker and Clapham, 2004).

E. australis continues to face a number of threats throughout its range. Ship strikes, entanglement in fishing gear, climate change, chemical pollution, habitat loss, coastal development, tourism, increased vessel traffic, and kelp gull harassment have all been identified by the IWC as factors potentially affecting the recovery of right whales. Despite current levels of ship strikes and entanglements, wintering populations at the three primary calving grounds (South Africa, Argentina and Australia) are recorded as increasing at annual rates of near 7%. However, the frequency of these events will likely increase as nations continue to develop their coastlines and as *E. australis* repopulates sections of its historic range. In the long run, habitat degradation and changes in ocean conditions caused by the gradual and cumulative impacts of climate change may pose a more significant threat to *E. australis* (Agardy, 1996).

Southern right whales are protected and managed by a variety of international, national, provincial, and state laws and policies. Within territorial waters, the level of protection and enforcement varies from comprehensive to nonexistent. While the majority of countries have established federal legislation prohibiting the take of *E. australis*, many lack comprehensive management or recovery plans for the conservation of right whales and their habitat. A variety of MPAs have been created in the Southern Hemisphere to protect *E. australis*. These include the prime calving grounds around Península Valdés (Argentina), Walker Bay (South Africa) and

Head of the Bight (South Australia). However, many of these MPAs lack management plans, adequate staffing, funding and enforcement capabilities and it is difficult to assess whether these areas are effective in conserving and protecting *E. australis* and its habitat.

Recent studies on the genetics, migration, behavior and physical characteristics of *E. australis* may support listing the species as at least four Distinct Population Segments (DPS). These segments include the (1) western South Atlantic, (2) eastern South Atlantic, (3) Australia, and (4) New Zealand. The discreteness criterion may be met by comparisons of mtDNA haplotype frequencies, which show significant genetic differentiation, as well as by comparisons of physical characteristics and migratory patterns indicative of reproductive isolation. The significance criterion may be met by the loss of range that would be suffered if any of the population segments were to go extinct. The Chile/Peru population may also represent a DPS, however, less data has been published on this population regarding the discreteness and significance requirements of the 1996 DPS Policy.

Based on the best available science reviewed in this report, it is likely that the current listing of *E. australis* as a single, global species is no longer appropriate for the purposes of the ESA. Instead, *E. australis* is likely composed of several DPSs, and the status of those DPSs may warrant a different classification under the ESA. However, a more detailed analysis is needed before such conclusions can be reached. Therefore, NMFS recommends a full status review be conducted for *E. australis* to identify the appropriate DPSs for this species and to determine whether any identified DPSs are endangered with extinction or likely to become so in the foreseeable future.

Until a status review is completed NMFS recommends that the globally listed population of *E. australis* retain its current status as endangered for the following reasons. First, the worldwide population of *E. australis* likely remains depleted as a result of historic commercial whaling. Second, the historic range and distribution of *E. australis* have been reduced, and in some areas (mainland New Zealand and Chile/Peru) the population is nearly extirpated. Third, certain nations with breeding populations of *E. australis* have yet to develop comprehensive and adequate regulatory mechanisms for protection and conservation of the species. Fourth, long-term threats from habitat degradation caused by human induced climate change and coastal alterations have been recognized but have not been sufficiently studied or addressed.

3.0 RESULTS

3.1 Recommended Classification:

- Downlist to Threatened
- Uplist to Endangered
- Delist
- No change is needed

3.2 New Recovery Priority Number: NA

3.3 Listing and Reclassification Priority Number: NA

4.0 RECOMMENDATIONS FOR FUTURE ACTIONS

This 5-year review provides sufficient information to suggest that a full analysis of the species under the DPS policy is warranted. Therefore, we recommend NMFS conduct a full status review for *E. australis* to identify the appropriate DPSs for this species and to determine whether any identified DPSs are endangered with extinction or likely to become so in the foreseeable future.

Further, NMFS recommends additional and continued research to address information gaps regarding southern right whales in the following areas:

- Genetic research, with increased sample sizes, using microsatellites and other genetic markers to measure gene flow between putative breeding stocks.
- Improved understanding of the feeding distribution throughout the circumpolar range of *E. australis*.
- Satellite tagging to determine migratory movements and location of key habitats, and to refine knowledge of population structure.
- Long-term monitoring of populations along Brazil, Madagascar, Namibia and other regions within the species' historic range where recovery and/or reoccupation of *E. australis* may be underway.
- Long-term threat of habitat degradation caused by climate change and coastal/marine development.
- Improved modeling techniques to estimate pre-exploitation population size and recovery rates on a stock-by-stock basis where possible.
- Impact and threat of disease on population recovery.

Lastly, NMFS recommends that nations with jurisdiction over waters where *E. australis* populations or habitats are known to occur continue to manage the species under their current regulatory mechanisms, and, where these mechanisms are lacking or inadequate, take actions to improve the protection of *E. australis* within their territorial waters.

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NATIONAL MARINE FISHERIES SERVICE
5-YEAR REVIEW
Eubalaena australis

Current Classification: Endangered

Recommendation resulting from the 5-Year Review

- Downlist to Threatened
- Uplist to Endangered
- Delist
- No change is needed

Review Conducted By: Chris Uyeda. Office of Protected Resources, Silver Spring, MD.

HEADQUARTERS APPROVAL:
Director, Office of Protected Resources

Approve:  Date: 10/23/07
for James H. Lecky

Assistant Administrator, NOAA Fisheries

Concur Do Not Concur

Signature:  Date: 10/23/07
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