Balaenoptera borealis – Sei Whale

Regional Red List status (2016)	**Endangered A1d***
National Red List status (2004)	Data Deficient
Reasons for change	Non-genuine change: New information
Global Red List status (2008)	Endangered A1ad
TOPS listing (NEMBA) (2007)	None
CITES listing (1981)	Appendix I
Endemic	No

*Watch-list Data

Following the overexploitation of Blue, Fin and Humpback Whales, Sei Whales were specifically targeted in the southern hemisphere, resulting in the most substantial collapse of any whale stock during recent times.

Taxonomy

Balaenoptera borealis (Lesson 1828)

ANIMALIA - CHORDATA - MAMMALIA - CETARTIODACTYLA - BALAENOPTERIDAE - *Balaenoptera - borealis*

Common names: Sei Whale, Coalfish Whale, Japan Finner, Northern Rorqual, Pollack Whale, Rudolph's Rorqual, Sardine Whale (English), Seiwalvis (Afrikaans)

Taxonomic status: Species

Taxonomic notes: Although currently recognised as a distinct species, the Sei Whale is closely related to the Omura's Whale (*B. omurai*) and Bryde's Whale (*B. edeni*) (Wada et al. 2003), and was often confused with these species in whaling statistics. In particular, prior to 1972, most catch and sighting records were in fact Bryde's Whales, and those in the western Pacific may have been Omura's Whales. While two subspecies have been suggested: *B. b. borealis* (Tomilin, 1957) in the northern hemisphere and *B. b schlegeli* (Flower, 1884) in the southern hemisphere, these have not been widely accepted by the scientific community.

Assessment Rationale

As a direct result of commercial whaling between 1910 and 1979, an estimated total of 176,000 Sei Whales were killed in the southern hemisphere. Aside from the Antarctic, the west coast of Africa was considered the most productive region for Sei Whales, and between 1912 and 1967, approximately 9,480 Sei Whales were caught in this region. Following the substantial decline of the Blue, Fin and Humpback Whales, commercial whaling of this species peaked in the early 1960s, where the total catch increased from 3,629 in 1959 to 22,207 in 1965. This resulted in a major population collapse from which individuals that frequented African waters may have originated. It is suggested that the exploited Sei Whale population in the region of Antarctica due south of Africa decreased from 21,000 individuals in 1960 to an estimated 5% of that in 1979. Furthermore, by 1979 the total southern hemisphere populations are believed to have decreased from 100,000 to 24,000, however, the accuracy of these data may have been affected by catch per unit effort, and may have underestimated the population decline.

While no recent surveys have been conducted for this species, the population is expected to be recovering, however, not as rapidly as other whale species, and no increases have been observed in strandings data. Sei Whales are rarely sighted in South African waters, but historically were considered fairly common; for example, Sodwana Bay previously exhibited high catch and sightings records between the 1940s and 1960s. Any specific increases in population abundance of Sei Whales would be difficult to detect within the assessment region. The national assessment for this species is considered in line with that of the global assessment, and the majority of the decline is attributable to the southern hemisphere, thus this species is listed as Endangered A1d. However, continued monitoring is needed to estimate the population trend for the assessment region more accurately. This species should be reassessed once such data are available.

Regional population effects: Sei Whales are highly migratory and wide-ranging. There are no barriers to dispersal, thus rescue effects are possible.

Distribution

Sei Whales occur worldwide across all major ocean basins, except the extreme high latitudes of the Arctic and Antarctic polar regions. Similar to other Balaenopterid species, Sei Whales migrate between the warmer tropics and subtropics in winter, and the cooler temperate and subpolar regions in summer. The extent of their winter range remains uncertain in parts, but is considered to be widely dispersed (Horwood 1987, 2002). Their distribution is usually restricted to offshore areas, with water temperatures typically between 8 and 18 °C. They are known to avoid areas of anthropogenic disturbance. In peak summer in the southern hemisphere (January–February), they usually occur between 40 and 50°S in the

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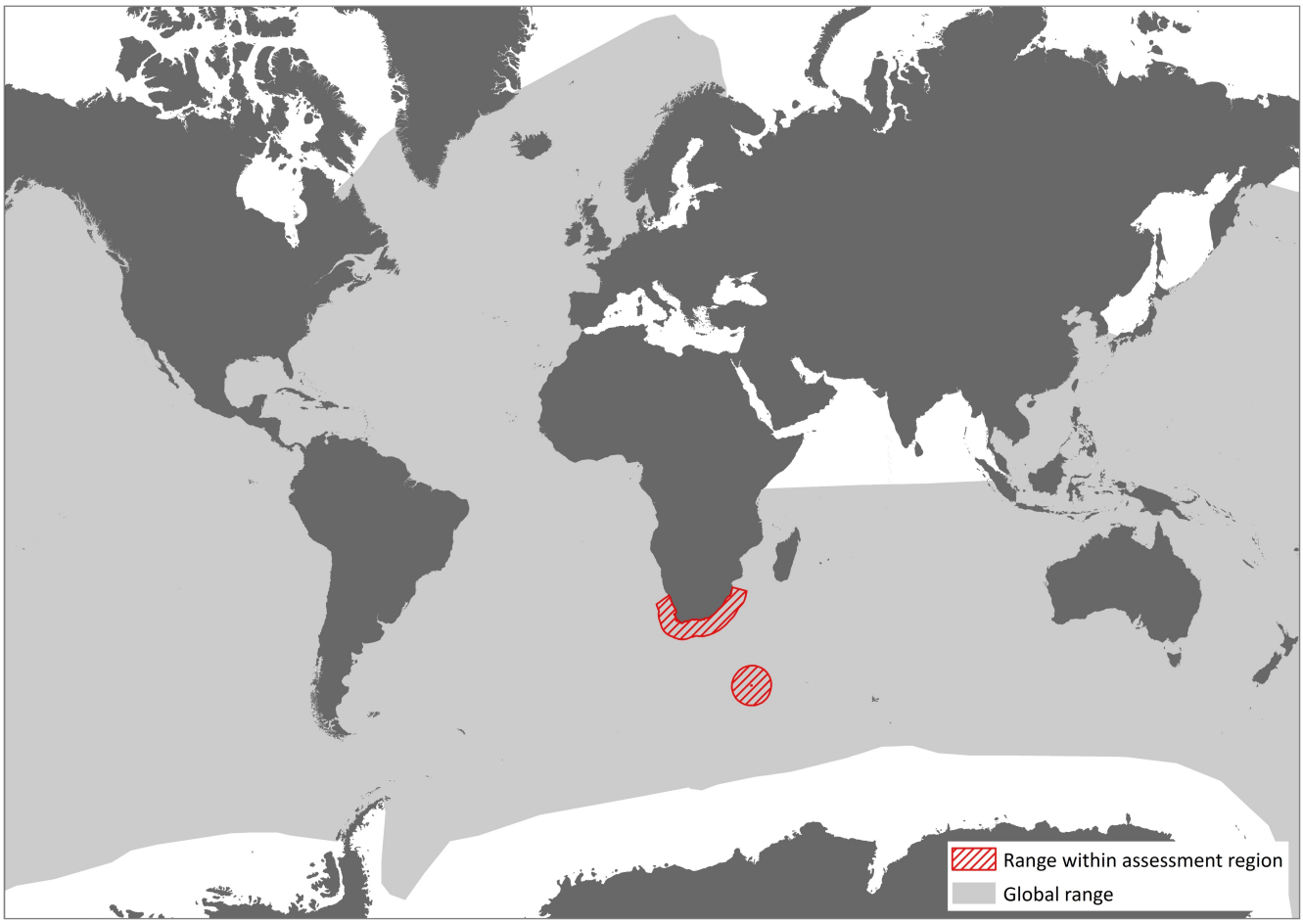

Figure 1. Distribution range for Sei Whale (*Balaenoptera borealis*) within the assessment region (IUCN 2012)

southern Indian oceans and the South Atlantic (Joiris et al. 2015), and between 45 and 60°S in the South Pacific, but only the larger individuals are known to travel further south than the Antarctic Convergence (± 55°S) (Skinner & Chimimba 2005). Sei Whales in the waters off South Africa are typically en route northwards from their summer feeding grounds (predominantly in May/June), or southwards from their tropical breeding grounds (generally between August and October) (Bannister & Gambell 1965; Best 1967). Increased Sei Whale catches off the western (Donkergat) and eastern (Durban) coasts of South Africa during spring and autumn are indicative of these migration routes (Horwood 1987). They are usually encountered off the edge of the continental shelf on the west coast (Best & Lockyer 2002).

Population

Following the major decline of Blue, Humpback and Fin Whales in the 1960s, commercial whaling of Sei Whales increased substantially. Between 1910 and 1979, records suggest that approximately 176,000 Sei Whales were caught in the southern hemisphere. Aside from the Antarctic, the west coast of Africa was considered the most productive area for whaling of Sei Whales (Best & Lockyer 2002). Without species-specific quotas (quotas were set only for a combination of Sei Whales and Fin Whales, and were not partitioned geographically), more than 28,000 Sei Whales were caught during the two major whaling seasons between 1964 and 1966 in the Atlantic Ocean. This caused the most substantial collapse of any whale stock during recent times, where population abundance of this species declined by 80% at the Donkergat and Durban whaling stations between 1965 and 1967 (Gambell 1974; Best & Lockyer 2002). Records suggest that in 1964 alone over 20,000 Sei Whales were caught, but on average between 1960 and 1972, 5,000 individuals were taken per year. The majority of Sei whaling operations took place from pelagic fleets south of 40°S in summer; and it is suggested that the exploited Sei Whale population in the region of Antarctica due south of Africa decreased from 21,000 individuals in 1960 to an estimated 5% of that in 1979 (IWC 1980). However land-based whaling was also conducted in winter from Brazil, Peru, South Africa, and to a lesser extent, Chile, where some confusion with Bryde's Whales occurred.

Sei Whales in the southern hemisphere were vaguely divided into six key management areas by the IWC, and only in 1979 were all southern hemisphere stocks formally protected. The most recent population assessment of Sei Whales in the southern hemisphere was coordinated by the IWC Scientific Committee in 1979 (IWC 1980), and built on by Horwood (1987). These results estimated the Sei Whale population, excluding those of the southern Atlantic (Area II), to have decreased from approximately 64,000 in 1960 to 11,000 in 1979. Importantly, this estimate represents only those individuals of legal size, which are projected as 67% of the total population. These data were collected from Japanese whaling and surveying vessels, and were based on catches/sightings per unit effort. There are no current population size or trend estimates (Prieto et al. 2012).

Discrepancy between abundance indices and population models in the southern Atlantic (Area II) suggested that the IWC's management areas delineated for this species,

do not correlate to genuine reproductive populations. Additionally, as previously mentioned, nearly all of the South Atlantic stock was removed during the two major whaling operations in the late 1960s. Considering the lack of survey effort for this species, estimating the current population abundance and trends for this species is extremely challenging. The only recent estimate of abundance for Sei Whales is from a portion of their range in the North Pacific. Their abundance in the central North Pacific was projected as approximately 9,286 (CV = 0.35) individuals in 2010 (Hakamada et al. 2011). The IWC provided a 1989 population estimate for Sei Whales south of 30°S at approximately 10,500, but no variance was supplied. This estimate was based on sighting data from the International Decade of Cetacean Research (IDCR) and the Japanese Scout Vessel (JSV). Exhibiting a generation time of 23.4 years (Taylor et al. 2007), this species has an estimated maximum rate of increase of less than 3% / year (Horwood 1987; Best & Lockyer 2002).

Current population trend: Unknown

Continuing decline in mature individuals: No

Number of mature individuals in population: Unknown

Number of mature individuals in largest subpopulation: Unknown

Number of subpopulations: Unknown

Severely fragmented: No

Habitats and Ecology

Although usually moving in small schools of between three and eight individuals (often segregated by age and sex), Sei Whales congregate at feeding grounds and may develop aggregations of more than 100 individuals. The blow shape of Sei Whales is similar to that of the Fin Whale, but does not project as high or as broadly. In comparison to that of the Fin Whale, the dorsal fin of the Sei Whale is more upright. Sei Whales are also considered fast swimmers, and have been recorded to reach speeds of up to 30 knots over short distances.

Their diet is greater in variety than that of the Blue Whale, but they usually only feed on one food type at a time. For example, 21,713 North Pacific Sei Whale stomachs were dissected, revealing that 82.7% consisted only of copepods and the stomach contents of 12.6% comprised only of euphausiids; while in the southern hemisphere, 31,494 stomachs were examined, revealing that 54.3% contained only euphausiids, 30.5% consisted only of copepods and 14.4% of the dissected stomachs held only amphipods (Nemoto & Kawamura 1977). In the southern hemisphere, their most important prey is considered to be copepods, but in Antarctica specifically, they may take krill (*Euphausia superba*). Within the waters surrounding the assessment region, Sei Whales consume both euphausiids and copepods, however in small quantities (Bannister & Baker 1967; Best 1967). Sei Whales do not consistently return to the same feeding grounds every year, and may inexplicably disappear from a particular site during certain years, or even decades (Horwood 1987).

Breeding in the southern hemisphere usually takes place between the months of April and August, with a peak in June. The gestation period lasts for approximately 12 months. Newly born calves are usually about 4.5 m, and over the next six months grow rapidly to a length of approximately 8.0 m (Skinner & Chimimba 2005).

Ecosystem and cultural services: Marine mammals integrate and reflect ecological variation across large spatial and long temporal scales, and therefore they are prime sentinels of marine ecosystem change; migratory mysticete whales may be used to investigate broadscale shifts in ecosystems (Moore 2008).

Use and Trade

Major commercial whaling of the Sei Whale has ceased, although annually approximately 100 individuals are taken from the waters of the North Pacific by Japanese whalers under a permit of scientific research.

Threats

Subsequent to the decline of Blue, Fin and Humpback Whales due to commercial whaling, Sei Whales were specifically targeted by whalers in the southern hemisphere and North Pacific, leading to a rapid and intensive exploitation of this species from the late 1950s to the mid-1970s. Although occurring over a longer period, Sei whaling in the North Atlantic was less intensive.

Table 1. Threats to the Sei Whale (*Balaenoptera borealis*) ranked in order of severity with corresponding evidence (based on IUCN threat categories, with regional context)

Rank	Threat description	Evidence in the scientific literature	Data quality	Scale of study	Current trend
1	*5.4.2 Fishing & Harvesting Aquatic Resources*: historical whaling (no longer a threat). Current stress *2.3 Indirect Species Effects*: inherent small population size and genetic isolation.	Gambell 1974	Indirect	Regional	Ceased (manageable if sufficient protection is given to the population and the more severe threats are controlled/prevented).
2	*11.1 Habitat Shifting & Alteration*: due to climate change. Current stress *2.3.8. Indirect Species Effects*: on food resources.	Burns & Baker 2000	Simulation	International	Recent research projects that sea ice in the southern hemisphere will reduce by more than 40% in the next century, thus affecting food resources for whales in the form of *Euphausiacea* spp.
3	*4.3 Shipping Lanes*: ship strikes. Current stresses *2.1 Species Mortality* and *2.2 Species Disturbance*.	Cole et al. 2006	Empirical	Local	Only 2 Sei Whales were reportedly killed as a result of ship strikes off the east coast of the U.S between 2000 and 2004.

Commercial exploitation of this species ended in 1975, 1979 and 1989 in the North Pacific, southern hemisphere and North Atlantic, respectively. Under a scientific research permit, Japanese whaling in the North Pacific recommenced in 2002, and records showed that since 2004, approximately 100 individuals are caught each year.

Sei Whales are documented to avoid areas of anthropogenic influence, and are usually limited to an offshore distribution. As a result, they appear to have a fairly low risk of trauma and death as a result of ship strikes. However, two fatal ship strikes were recorded on the east coast of the United States between 2000 and 2004 (Cole et al. 2006). The frequency or severity of this threat is unknown within the assessment region.

Current habitat trend: Declining in quality due to climate change (Burns & Baker 2000).

Conservation

Since 1975 in the North Pacific and 1979 in the southern hemisphere, Sei Whales have been independently and formally protected by the International Whaling Commission. Additional protection includes the general moratorium on commercial whaling (since 1986); however, this does not shelter Sei Whales from catches taken under a scientific permit. The Sei Whale is listed on Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), however since 2000, Iceland has opposed this listing. This species is also listed on Appendix II of the Convention on the Conservation of Migratory Species of Wild Animals (CMS). There is insufficient data to assess the present status of this species in the southern hemisphere, and according to the IWC, surveys have discovered little evidence of population recovery in the northeastern Atlantic.

Within South Africa's Exclusive Economic Zone, they are fully protected. The major intervention necessary for this species is the collection of more data relating to its current population status and trends using ship-based surveys.

Recommendations for managers and practitioners:

- Systematic monitoring: design and implement a monitoring programme (acoustic and sightings) that effectively samples Sei Whales to determine population size and trends within the assessment region.
- Develop best practice guidelines for seismic surveys and enforce regulations.

Research priorities: While research output for other whale species has increased significantly over time, this is not the case for Sei Whales (Prieto et al. 2012). Research priorities include:

- Estimate of current population size and trend estimates within the assessment region.
- Identification of threats and threat severity to this species, including the effects of climate change.
- Clear definition of stock units for management purposes.
- Studies detailing distribution and migration patterns, including the identification of wintering areas.

Data Sources and Quality

Table 2. Information and interpretation qualifiers for the Sei Whale (*Balaenoptera borealis*) assessment

Data sources	Field study (literature), indirect information (literature, expert knowledge)
Data quality (max)	Estimated
Data quality (min)	Inferred
Uncertainty resolution	Best estimate
Risk tolerance	Evidentiary

Encouraged citizen actions:

- Report whale strandings to relevant authorities.
- Participate as volunteers in Sei Whale research projects.
- Whale watching operators could contribute to photo-ID catalogues and behavioural observations.

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Details of the methods used to make this assessment can be found in *Mammal Red List 2016: Introduction and Methodology.*