

Orcinus orca – Killer Whale



Regional Red List status (2016)	Least Concern*
National Red List status (2004)	Data Deficient
Reasons for change	Non-genuine change: New information
Global Red List status (2013)	Data Deficient
TOPS listing (NEMBA) (2007)	None
CITES listing (2003)	Appendix II
Endemic	No

*Watch-list Data

Killer Whales are global super-predators: more than 140 species of marine vertebrates have been recorded as Killer Whale prey (Ford 2009). Second only to humans, the Killer Whale may be the most widely-distributed mammal on Earth (Rice 1998).

Taxonomy

Orcinus orca (Linnaeus 1758)

ANIMALIA - CHORDATA - MAMMALIA -
CETARTIODACTYLA - DELPHINIDAE - *Orcinus* - *orca*

Synonyms: *Orcinus glacialis* (Berzin & Vladimirov 1983)

Common names: Orca, Killer Whale (English), Moordvis (Afrikaans)

Taxonomic status: Species

Taxonomic notes: *Orcinus orca* is currently considered a single, cosmopolitan species, however many populations (including some which occur sympatrically) are ecologically, genetically and morphologically distinct (Rice 1998; Ford 2009). Despite such distinction, the global genetic diversity of the species appears low at both mitochondrial and nuclear DNA markers (Hoelzel et al. 2002; Morin et al. 2010), with such low diversity ascribed to a historical population bottleneck (Hoelzel et al. 2002). However, high diversity and incidence of private haplotypes from South Africa and the distribution of South

African haplotypes throughout the network suggest the subregion to have been a refuge to the loss of genetic diversity found elsewhere (Moura et al. 2014).

Worldwide, various 'ecotypes' are recognized (although see de Bruyn et al. 2013); in the Antarctic and sub-Antarctic four ecotypes are proposed (designated *Type A-D*) (Pitman & Ensor 2003; Pitman et al. 2011). Morin et al. (2010) suggested that Antarctic *Type B* and *Type C* and northeast Pacific Bigg's (*Transient*) Killer Whales be designated as distinct species. Two species previously proposed from the Antarctic – *Orcinus glacialis* (Berzin & Vladimirov 1982) and *Orcinus nanus* (Mikhalev, Ivashin, Savusin & Zelenaya 1981), have not been accepted (Perrin 2009), and the relationship of these previously proposed species to the proposed ecotypes remains unknown.

Assessment Rationale

This taxonomic unit is treated as one species in this assessment even though it may be more complicated. At least two subpopulations of Killer Whales have been recognised within South African waters, those occurring off mainland South Africa, and those associated with the region around the Prince Edward Islands. While a monitoring programme recently initiated at the Prince Edward Islands presently provides some data for that subpopulation and will provide more complete information (especially demographic parameters) in future, the South African subpopulation is almost entirely unknown. No abundance estimates are available for the entire assessment region, but there are considered to be 20–50 mature individuals occurring around the Prince Edward Islands. Population size, structure and movement of Killer Whales should be determined.

No major threats that could cause rapid decline were identified and there is no reason to believe there are range-wide declines. However, the minor threat of competition with the longline fisheries, which may cause occasional, intentional deaths, was identified in both subpopulations. Interactions with longline fisheries should continue to be monitored and ideally a photographic identification catalogue should be established to determine which individuals are depredated.

The species is wide-ranging and common and its habitat is not fragmented. Such connectivity, combined with the lack of major identified threats, means we list this species as Least Concern. If taxonomy is resolved, re-assessment at subspecies or subpopulation level may be required.

Regional population effects: The Killer Whale is an extremely wide-ranging pelagic cetacean, with a continuous distribution and no obvious barriers to dispersal, thus rescue effects are possible.

Distribution

The Killer Whale is a well-known cosmopolitan species, and with the exception of humans, may be the most widespread mammal across the globe (Heyning &

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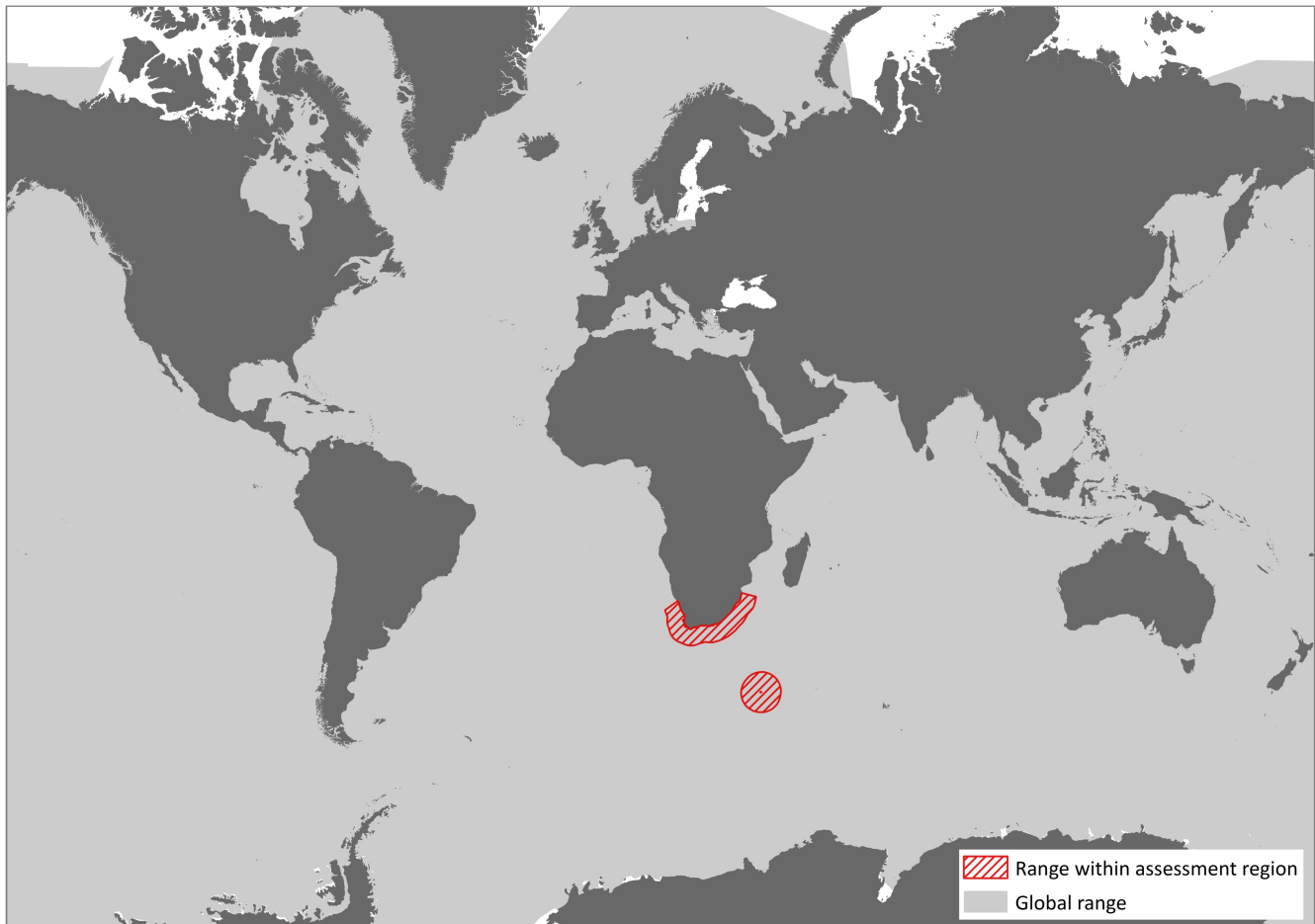


Figure 1. Distribution range for Killer Whale (*Orcinus orca*) within the assessment region (IUCN 2013)

Dahlheim 1988; Rice 1998). In general, this species occurs most commonly within high productivity and temperate nearshore regions (Forney & Wade 2006), however they are not restricted by water temperature or depth.

The species ranges across the entire assessment region from Kosi Bay to the Orange River mouth, and around the Prince Edward Islands, across all water depths (Best 2007). Sightings from the Durban whaling grounds suggest peak occurrence in June and October, and Elephant Seal (*Mirounga leonina*) remains in the stomach contents of some individuals captured there indicate movement from sub-Antarctic waters (Findlay 1989; Findlay et al. 1992; Best et al. 2010), which is also suggested by satellite tracking (Reisinger et al. 2015). Together these may indicate seasonal or transient occurrence of at least some individuals.

Population

Killer Whales at the Prince Edward Islands bear some morphological resemblance to Antarctic *Type B* Killer Whales (and are genetically closely related; Moura et al. 2015), whilst those found in mainland waters have until recently been assumed to be *Type A* (Best 2007). However, strong evidence should be provided before populations are defined as or assigned to ecotypes (de Bruyn et al. 2013). Among Killer Whales stranded on the South African coast, small individuals with significant tooth wear have been designated as a new flat-toothed morphotype (Best et al. 2014); this is potentially supported by the large haplotype diversity among South African Killer Whales (Moura et al. 2014).

There are no population estimates for mainland South Africa and there are very few sighting and stranding data available (but see Findlay et al. 1992; Best et al. 2010). However, an ongoing photo-identification study at the Prince Edward Islands has identified around 57 individuals, of which 37 were mature (Reisinger et al. 2011b; Reisinger & de Bruyn 2014).

The Prince Edward Islands population and a group of individuals that prey on common dolphins (*Delphinus* spp.) in False Bay may be considered cultural groups, where culture refers to “information or behaviour – shared by a population or subpopulation – which is acquired from conspecifics through some form of social learning” (Rendell & Whitehead 2001). In this case the specific hunting strategies used by these socially connected groups at particular locations could be considered culture. As such, they may qualify as conservation value subpopulations.

There is potentially some exchange and almost certainly some spatial overlap between the two subpopulations. Four of the 36 Killer Whales landed by whalers off Durban

Table 1. Killer Whale (*Orcinus orca*) population composition for Prince Edward Islands between 2006 and 2013

Class	Number	% of total
Juveniles	20	35
Adult females	27	47
Adult males	10	17
Total	57	100

had Southern Elephant Seal remains in their stomachs (Best et al. 2010) and the Prince Edward Islands (PEIs) are the nearest Southern Elephant Seal breeding colony. Among Killer Whales satellite-tracked from the PEIs, one individual travelled northwards to ~34.9°S; 37.3°E (Reisinger et al. 2015). This position is near to, but does not actually overlap, the distribution of South African sightings reported by Best et al. (2010). However, this is more likely to represent a lack of sighting (or reporting) effort offshore of South Africa. Moreover, Killer Whales are capable of travelling long distances. Yet there have been no photographic matches between the PEIs and South Africa, and Killer Whales from South Africa and the PEIs are morphologically distinct (Best 2007; Best et al. 2010); although the differences may not be apparent to untrained/inexperience observers or in poor sighting conditions at sea. The PEIs population is composed mainly of animals which show strong seasonal residence at the PEIs (Keith et al. 2001; Reisinger et al. 2011a; R. Reisinger & N. de Bruyn unpubl. data). All the PEIs animals sampled share a single haplotype (they are closely related) (Janse van Rensburg et al. 2013), and northward movements from the PEIs of satellite tracked individuals have been rapid, with individuals subsequently returning to the PEIs (Reisinger et al. 2015). This leads to the inference that the subpopulations are distinct, but may overlap spatially at times.

Although these subpopulation sizes are small and thus would qualify for a threatened listing, this species is wide-ranging and its distribution is not fragmented. There is no expected continuing decline in the number of subpopulations or mature individuals. Thus, there is no reason to suspect this species is threatened within South African waters.

Model based estimates of generation time are 25.7 years (Taylor et al. 2007). The most detailed information on demographic parameters are from a long term (1970) study of populations of Resident Killer Whales in the northeast Pacific (Olesiuk et al. 1990, 2005). Some key parameters from this population (1996–2004):

- Mean age at first birth: 15.4 years
- Mean calving interval: 5.5 years
- Estimated reproductive potential: 4.5 calves
- Realized calf production: 2.2 calves
- Mean life expectancy (females): 30 years
- Mean life expectancy (males): 19 years
- Longevity (females): ~ 80 years
- Estimated maximum longevity (males): ~ 40–50 years
- Mean annual mortality: 3.4%
- Cumulative juvenile mortality (up to recruitment age, 15.5 years): 39.2%
- Population composition: juveniles ~ 47%; reproductive females ~ 24%; post-reproductive females ~ 11%; adult males ~ 18%. Based on a photographic identification study at the Prince Edward Islands (Tosh et al. 2008; Reisinger et al. 2011b; Reisinger & de Bruyn 2014), population composition for the period 2006–2013 is summarised in Table 1.

Current population trend: Stable

Continuing decline in mature individuals: No

Number of mature individuals in population: Unknown

Number of mature individuals in largest subpopulation: Unknown

Number of subpopulations: The subpopulations are defined as: 1) South African and 2) PEIs, but it is unknown whether these apply to the entire South African population.

Severely fragmented: No

Habitats and Ecology

Killer Whales may occur in any marine or large estuarine habitats (although are not recorded in estuaries in the assessment region) but are most common in areas of high marine productivity, particularly at higher latitudes and near shore (Dahlheim & Heyning 1999; Forney & Wade 2006). Movements can be extensive. For instance, a Killer Whale tagged in the Canadian Arctic travelled over 5,400 km in approximately one month (Matthews et al. 2011) and *Offshore* Killer Whales from Alaska have moved over 4,000 km (Dahlheim et al. 2008). In the Antarctic, they readily enter areas of floe ice in search of prey (Pitman & Ensor 2003).

Globally, Killer Whales are recognised as super-predators capable of adapting their behaviour (both social and hunting) to prey species availability (Jefferson et al. 1991): more than 140 species of marine vertebrate have been reported as prey (Ford et al. 1998; Ford 2009). This includes most marine mammal species (except river dolphins and manatees), seabirds, sea turtles, many species of bony and cartilaginous fishes, and cephalopods (Dahlheim & Heyning 1999; Ford & Ellis 1999; Ford 2009). Off the South African coast, prey includes toothed whales and dolphins, baleen whales, bony and cartilaginous fishes (some depredated from longline fishing vessels), seabirds (although these may largely be non-consumptive or surplus killing) and possibly Cape Fur Seals (*Arctocephalus pusillus pusillus*) (Best et al. 2010). At the Prince Edward Islands prey includes seals, penguins and Patagonian Toothfish, (*Dissostichus eleginoides*) (depredated from longline fishing vessels) (Williams et al. 2009; Reisinger et al. 2011a). These prey are hunted using diverse foraging tactics, such as intentional beaching to catch seals onshore (Lopez & Lopez 1985) and washing seals off ice floes (Visser et al. 2008). They are known to use cooperative techniques to herd fish and to attack large prey (Dahlheim & Heyning 1999; Baird 2000).

Despite this generally eclectic diet, at least some populations feed on a narrow range of prey (Ford et al. 1998). In the northeast Pacific, three sympatric ecotypes of Killer Whales have been described and each of these specializes in a narrow range of prey. *Resident* Killer Whales feed exclusively on squid and fishes (primarily salmon), *Transient* Killer Whales feed mainly on marine mammals (pinnipeds and cetaceans) and *Offshore* Killer Whales feed largely on bony and cartilaginous fishes (Ford et al. 1998; Herman et al. 2005; Dahlheim et al. 2008). The flat-toothed morphotype recently described in South African waters by Best et al. (2014) may be analogous to northeast Pacific *Offshore* Killer Whales (Ford et al. 2011); the tooth wear described in the South African animals is likely caused by predating on cartilaginous fishes, as in the northeast Pacific *Offshores*.

In the Southern Ocean, *Type A* Killer Whales are proposed to specialize on Antarctic Minke Whales (*Balaenoptera*

Table 2. Threats to the Killer Whale (*Orcinus orca*) 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	5.4.5 <i>Persecution/Control</i> : intentional killing to reduce longline fisheries competition. Current stress 2.1 <i>Species mortality</i> .	(Kock et al. 2006)	Anecdotal	Regional	Unknown
2	9.2 <i>Industrial & Military Effluents</i> and 9.3 <i>Agricultural & Forestry Effluents</i> : bioaccumulation of persistent organic pollutants in body tissues.	(Ross et al. 2000)	Anecdotal	Regional	Transient Killer Whales of British Columbia, Canada, can now be considered among the most contaminated cetaceans in the world.
3	11.1 <i>Habitat Shifting & Alteration</i> : due to climate change. Current stress 2.3.8 <i>Indirect Species Effects</i> on food resources.	-	Anecdotal	-	Largely unknown, but Killer Whale response will depend upon prey responses to change. Distributional and fine scale habitat change in various Killer Whale prey species is evidenced.

bonaerensis) but have on occasion been seen to prey on Southern Elephant Seals (*Mirounga leonina*). *Pack Ice* (Large *Type B*) Killer Whales feed almost exclusively on seals (especially Weddell Seals [*Leptonychotes weddellii*]) but have been observed taking Antarctic Minke Whales on occasion. *Gerlache* (Small *Type B*) Killer Whales may feed mainly on fish but they also take Gentoo Penguins (*Pygoscelis papua*) and Chinstrap Penguins (*Pygoscelis antarctica*). *Ross Sea* (*Type C*) Killer Whales are putative fish specialists, particularly Antarctic Toothfish (*Dissostichus mawsonii*). The diet of Pitman et al. (2011) “*Subantarctic Killer Whales*” (*Type D*) is unknown, but they may feed on fish, as they have been observed interacting with longline fisheries (Pitman & Ensor 2003; Pitman et al. 2007, 2011, Pitman & Durban 2010, 2012; Tixier et al. 2016). Killer Whales at the sub-Antarctic Crozet Islands (which appear most similar to Antarctic *Type A* Killer Whales) seem to be generalists, taking elephant seals, fur seals, penguins, large whales and fish (Guinet 1992).

Ecosystem and cultural services: Coastal delphinids (including Killer Whales), as long-lived, long-term residents along the coast, can serve as important sentinels of the health of coastal marine ecosystems (Wells et al. 2004). As top-level predators on a wide variety of fishes and squids, they concentrate contaminants through bioaccumulation and integrate broadly across the ecosystem in terms of exposure to environmental impacts.

Use and Trade

There is no contemporary trade or use of this species in South Africa.

Threats

No major threats to this species have been identified; however, unofficial communications indicate that deep-water longliners use dynamite to scare off Killer Whales that remove catches from the longlines. Killer Whale mortalities are expected, but numbers are unknown. Killer Whales steal hooked fish from deep-water longline fishing vessels in South African waters and around the PEIs (Tilney & Purves 1999; Kock et al. 2006; Williams et al. 2009). From 1999–2001 Killer Whales interacted with 33–64% of longlining cruises to the PEIs (Kock et al. 2006). In South African waters from 2002–2006, Killer Whales depredated 0.5% of total catch on monitored vessels (Williams et al. 2009). Fishermen (illegally) attempt to deter these Killer Whales using explosives or firearms (Kock et al. 2006); this may obviously result in injury or death, but has not been quantified. Poncet et al. (2010) suggested that lethal interactions with longline fisheries may be one of the causes for the declining population size and survivorship of the Crozet Killer Whale population (1964–2002). Tixier et al. (2010) report relatively constant depredation rates around the Crozet Islands, but the social transmission and spread of this behaviour among

Table 3. Conservation interventions for the Killer Whale (*Orcinus orca*) ranked in order of effectiveness with corresponding evidence (based on IUCN action categories, with regional context)

Rank	Intervention description	Evidence in the scientific literature	Data quality	Scale of evidence	Demonstrated impact	Current conservation projects
1	5.4 <i>Compliance & Enforcement</i> : bycatch assessment in longline fisheries. Depredation deterrents.	-	Anecdotal	-	-	-
2	3.1 <i>Species Management</i> : monitoring of Killer Whale interactions with fisheries, and implementation of acoustic and mechanical devices to deter depredation from longline fisheries.	Rabearisoa et al. 2012	Anecdotal	Regional	Alternate fishing gear technologies should be investigated, so as to mitigate depredation.	-

Killer Whales is likely (e.g. Fearnbach et al. 2014).

Killer Whales depredate Patagonian Toothfish from seven longline fishing vessels around the Crozet Islands, ~1,000 km east of Marion. Tixier (2012) estimated that Killer Whales depredated 116 t / year of Patagonian Toothfish between 2001 and 2010. Pot fishing and acoustic harassment devices (AHDs) have been used in an attempt to mitigate this interaction. Catch per unit effort during pot fishing was not economically sustainable (Gasco et al. 2010) and Killer Whales appear to become habituated to AHDs after the first exposure, which also raises concerns about the effect of the loud amplitude noise on Killer Whales' hearing (Tixier et al. 2014b).

Tixier et al. (2014a) showed that several variables influenced the interaction between Killer Whales and fishing vessels: short longline sets (< 5 km) and faster hauling speeds decreased losses; the depth of longline sets, the distance travelled between sets and the number of vessels operating simultaneously all decreased the probability of interaction (Tixier et al. 2014a). Tixier et al. (2010) recommended that vessels move > 40 nautical miles before fishing again and, after an interaction, lines < 5 km be used. However local factors may influence how effective such mitigation measures are (Tixier et al. 2014a).

Persistent bio-accumulating contaminants are inferred to pose a potential threat to Killer Whales that inhabit, or prey on high trophic level prey that occupy coastal zones (Cockcroft 1999), such as the individuals which prey on common dolphins in False Bay. Contaminants such as persistent organic pollutants (POPs) are ubiquitous in marine environments and since they accumulate at higher trophic levels (biomagnification), Killer Whales are particularly at risk (e.g. Ross et al. 2000). Noël et al. (2009) found relatively high concentrations of POPs in Killer Whales at the Crozet Islands, 1,000 km east of Marion Island. Although polychlorinated biphenyl (PCB) concentrations were lower than in Northern Hemisphere populations, in 70% of individuals they were still above a conservative 1.3 mg / kg marine mammal health threshold (Mos et al. 2007), demonstrating that marine mammals from even remote locations are at risk.

Current habitat trend: Stable. Killer Whales are cosmopolitan and do not show obvious habitat preferences. However, culturally specialised Killer Whale groups may be at risk from shifting prey distribution and abundance because it appears that these specialized groups may have difficulty adapting their diet and behaviour. In general, increased marine resource utilisation poses a threat to this species, either directly (squid and fish-eating Killer Whales) or indirectly (marine mammal-eating Killer Whales).

Conservation

This species is fully protected in South African waters through national legislation – Marine Living Resources Act, 1998 (Act No. 18 of 1998) and the Prince Edward Islands Act, 1948 (Act No. 43 of 1948). The species is listed in Appendix II of CITES. Mitigation of Killer Whale interaction with longline fishing vessels is considered the only major conservation intervention necessary for this species at present. Thus, continued research into the spatiotemporal patterns of longline-Killer Whale interactions is necessary, and observer protocols should be standardised to ensure the collection of valuable, unbiased data (Kock et al. 2006).

Studies on taxonomy, subpopulation structure, abundance and life history are needed for the South African and Prince Edward Island areas. Regional subpopulations of Killer Whales can be small and highly specialized, and therefore vulnerable to over-exploitation and habitat deterioration. Several small subpopulations elsewhere in the world have already been recognized as having a high risk of extinction (e.g. Southern *Resident* Killer Whales; Krahn et al. 2004). Within potential subpopulations, cultural uniqueness which has high conservation value should be identified and conserved.

Photographic identification at the Prince Edward Islands is the only systematic monitoring programme for this species (e.g. Reisinger et al. 2011b; Reisinger & de Bruyn 2014). Similar, although unsystematic, photo-identification has been carried out on the False Bay common dolphin preying group over the last five years.

Recommendations for managers and practitioners:

- Interactions between Killer Whales and longline fisheries require monitoring.
- Investigations into the development of effective depredation mitigation measures are urgently required.
- Assessment of the severity of factors that are expected to pose potential threats by virtue of distribution patterns of Killer Whales should be made.

Research priorities:

- Taxonomic resolution of South African and Prince Edward Island Killer Whale stocks to determine population identity and any subsequent subspecies distribution.
- Current population size and trend estimates are urgently required.
- Foraging range and diet, including potential response of prey resources to the effects of climate change.
- Within potential subpopulations, cultural uniqueness which has high conservation value should be identified and conserved.
- Movement and foraging range studies are required to assess overlap, if any, of identified groups.

Current ongoing research projects:

- Prince Edwards Islands – Marion Island Marine Mammal Programme, Mammal Research Institute, Department of Zoology and Entomology, University of Pretoria: The Mammal Research Institute has opportunistically monitored Killer Whales at the Prince Edward Islands since the 1970s (see Condy et al. 1978), but recently (2006) dedicated Killer Whale work has been launched. The project is based on photographic identification of individuals and includes aspects such as satellite tracking, genetics and stable isotope analyses (www.marionseals.com).
- South Africa – no dedicated projects, although some opportunistic work on the False Bay animals has been conducted and additional work has been proposed.

Encouraged citizen actions:

- Foraging ecology research at Marion Island is progressing but impeded by the financial investment that is required for satellite telemetry. Aid in funding this aspect can be securely provided through: <http://www.givengain.com/cause/4655/>.
- Use information dispensed by the South African Sustainable Seafood Initiative (SASSI) to make good choices when buying fish in shops and restaurants, e.g. wwfsa.mobi, FishMS 0794998795.
- Buy fresh produce that has been grown in pesticide-free environments.
- Save electricity and fuel to mitigate CO₂ emissions and hence, the rate of climate change.
- Buy local products that have not been shipped.
- Reduce boat speed in bays and harbours.
- Report sightings on MammalMAP. Sightings of Killer Whales and photographs suitable for photographic identification can be uploaded to MammalMAP or reported to the Mammal Research Institute, Department of Zoology and Entomology, University of Pretoria.
- When participating in whale/dolphin watching tours, ensure regulations are adhered to.
- Don't approach or chase Killer Whales in boats.

Data Sources and Quality

Table 4. Information and interpretation qualifiers for the Killer Whale (*Orcinus orca*) assessment

Data sources	Field study (literature), indirect information (expert knowledge)
Data quality (max)	Inferred
Data quality (min)	Suspected
Uncertainty resolution	Expert consensus
Risk tolerance	Evidentiary

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