



Antarctic seals: ecology and conservation

Introduction

This document describes the general biology, ecology and conservation status of the seal species that are found within the Antarctic Treaty area.

There are six species of seal typically found in Antarctic waters; southern elephant seal (*Mirounga leonina*), leopard seal (*Hydrurga leptonyx*), Weddell seal (*Leptonychotes weddelli*), crabeater seal (*Lobodon carcinophagus*), Ross seal (*Ommatophoca rossi*) and Antarctic fur seal (*Arctocephalus gazella*). All, except the Antarctic fur seal, are classified as phocid seals; these earless or true seals, generally have a large streamlined tubular body shape and relatively hairless skin. Their front flippers are small and they tend to be cumbersome on land using undulations of their bodies to move about. Otterids, or eared seals, are made up of fur seals and sea lions. They have dense fur covering the majority of their body (all except the flippers) and have external ears that protrude from the side of the head. These seals can turn their hind flippers in under their bodies and use all of their flippers like legs that allows them to move surprisingly quickly on land. In water, otterids use their front flippers for locomotion whereas phocids use their hind flippers in a side to side motion.

Elephant and fur seals breed on beaches on sub-Antarctic islands and the Antarctic Peninsula and the remaining so called 'ice seals' are dependent on pack ice or fast ice for part or all of their life cycles, e.g. breeding, resting and predator avoidance.

Threats

A major issue for Antarctic seal conservation is the uncertainty surrounding their population sizes and the infrequency of censuses. Given these factors, it is impossible to detect anything but very large, and probably catastrophic, changes, making any response to developing threats very difficult.

Climate change

Overall the biggest threat to Antarctic seals is considered to be climate change and any subsequent changes in sea ice. For ice seals this will impact directly upon their breeding and resting habitat but also has implications for access to feeding grounds and refuge from predators. For all species, sea-ice reduction is also expected to negatively impact on their food availability, especially Antarctic krill (*Euphausia superba*). However, the exact responses of the different species to warming scenarios are as yet unknown (see: <https://environments.aq/information-summaries/vulnerability-of-southern-ocean-biota-to-climate-change>).

Fishing

Current fishing levels are not thought to be an issue for seals, but increases in catch levels or changes in the spatial distribution of fishing effort have the potential to cause negative impacts. For example, the development of new fisheries in the Antarctic, particularly ones targeting Antarctic toothfish, could have an impact on Weddell seal populations. Whilst seals do suffer entanglement in fishing gear, and can be accidentally killed in fishing operations, this currently is at very low levels where monitoring exists.

Disease

Disease outbreaks are a potential risk to Antarctic seals, especially with the increase of human activities within the Treaty area. Antibodies to canine distemper virus have been found in crabeater and leopard seals on the Antarctic Peninsula, Weddell and crabeater seals have been found with phocine herpes antibodies and anti-brucella antibodies have been detected in Antarctic fur seals and crabeater seals at Cape Shirreff (South Shetland Islands). One mass mortality event has been recorded in the Treaty area when, in 1955, 1,500 crabeater seals were found dead on the Peninsula. However, although a viral disease was suspected, no samples were taken (<https://environments.aq/information-summaries/antarctic-wildlife-diseases>).



A young Weddell seal (*Leptonychotes weddelli*), Adelaide Island, Antarctic Peninsula





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Ottarids

ANTARCTIC FUR SEAL	
<i>Common name</i>	Antarctic fur seal
<i>Latin name</i>	<i>Arctocephalus gazella</i>
<i>Conservation Status</i>	Considered as 'least concern' by the IUCN; however, there is some evidence of a recent population decline, after a post-sealing recovery in numbers, at the two largest colonies of South Georgia and Bouvetøya.
<i>Numbers</i>	Antarctic fur seals were hunted to near extinction, but over the last century their numbers have recovered and the current population may well be greater than four million.
<i>Life history</i>	Males are typically over four times larger than females and the sexes are known to segregate. Female fur seals are restricted to foraging close to the breeding beaches during their four month lactation (December to April) whereas males leave the breeding beaches after mating (December). Both sexes have been shown to disperse during the winter with some females crossing the polar front to the South American continental shelf.
<i>Distribution</i>	Ninety-five percent of the world population breeds on South Georgia and, of the eleven other breeding sites, two (the South Shetland Islands and the South Orkney Islands) are within the Treaty area. Whilst the number of animals breeding south of sixty degrees is relatively small, large numbers of males, and some females, disperse southwards when they are not breeding, foraging around the edge of the pack ice or along the Peninsula region.
<i>Diet</i>	Within the Scotia Sea they typically consume Antarctic krill, but also eat fish and squid particularly in the Indian Ocean and Pacific sectors. Larger males are known to kill penguins particularly in and around large colonies and at times when chicks first go to sea.

Phocids – land seals

SOUTHERN ELEPHANT SEAL	
<i>Common name</i>	Southern elephant seal
<i>Latin name</i>	<i>Mirounga leonina</i>
<i>Conservation Status</i>	Southern elephant seals are considered 'least concern' by the IUCN with a pup production of over 200,000 per year.
<i>Numbers</i>	In the 19th Century southern elephant seals were harvested for their oil, and their numbers depleted, although not as severely as fur seal. Later commercial sealing (undertaken between 1909 and 1968) was well managed and involved the taking of adult males. South Georgia accounts for 50% of production with three other sub-Antarctic sites and a South American breeding site bringing this up to 99%. In the Atlantic sector the populations are thought to be growing or stable and the decreases observed in the Indian Ocean sector appear to have ceased. However, Macquarie Island (the only Pacific sector breeding site) saw decreases of 0.8% per year between 1988 and 2014.
<i>Life history</i>	Adult males weigh over 4.5 times as much as females and can dive to depths of >2km breath holding for up to two hours. Southern elephant seals undergo two migrations a year between the breeding (austral spring) and moulting (austral summer) periods, spending a combined total of 80-85% of their time at sea. They are prolific divers and are rarely seen at the sea surface, spending over 65% of their time below 100m.
<i>Distribution</i>	Within the Treaty area, no significant breeding takes place, but southern elephant seals forage within the dynamic area around the edges of the pack ice and can be seen moulting on Antarctic beaches.
<i>Diet</i>	Elephant seals are known to consume squid and fish, including lantern fish and toothfish. They are also presumed to consume krill although the relative importance of these prey are unknown.



Antarctic fur seals



Southern elephant seals





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Phocids – ice seals

CRABEATER SEAL	
Common name	Crabeater seal
Latin name	<i>Lobodon carcinophaga</i>
Conservation Status	Crabeater seals are considered to be one of the most numerous large mammals on earth and are listed as 'least concern' by IUCN.
Numbers	Population estimates range from two to 75 million animals. The most recent census in the late 1990s estimated eight million, but major parts of their distribution were not surveyed so there remains large uncertainty about their abundance.
Life history	On average crabeater seals dive to depths of 40-140m, but can reach depths of 700m. Their life-cycle is entirely dependent on ice, using ice floes to rest, breed and moult. Up to 80% of crabeater seals die in their first year through predation by leopard seals, and most young seals bare marks or injuries from attacks. Orcas kill all ages of crabeater seal, taking them in the water and even from ice floes.
Distribution	Crabeater seals have a circumpolar distribution. They are mostly found in the dynamic Antarctic pack ice, typically from the continental shelf break northwards (0.5° to 1° latitude) with non-breeders further north. Crabeater seal distribution is governed by their often conflicting needs to access areas of high food (zooplankton) abundance with access to air to breathe and ice to rest on.
Diet	Crabeater distribution mirrors the known distribution of their main prey, Antarctic krill.

LEOPARD SEAL	
Common name	Leopard seal
Latin name	<i>Hydrurga leptonyx</i>
Conservation Status	Leopard seals are considered 'least concern' by the IUCN, but abundance trends are currently unknown.
Numbers	Their population is thought to be approximately 35,000 individuals.
Life history	Leopard seals are typically shallow divers (10-50m) hunting at twilight. They tend to be solitary especially in older animals that are often observed with scars from aggressive encounters with others.
Distribution	Leopard seals have a circumpolar distribution concentrated in, but not limited to, the Southern Ocean. They are most commonly found in and around the outer fringes of the pack ice or close to the Antarctic continent within the Treaty area. However, their range extends beyond the Polar Front with regular sightings in South America, South Africa, Australia and as far north as the Cook Islands. Across this north-south distribution there is evidence of a gradient in age classes with the proportion of younger immature animals increasing in lower latitudes. Although they have been observed year-round on Heard Island and South Georgia, their occurrence on sub-Antarctic islands is thought to be mostly driven by a proportion of the population migrating northwards with the ice edge during the austral winter.
Diet	Leopard seals feed on krill, fish and squid as well as penguins and other seal species. They are thought to have a significant impacts on penguin and seal colonies in certain local areas.



Crabeater seals



Leopard seals





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ROSS SEAL	
<i>Common name</i>	Ross seal
<i>Latin name</i>	<i>Ommatophoca rossii</i>
<i>Conservation Status</i>	Ross seals are the least-studied Antarctic seal and this lack of data has led them to be classified as a Specially Protected Species, under Annex II to the Protocol on Environmental Protection to the Antarctic Treaty. They are, however, considered 'least concern' by the IUCN.
<i>Numbers</i>	Ross seal numbers are thought to be around 78,000.
<i>Life history</i>	At sea they reach greater depths than crabeater seals, commonly diving to 100-300m and occasionally reaching close to 800m.
<i>Distribution</i>	The seals have a circumpolar distribution in Southern Ocean waters surrounding Antarctica. Through sightings they were assumed to be confined to areas deep in the Antarctic pack-ice zone, but, recent tracking has shown that they actually spend several months each year foraging in the open ocean in association with the Antarctic Polar Front and have much less of a dependence on sea ice than was previously thought. They are now considered 'commuters', as they are ice-dependent for breeding and moulting, but forage in lower latitudes far away from the heavy ice.
<i>Diet</i>	Their diet is largely unknown but thought to consist mostly of squid and fish.

WEDDELL SEAL	
<i>Common name</i>	Weddell seal
<i>Latin name</i>	<i>Leptonychotes weddellii</i>
<i>Conservation Status</i>	Like all the other Antarctic seals they are considered 'least concern' by the IUCN.
<i>Numbers</i>	Population estimates range from 200,000 to one million individuals.
<i>Life history</i>	In contrast to the other ice seals, they breed in areas of predictable stable fast ice or on land, allowing them to form loose aggregations (or breeding colonies) at specific sites. There appears to be large variability in their movements, with some individuals staying close to breeding colonies, whereas others move into the pack ice, likely exploiting polynyas and areas of thinner sea ice. Younger animals seem to move north from the continent and spend the winter in the pack ice. Within the fast ice, Weddell seals are relatively protected, but within the pack ice they are vulnerable to predation by killer whales and leopard seals. Weddell seals dive to depths of over 600m, although they typically feed at depths of 100-350m.
<i>Distribution</i>	They have a circumpolar distribution and also occur offshore from within the pack-ice zone northwards to the Polar Front. They are present at many islands along the Antarctic Peninsula, as well as a small population that breeds on South Georgia. Weddell seals are the most southerly breeding mammal and occur in large numbers on fast ice, right up to the shoreline of the Antarctic continent.
<i>Diet</i>	They are generalist predators, with differences depending on their location. They eat notothenoid fish (ice fishes), particularly the Antarctic silverfish, Antarctic toothfish, myctophids and cephalopods.



Ross seal



Weddell seal

