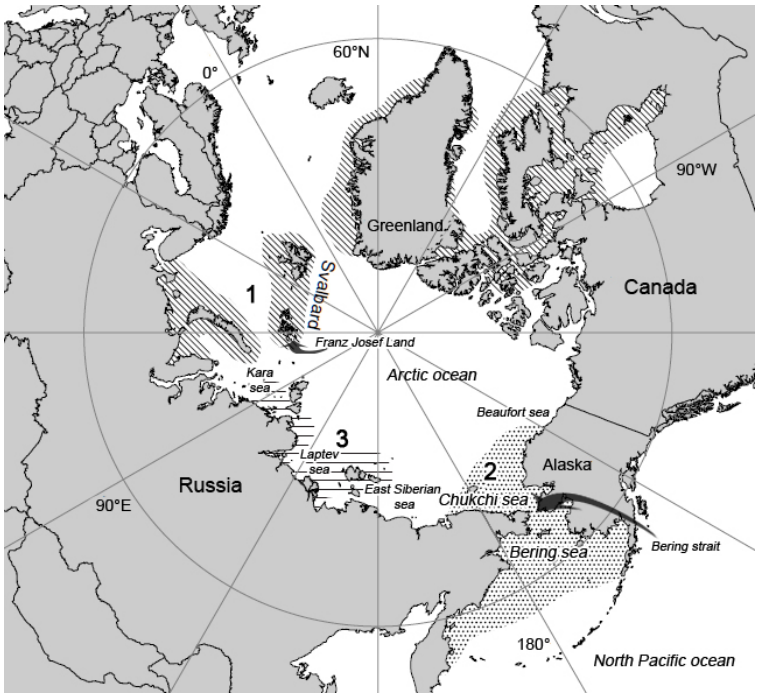
species factsheet

| species introduction |

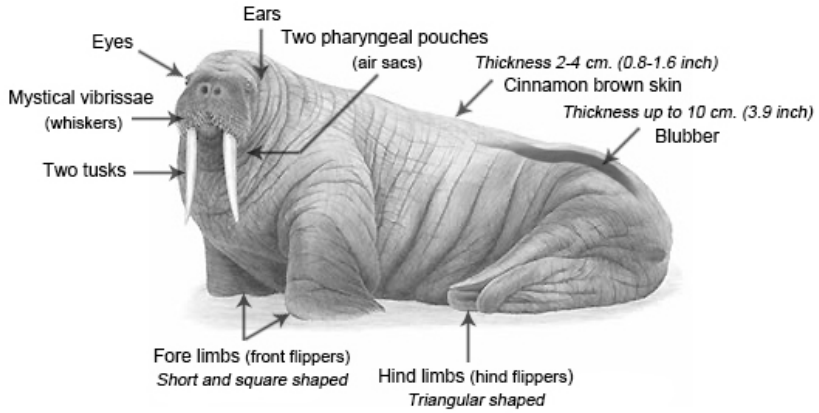
Common name: Walrus

Scientific name: *Odobenus rosmarus*

The walrus is the only representative of the family of Odobenidae, or tooth walkers (Greek). The name walrus comes from the Danish Hvalros which means sea horse or sea cow. Three subspecies are recognized: *Odobenus rosmarus divergens (*Pacific walrus), *Odobenus rosmarus rosmarus* (Atlantic walrus) and *Odobenus rosmarus laptevi (*Laptev walrus).



The approximate distribution of walrus subspecies: ATLANTIC WALRUS (1), PACIFIC WALRUS (2) AND LAPTEV WALRUS (3). (MODIFIED FROM ACQUARONE, 2004; FAY, 1985; IN BORN, ET AL., 1995)



External anatomy of the Atlantic walrus (*Odobenus rosmarus rosmarus*). (Modified from: Kuehl, n.d.)

| status in the wild |

According to the IUCN Red list the walrus population is data deficient, or in plain language we do not know its conservation status. The walrus is a charismatic and important member of the Arctic fauna, which justifies its conservation.

Main threats to the walrus population are changes in sea ice cover due to climatic change and harvest by indigenous populations. More extensive human use of the Bering Strait (the main area where the majority of walruses live) is foreseen due to the future availability of the shipping route along the north coast of Canada. This is because of climate induced reductions in sea ice, which will mean more disturbance by shipping and possible pollution due to exploitation of oil and gas reserves in the Arctic.

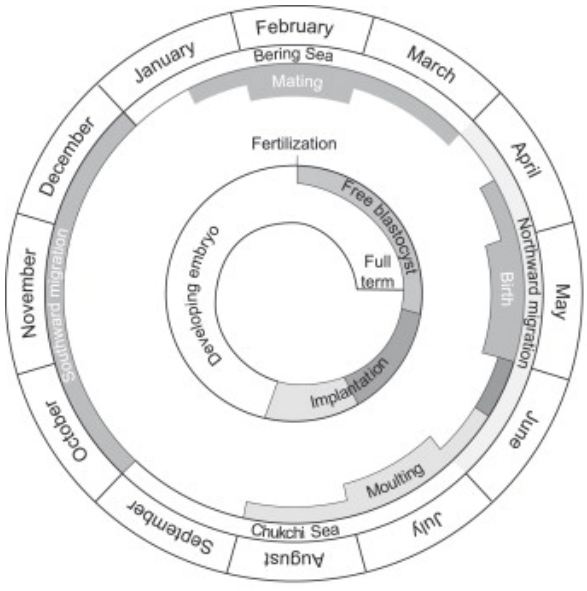
| species reproduction |

The walrus is the largest pinniped in the Arctic. Females can reach a weight of 1000kg and males can reach weights of 1800kg. Walruses have the largest penis bone known in nature.

Walrus with pup at Dolfinarium Harderwijk

Walruses breed from January to March. The pregnancy pauses in an initial stage for a few months (delayed implantation) to ensure calves are born in spring when food is abundant. Pregnancy lasts for 15 to 16 months. Walruses produce a single calf and are very caring and extremely protective mothers. Calves stay with their mothers for two years until they are weaned. Occasionally male calves stay two to three years longer until they join male groups.

Female walruses become sexually mature between six to eight years. Male walruses become mature around eight years but are not allowed to reproduce, due to competition from fully adult males, until they are 15 years old.



General description of the Pacific walrus' life cycle: mating mainly occurs in mid-winter from January-March; calves are born from mid-April to mid-June, during the northward migration, whereas southward migration occurs in the fall. The cycle in the centre reflects the implantation cycle. (Krupnik & Ray, 2007; modified from Fay, 1981)

| species habitat |

Walruses occur in areas of unconsolidated ice, open leads and thin ice like ‘first-year’ ice, to have the possibility to create breathing holes (Fay, 1982; Richard, 1990; Barber, *et al.*, 1991). Therefore, they avoid areas with high concentrations of thick ice or extensive, unbroken ice (Burns, *et al*., 1980, 1981; Fay, 1982; Richard, 1990; Barber, *et al*., 1991). It is presumed that areas of heavy ice cover play a restrictive role in the distribution of walruses and form barriers between different populations (Fay, 1982; Dyke, *et al*., 1999, Harington, 2008). Sea ice and terrestrial habitat are important for the walrus to rest upon (hauling out) (Fay, 1982; Miller, *et al*., 2011).

A herd of walruses resting on a terrestrial haul out site along Alaska's shoreline of the Chukchi sea. (Madison, 2011)

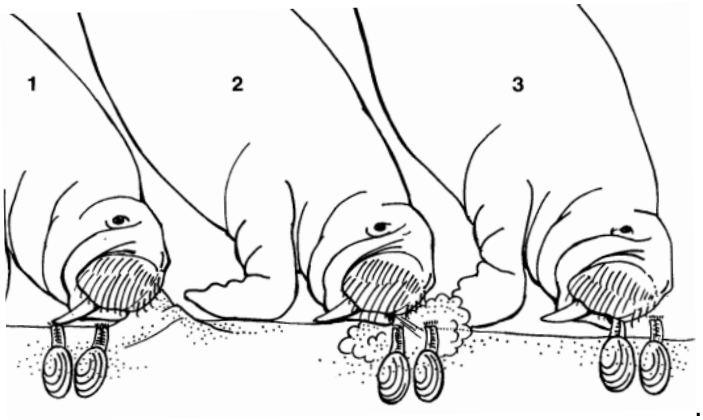
Selection of suitable terrestrial haul out areas is believed to be influenced by: the proximity of food resources, isolation from predators and other disturbances (for example human disturbance), social factors and protection from wind and surf (Richard, 1990). Substrates of these sites vary widely, ranging from sand to boulders. “Isolated islands, points, spits, and headlands are occupied most frequently.” (Miller, *et al*., 2011)

Male walruses tend to use terrestrial haul out areas more frequently than females with young, resulting in a wider distribution of male walruses in the ice-free season (Miller, *et al*., 2011). In summer, adult males mostly haul out on more than 30 terrestrial sites (Estes & Gol’tsev, 1984) close to suitable feeding areas (Laidre, *et al.*, 2008). Females tend to avoid hauling out on land, since their offspring are more vulnerable to trampling (Fay & Kelly, 1980; Ovsyanikov, *et al*., 1994; Kochnev, 2004; Kavry, *et al*., 2008; Fischbach, *et al*., 2009) or predation (Kochnev 2004; Ovsyanikov, *et al*., 2007; Kavry, *et al*., 2008). Another reason could be that females encounter more difficulties in foraging from shore when accompanied by a young calf (Cooper, *et al.*, 2006; Jay & Fischbach, 2008).

| species food |

Walruses mainly feed on bivalve molluscs, mostly clams, but also on snails (*Gastropoda*) and polychaete worms. They will also occasionally take other prey, for example seals. Sizes of food organisms can vary from species weighing less than 0.1 grams (1.54 grains), to pinnipeds weighing more than 200kg (Fay, 1985). Walruses only swallow fleshy parts of bivalve and gastropod molluscs, as walruses do not eat shells (Fay, 1982, 1985). Walruses eat small crustaceans, like crabs (*Majidae*), normally in their soft-shelled stage (Lowry & Fay, 1984). All other organisms are eaten whole, except seals (Fay, 1985). Seals are swallowed in strips and chunks of skin, blubber, viscera and muscle (Lowry & Fay, 1984). Walruses have also been seen to feed on dead cetaceans, principally their blubber and skin (Fay,

1985). Adult male walruses forage little, and tend to fast during the winter breeding period, but compensate for this by increasing their food intake throughout summer and autumn (Fay, 1982; Fay, 1985; Ray, *et al.*, 2006). Less food is taken during spring, when walruses migrate northward (Fay, 1982). During the moulting period, a walrus hauls out and does not feed (Pederson, 1962), or food intake is markedly decreased (Kastelein, *et al*., 2000). Walruses use their whiskers and snout to locate prey items and to root in the bottom sediment (Fay, 1982; Miller, *et al*., 2011). Tusks are not used to excavate prey from the bottom. Next to rooting with their snout, walruses use so called 'hydraulic jetting of water' with their mouth to excavate prey items. (Oliver, *et al*., 1983) Kastelein & Mosterd (1989) described the excavation techniques for molluscs by Pacific walruses. Walruses are capable of creating strong suction with their mouths and this is probably how they extract clams from their shells.



A schematic overview of the excavation techniques of molluscs by walruses, with the rooting in the bottom sediment (1), pulsing jets of water (2), and the processing of a mollusc (3). (Extracted from: Kastelein & Mosterd, 1989)

| threats |

Climate change

Climate warming and reductions in sea ice habitat in the Arctic are threats for the conservation of the Pacific walrus (Jay, *et al*., 2011). But species-specific effects of climate change are difficult to quantify because of the sensitive and different responses within Arctic marine mammals to environmental changes, and the complexity of Arctic ecosystems (Laidre, *et al*., 2008).

Reduced summer sea ice over the continental shelf in the Chukchi Sea in the past decade has resulted in increased use of land haul outs by adult female walruses and young during ice-free periods (Jay & Fischbach, 2008; Kavry, *et al*., 2008). Since walruses are more vulnerable to disturbances and predators on land, an increase in land use to haul out will lead to more trampling and death of walruses (Kavry, *et al*., 2008; Kochnev, *et al*., 2008; Fischbach, *et al*., 2009).

Within Arctic marine ecosystems, reduction in sea ice habitat can lead to a reduced benthic production and an increase in pelagic consumption; though consequences of sea ice reduction are hard to predict and also depends on regional conditions that influence productivity (Piepenburg, 2005; Grebmeier, *et al*., 2006a,b; Lalande, *et al*., 2007; Rausch, *et al*., 2007; Bluhm & Gradinger, 2008; Jay, *et al*., 2011).

Jay, *et al*. (2011) developed a Bayesian network model "to integrate potential effects of changing environmental conditions and anthropogenic stressors on the future status of the Pacific walrus population at four periods through the twenty-first century." This study

concluded that future population outcomes of the Pacific walrus are mostly influenced by sea ice habitat (particularly during summer and fall) and harvest levels.

Since 1972, the Pacific walrus is harvested by Alaskan native communities, for subsistence purposes, under an exemption provided in the Marine Mammal Protection Act (IUCN, 2008; Jay, *et al*., 2010). Also, Russian natives have hunted the walrus for subsistence (Jay, *et al*., 2010). In the past, people from Norway, Russia, Great Britain, Greenland, Canada, and the U.S. hunted walruses for their meat, skin and ivory tusks. Indigenous Arctic peoples of the U.S., Canada, Greenland, and Russia still hunt walruses because hunting is an important part of their culture and tradition. These people hunt walruses for their meat, hide, ivory tusks and other body parts (Seaworld, 2005).

Harvest levels

Estimates of annual walrus harvest levels, within the 47 year period of 1960-2007, range between 3,184 to16,127 animals per year (mean 6,713) (U.S. Fish and Wildlife Service, 2010). This estimate includes adult and juvenile walruses (Fay & Bowlby, 1994). Recent levels of harvest are lower than the average in the prior mentioned long-term period; in the five-year period from 2003-2007 harvest levels were estimated to be 4,960 to5,457 walruses per year.

| conservation |

Conservation of the walrus is threatened by climate change. Decrease of emissions of mainly carbon dioxide and methane by our modern societies is needed.

Intensive monitoring of walrus populations and studies on the influence of climate change should be undertaken. Harvest levels should be adapted to the likely changes in walrus population levels and special attention should be paid to the protection of critical habitat, especially haul-out sites. Increased usage of the Bering Sea is foreseen when the polar ice melts in summer and the North West passage above Canada is opened for ship traffic, together with the exploitation of gas and oil reserves in the region. This means extra pressure and threat to the natural habitat of the walrus.

As the walrus may become critically endangered in the future it is important that a population is maintained in zoos. Zoos should undertake research to ensure successful reproduction and build-up a population that is sustainable long term. This zoo population may provide research opportunities which are highly necessary to increase relevant knowledge for the conservation of the species in the wild.

| find out more |

For laymen that wish to access easy understandable information the websites of SeaWorld are especially recommended (full details in an accompanying list).

The book by Fay (1982: *Ecology and biology of the Pacific walrus, Odobenus rosmarus divergens. Illiger, vol 74.* Washington D.C.: U.S. Department of the Interior, Fish and Wildlife Service) gives the most comprehensive overview of available knowledge on walruses.

An extensive reference list for further information on walrus is available in an accompanying list.

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