

PACIFIC WALRUS

Odobenus rosmarus Linnaeus, 1758
(Odobenidae)

Global rank G4 (18Nov1996)
State rank S3 (14Nov2008)

State rank reasons

Population abundance and trends unknown, but suspected >100,000. Historically, populations have fluctuated in response to commercial exploitation. Currently protected from exploitation, although Native subsistence harvest is unregulated. Threats include direct and indirect effects of subsistence harvest and incidental take in commercial fisheries. Effects of climate change on this ice-dependent species are of concern.

Taxonomy

The two geographically isolated subspecies (*O. r. divergens* in Pacific, *O. r. rosmarus* in Atlantic) exhibit distinct differences in mtDNA haplotypes and have slight differences in cranial morphology and tusk characteristics. Walruses from different sampling locations exhibit mtDNA differences that may be useful in stock identification (Cronin et al. 1994).

Walruses occurring along the north coast of Asia, particularly in the Laptev Sea, are thought to have little contact with the other forms, and some Russian investigators recognize them as a third subspecies, *O. r. laptevi* (Reeves et al. 1992).

The Odobenidae have been regarded as a subfamily of the Otariidae by some authors; other authors contend that this would make the Otariidae paraphyletic (see Wozencraft, in Wilson and Reeder 1993). Jones et al. (1992) and Wozencraft (in Wilson and Reeder 1993) recognized the Odobenidae as a distinct family.

General description

One of the largest pinnipeds, second only to the elephant seal (genus *Mirounga*). Moderately sexually dimorphic, adult males range between 200 to 350 cm in length, and weigh from 800 to 1700 kilograms; females are smaller, generally between 166 and 290 cm long, and weigh between 536 and 1139 kg. The most distinctive features of walrus are its tusks, present in both sexes. Tusks are elongated upper canine teeth that continue to grow throughout the life of the animal, first becoming externally visible at about one year, and are somewhat longer and thicker in



males. About 400 mystacial vibrissae (stout, quill-like whiskers) make up the "mustache" of a walrus. The head and body are covered with short, tawny hair but the flippers are bare. Hide is extremely thick and tough; dark when young; lighter with age. Short, tawny hair gives chestnut to cinnamon color overall; can have pink to red color when hauled out and pale to white color when immersed in cold water (Fay 1982, 1985, Tessler, pers. comm. 2004).

Length (cm) 360
Weight (g) 1265000

Reproduction

Females ovulate at 6-7 years. Between 1950-1975, females ovulated at 4-8 years, but by the late 1980s the age of first ovulation had increased by about 2 years, presumably due to changes in the food supply (Fay 1982). Pacific females first give birth generally at about 10 years; males are sexually mature at 8-10 years but generally do not successfully mate until about 15 years old. Gestation lasts 15-16 months, including 4-5 months before implantation of fertilized egg. One calf (rarely 2) is born April to mid-June (mainly May). Calf is weaned by 2-2.5 years. Females in their prime give birth in alternate years. "Mobile lek" polygynous breeding system (Fay 1982). May live up to at least 40 years.

Ecology

Gregarious, with groups of up to several hundred animals hauling out among ice floes, and groups of up to several thousand males at terrestrial haulouts during the summer. Natural adult mortality rate is relatively low.

Migration

Beginning in April, females and young migrate northward from breeding areas in the Bering Sea into the Chukchi Sea following the retreating sea ice. Some individuals probably migrate more than 3000 km in a year, some or much of which may be done on floating cakes of ice (Reeves et al. 1992). Some sub-adult males make the northward migration along with the females. Along the Alaskan coast, small numbers of adult males apparently also make the migration following several weeks behind the majority of females. Mixed herds of males and females haul out at select locations along the Chukotka Peninsula and Wrangell Island, Russia in the summer months. Return migration commences in late September as sea ice advances southward. The majority of males stay in the Bering Sea throughout the summer making use of haulouts in Bristol Bay, Alaska, and along the Koryak coast in Russia (Fay 1985); similar seasonal movement may occur in North Atlantic.

Food

Feeds primarily on bivalve mollusks; principally clams. Also consumes many other benthic invertebrates. Generally eats fleshy portion of bivalve; rejects the shell. Some individuals may feed on fishes, birds, or other marine mammals. Feeds most commonly on bottom in shallow water (80 m or less) but apparently also can forage in deep water (200-500+ m) (Fay et al. 1984a, Reeves et al. 1992).

Phenology

Most active when feeding during early morning; rests the remainder of the day (Banfield 1974).

Habitat

Ice floes are used by all individuals in the winter, as well as by adult females and young in the summer. Require ice thicknesses of 60 cm or more to support their weight (Richard 1990). First-year ice with natural openings such as leads and polynyas is preferred; seldom found in areas of extensive, unbroken ice (Fay 1982). Males use beaches of remote islets and coastal headlands for summer resting and molting sites. Generally does not haul out on shores with permanent human occupation. Generally occurs in shallow waters (less than 100 m deep) (Richard and Campbell 1988). Young are born on ice floes. Sediment in feeding areas is typically composed of soft, fine sand (Richard 1990).

Global range

Genus *Odobenus* has a discontinuous distribution throughout arctic waters of the Northern Hemisphere. Atlantic walrus range from Foxe Basin, Hudson Bay, James Bay, and Labrador in the eastern Canadian Arctic to Greenland and east to Kara Sea and Franz Josef Land. Pacific walrus are found in the Beaufort, Chukchi, and Bering Seas. A population found in the Laptev Sea in the central Russian Arctic, generally considered to be Pacific walrus, is thought by some Russian researchers to be a separate subspecies entirely: *O. r. laptevi*. In winter, Pacific walrus occur in the Bering Sea, mainly between eastern Bristol Bay and an area southwest of St. Lawrence Island, and in the Gulf of Anadyr.

In summer, most Pacific walrus females and young occur in the Chukchi Sea (Point Barrow west to the mouth of the Kolyma River on the East Siberian Sea) and around the Diomede Islands, King Island, and Arakamchechen Island. When summer ice is light, large numbers haul out on shores of Wrangel and Herald islands and at traditional sites along the northern Chukchi Peninsula; in years of heavy summer ice, they generally remain associated with sea ice and do not come ashore in large numbers. During the southward fall migration, large groups haul out at Big Diomede Island and the Penuk Islands and at some coastal sites on the Siberian mainland. In summer, the majority of male Pacific walrus are found in the Bering Sea; many (at least 12,000) males summer on or near Round Island, in northern Bristol Bay, and another several thousand summer in the Gulf of Anadyr and in the Bering Strait (Reeves et al. 1992).

Historic Atlantic range included the Kara, Barents, and White seas and the shores of Novaya Zemlya, Franz Josef Land, Svalbard, and Bear Island; populations still widespread but populations now are much smaller. Some still migrate through Karskye Vorota Strait between winter range in southeastern Barents Sea and summer range in the Kara Sea. Formerly occurred in large numbers south to Sable Island (off Nova Scotia) and the Magdalen Islands (Gulf of St. Lawrence) but extirpated south of Labrador by early 1900s. Centers of abundance are Hudson Strait, northern Hudson Bay, northern Foxe Basin, and along portions of the coasts of Greenland, Devon Island, Ellesmere Island, and Baffin Island; relatively large numbers occur in Smith Sound, Jones Sound, and their adjacent

channels and embayments. From fall to late spring, a few hundred are present off central west Greenland in the Davis Strait pack ice; some winter in high arctic polynyas such as the North Water, Hell-Gate-Cardigan Strait, and Penny Strait-Queen's Channel, but there is also a northward migration in Davis Strait and Baffin Bay and a westward migration through Lancaster Sound during spring breakup (Reeves et al. 1992).

Laptev walrus occurs mainly in the Laptev Sea, the eastern Kara Sea, and the western East Siberian Sea (Reeves et al. 1992).

State range

In general, the range of the Pacific walrus is delimited by the shallow continental shelf waters of the Bering and Chukchi seas, occasionally moving into the East Siberian and the Beaufort Seas (Sease and Chapman 1988). Distribution varies markedly with seasons.

Winter: During winter, virtually the entire population occupies the ice pack in the Bering Sea in at least three major areas: the Saint Lawrence Island and the Gulf of Anadyr region; the eastern Bristol Bay and Kuskokwim Bay region; and near the Pribilof Islands (Fay 1982, Fay et al. 1984b).

Spring and summer: In the spring and summer, females and young follow the ice edge northward, generally passing through the Bering Strait and into the Chukchi Sea by June. The largest concentrations are found between 70 degrees N and Pt. Barrow in the east and between Bering Strait and Wrangel Island in the west. Most of the adult males remain behind as the ice retreats, and summer on or near terrestrial haulouts in Bristol Bay and the northern Gulf of Anadyr, Russia.

Fall: In October, as the pack ice develops in the Chukchi Sea, large herds begin to move southward, coming ashore on Bering Strait islands: Big Diomedé, King, St. Lawrence, and Penuk. Ice conditions dictate how long terrestrial haulouts are occupied in this area, but most walruses move to wintering areas south of St. Lawrence Island by early to mid-December (Fay 1982, Sease and Chapman 1988).

Major terrestrial haulouts are found in Bristol Bay at Cape Seniavan, Round Island, Cape Pierce and Cape Newenham (Fay et al. 1984b, c).

Global abundance:

A 1990 US – Soviet survey yielded a population estimate of about 200,000, at or near historic levels. However, this population estimate is not considered accurate due to problems in survey methodology (USFWS 2002 stock assessment). Laptev population numbers around 4000-5000 (Reeves et al. 1992).

State abundance

Current population size is unknown, nor has it ever been known with certainty (USFWS 2002 stock assessment). Pre-exploitation populations are estimated at a minimum of 200,000 animals, based on large sustained harvests in the 18th and 19th centuries (Fay 1982 in USFWS 2002 stock assessment). Between 1975 and 1990, aerial surveys were conducted by the US and Russia at five-year intervals, yielding population estimates ranging from 210,029 to 234,020. However, each of these surveys utilized very different survey designs and methods, each resulting in unacceptably large confidence intervals, and are not considered reliable (Gilbert et al. 1992 in USFWS 2002 stock assessment).

Global trend

Pacific population apparently doubled between about 1960 and 1980, reaching a maximum of more than 200,000; by 1978 its reproductive output was declining as the population reached environmental carrying capacity. Annual kill in Alaska and former USSR at least doubled in the 1980s and Pacific population was believed to be declining as of the early 1990s (Reeves et al. 1992). Pacific population may be stable or declining slightly (USFWS 1995 stock assessment). See also Fay et al. (1997) for evidence of a possible recent decline.

Atlantic populations have not made a similar recovery; early 1990s population in northeastern Atlantic may have been only 1500-2000; several thousand remain in the eastern Canadian arctic; population in Greenland's Thule district may be stable, but that off central west Greenland remains depleted (Reeves et al. 1992). Canadian populations apparently are stable (Richard and Campbell 1988). Formerly abundant in Gulf of St. Lawrence, then extirpated by exploitation; see Kingsley (1998) for recent sightings in the Gulf and lower estuary of the St. Lawrence.

State trend

Current population size is unknown. However, over the past 150 years, the Pacific walrus

population has been depleted and subsequently allowed to recover three times; population has fluctuated markedly in response to varying levels of human exploitation (Fay et al. 1989). Large commercial harvests reduced the population to an estimated 50,000-100,000 animals in the mid-1950s (Fay et al. 1997). After protective measures were put into place, the population is believed to have increased rapidly in size during the 1960s and 1970s (Fay et al. 1989 in USFWS 2002 stock assessment).

Global protection

Protected by the Marine Mammal Protection Act (1972) in the United States. Commercial walrus harvest was banned in 1941 in the United States (Fay 1957). Legally protected in Canada and Russia. Canada began regulating its commercial walrus harvest as early as 1867, and this was legally halted altogether in 1931. Commercial harvest in the former Soviet Union was halted in 1957 (Krylov 1968). Included in Appendix III of the Convention on International and Trade in Endangered Species of Wild Flora and Fauna (CITES).

Alaskan Natives still hunt Pacific walruses legally for subsistence use, with no limit to the number of animals taken. Arctic Natives in Canada have the right to hunt both Pacific and Atlantic walrus without permits for subsistence use, but each community has an established annual quota. In Russia there is also a regulated native subsistence harvest of both Atlantic and Pacific walrus. Native subsistence hunting of Atlantic walrus is regulated in Greenland. Atlantic walruses are fully protected from hunting in Svalbard and Franz-Joseph land (Born et al. 2001, USGS 2001).

State protection

The Federal government assumed management authority for Pacific walruses in U.S. waters with the passage of the Marine Mammal Protection Act (MMPA) in 1972. In 1976, the State of Alaska resumed management of the Pacific walrus with a federally-imposed provision that the catch be limited to 3000 walruses per year. This quota was found to be unworkable, however, and management authority for walruses was relinquished to the U.S. Fish and Wildlife Service (FWS) in 1979. The Eskimo Walrus Commission (EWC) was formed in 1978 as a consortium of Native hunters concerned with the health of walrus and other marine mammal populations

and has taken an active role in walrus management and research at the local, state, national, and international level. Although the Pacific walrus is legally protected in the United States, Alaskan Natives may hunt walruses legally for traditional subsistence and handicraft purposes. There are no limits on the number of animals harvested.

Species receives protection in the Walrus Islands State Game Sanctuary, northern Bristol Bay, which consists of seven islands: Round, Crooked, High, Summit, Black Rock, and the Twins. The sanctuary was created by the Alaska Legislature in 1968 (AS 16:20.090-140) to protect the most important walrus haulout area in North America. With the exception of the Twins and adjacent waters, and a month long subsistence hunting period on Round Island and its adjacent waters, all of the islands within the sanctuary and the waters within one-half mile of each, are closed to hunting (Alaska Department of Fish and Game 2003). Subsistence hunting may occur on Round Island and its adjacent waters from 20 September to 20 October with application for appropriate access permits (Alaska Department of Fish and Game 2003).

Global threats

The currently declining levels of harvest by humans (USFWS 1995 stock assessment) do not appear to constitute a significant threat. Laptev population is threatened by pollution and industrial activity (Reeves et al. 1992). Also see state threat comments.

State threats

Preyed upon by polar bears (*Ursus maritimus*), killer whales (*Orcinus orca*) and humans. The magnitude of natural mortality is unknown, but assumed low (Sease and Chapman 1988). Mortality caused by humans includes actual harvests and may also involve indirect effects, such as disturbance that causes stampedes and/or abandonment of important habitat, alteration of habitat, contamination with oil or other pollutants, competition for food with fisheries, and incidental take by fisheries (Sease and Chapman 1988).

Hunting, both legal and illegal, has the greatest potential impact on the Pacific walrus population (Fay 1982, Fay et al. 1989). Over the past 40 years, annual harvest mortalities have ranged from 3,200 to 16,100 animals/year. Based on 1996-2000 harvest statistics, harvest mortality

was estimated at 5,789 animals/year (USFWS 2002 stock assessment). The number of walrus killed but not retrieved is unknown (USFWS 1994), but has been estimated to range from 20 to 80 percent, with a probable average around 50 percent (Fay 1958, Kenyon 1958, Kelly 1990, Harbo 1961). Illegal hunting for ivory also occurs – current level and implications of illegal activity are unknown. While recent harvest levels are lower than historical highs, a lack of information on population size or trend precludes any meaningful assessment of the impact of current harvest levels.

Another element of concern is the potential for global climate change and associated changes in the distribution and extent of pack ice in the Bering and Chukchi Seas. The distribution of walrus is closely linked to the seasonal distribution of pack ice because walrus rely on sea ice as a substrate for resting and giving birth. There are no data to make reliable predictions of the net impacts that changing climate conditions would have on the status and trend of the Pacific walrus population (USFWS 2002 stock assessment).

State research needs

The following research objectives were summarized from the Conservation plan for the Pacific walrus in Alaska, prepared by the US Fish and Wildlife Service, Marine Mammals Management, 1994: Methods need to be developed to accurately assess and monitor population status, and a statistically valid population monitoring strategy must be implemented. Investigation into causes of mortality, both natural and anthropogenic, is needed. Research needed on feeding ecology and factors affecting energetic requirements. Investigations of contaminant levels in walrus should be resumed. Age/sex composition needs to be determined. Define the Optimum Sustainable Population range for Pacific walrus. Further investigations needed on at-sea movements and habitat use. Relationships between walrus and fisheries need to be examined and natural ecosystem changes identified. Understanding of the effect of human activities on Pacific walrus needs to be improved.

State inventory needs

An accurate population estimate is needed. Assess population trends. Identify and monitor essential habitats. Monitor annual subsistence

harvest, including strikes not retrieved. Monitor incidental take in commercial fisheries.

State conservation and management needs

While recent harvest levels are lower than historical highs, a lack of information on population size or trend precludes any meaningful assessment of the impact of current harvest levels. Ensuring that harvest levels remain sustainable is a goal shared by subsistence hunters and resource managers in the U.S. and Russia. Achieving this management goal will require continued investments in population research, harvest monitoring programs, international coordination and co-management relationships. Direct management of native subsistence harvest by USFWS is unlikely until and unless an appreciable decline in Pacific walrus population is convincingly established.

The following management and conservation needs were summarized from the Conservation plan for the Pacific walrus in Alaska, prepared by the US Fish and Wildlife Service, Marine Mammals Management, 1994: Conserve important habitats, such as the state game refuge at Round Island. Identify, monitor, and manage human activities that may be detrimental to the walrus population. Ensure the subsistence/handicraft harvest is consistent with the provisions of the MMPA and will allow the population to remain within a healthy range. Establish information and education programs promoting conservation of the Pacific walrus through increased understanding. Coordinate Federal, State, Native, international, and other cooperative conservation efforts.

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Acknowledgements

State Conservation Status, Element Ecology & Life History

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NatureServe Conservation Status Factors

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