Leopard Seal

Leopard seals are generalist predators known to prey heavily on penguins, patrolling the shallow waters around colonies during the summer breeding season (Hall-Aspland and Rogers, 2004).

From: Encyclopedia of Marine Mammals (Third Edition), 2018

Related terms:
Pinniped, Crabeater Seal, Weddell Seal, Krill, Harbor Seal, Predation, Marine Mammals, Penguins, Dolphins

Leopard Seal

Tracey Rogers, in Encyclopedia of Marine Mammals (Third Edition), 2018

II Distribution and Abundance

Leopard seals are solitary, and widely dispersed at low densities throughout the circumpolar Antarctic pack ice (Fig. 2; Rogers et al., 2013). When the sea ice extent is minimal, leopard seals are restricted to coastal habitats (Meade et al., 2015). While the majority of the leopard seal population remains within the pack ice (Rogers et al., 2013), seals are regular, although not abundant, winter visitors north to the subantarctic and along the southern continents. Leopard seals further north, in mid-latitude regions, tend to be younger animals in poor health, as indicated by elevated serum protein fractions and poor body condition (Gray et al., 2005). The leopard seal population is estimated to be 222,000–440,000, but this may be negatively biased (Southwell et al., 2008).

Figure 2. Leopard seal distribution. Map produced by Anders Skoglund, Norwegian Polar Institute.

Read full chapter

URL: https://www.sciencedirect.com/science/article/pii/B9780128043271001631

Leopard Seal

Tracey L. Rogers, in Encyclopedia of Marine Mammals (Second Edition), 2009

III Ecology

Leopard seals take a diverse range of prey (Lowry *et al.*, 1988; Hall-Aspland and Rogers, 2004) including fish, cephalopods, sea birds, and seals. Different food sources are used when available or when opportunities to take other more sought-after prey are few. Krill makes up the largest proportion of their diet, particularly during the winter months when other food types are not abundant. At this time the leopard seals must compete directly with krill-feeding specialists, such as the crabeater seal (*Lobodon carcinophagus*) and Adélie penguin (Siniff and Bengtson, 1977). This is believed to be a time of potential food shortage and causes some juvenile leopard seals to move north from the pack ice during the austral winter. The leopard seal is responsible for more predation on warm-blooded prey than any other pinniped. Leopard seals capture and eat juvenile crabeater seals in particular but also prey on Weddell (*Leptonychotes weddellii*) Ross (*Ommatophoca rossii*) and southern elephant (*Mirounga leonina*) seals, subantarctic and Antarctic fur seals (*Arctocephalus* tropicalis and A. *gazella*) and southern sea lions (*Neophoca cinerea* and *Phocarctes hookeri*). Newly weaned crabeater seals are the most vulnerable and are taken from November to February. Crabeater seal survivors bear characteristic parallel paired scars from leopard seal attacks; approximately 78% of adult crabeater seals display such marks. The teeth of the leopard seal have a dual role; the large recurved canines and incisors are designed for gripping and tearing prey, whereas the upper and lower tricuspid (three cusped) molars interlock to provide an efficient krill sieve.

Read full chapter

URL: https://www.sciencedirect.com/science/article/pii/B9780123735539001553

Predation on Marine Mammals

David W. Weller, in Encyclopedia of Marine Mammals (Second Edition), 2009

2 Leopard Seals

The leopard seal is known to prey on penguins, sea birds, fish, squid, krill, and pinnipeds. In certain parts of their range, pinnipeds are an important part of leopard seal diet, while in other areas pinnipeds are rarely taken (Reidman, 1990). Leopard seals commonly hunt a variety of pinnipeds, but young crabeater seal pups (*Lobodon carcinophaga*) are probably the most frequently attacked and form an important part of the leopard seal diet between November and January (Siniff and Bengtson, 1977). After January, crabeater seal pups have physically developed to the point where they are better able to escape leopard seal predation, and the rate at which they are taken declines.

Parallel tooth scars resulting from unsuccessful leopard seal attacks are quite common on crabeater seals. A study of crabeater seals in 1976 reported that 78% of 85 adult seals handled for research purposes had scars likely to have resulted from interactions with leopard seals (Siniff and Bengtson, 1977). Fresh wounds were far more common on subadults than adults, suggesting that immature animals up to the end of their first year were most likely to be attacked, and it is thought that pups younger than 6 months are probably unlikely to survive encounters with leopard seals. The relatively high level of predation on crabeater seals is believed to represent a food source potentially more important to leopard seals than either krill or penguins.

A Biophysical and Economic Profile of South Georgia and the South Sandwich Islands as Potential Large-Scale Antarctic Protected Areas

Alex D. Rogers, ... Pippa Gravestock, in Advances in Marine Biology, 2015

4.2.3.3 Leopard Seals (*Hydrurga leptonyx*)

Leopard seals, *Hydrurga leptonyx* (IUCN Red List Status: Least Concern), are powerful predators feeding mainly on seabirds and other seals (Walker et al., 1998), but also on krill and, off the Antarctic continent, silverfish (Forcada et al., 2009; Hall-Aspland et al., 2005; Lowry et al., 1988). These seals breed on pack ice during the Antarctic summer (November to December), but disperse further northward towards the sub-Antarctic Islands in winter. At South Georgia, these seals are observed from April to November, with individuals remaining around the islands for up to 130 days (Forcada and Robinson, 2006; Walker et al., 1998). However, there are also reports of seals present in summer (P. Trathan, British Antarctic Survey, personal communication, 2012). Around South Georgia, leopard seals feed mainly on fur seals, although they take penguins and fish as well, with smaller proportions of other animals, including seabirds, southern elephant seals and also krill (Walker et al., 1998). Krill are particularly important components of the diet of leopard seal pups but also comprise a significant element of the diet of other life-history stages around South Georgia (Forcada et al., 2009). Several hundred individuals are probably present around South Georgia each year with the majority being juveniles (Walker et al., 1998). Leopard seals are also present around the South Sandwich Islands.

Communication

Kathleen M. Dudzinski, Justin D. Gregg, in Encyclopedia of Marine Mammals (Third Edition), 2018

B Pinnipedia

Pinnipeds vary in their degree of gregarious behavior and thus tolerance for tactile contact by conspecifics. Leopard seals (*Hydrurga leptonyx*) are solitary predators and rarely seen in close proximity. In contrast, Weddell seals congregate in breeding colonies, but each mother–pup pair maintains an individual space. The more polygynous pinnipeds, such as walrus (*Odobenus rosmarus*) and California sea lions (*Zalophus californianus*), often crowd onto beaches, almost piling on top of each other, with little regard for "personal space." Mothers and pups maintain close tactile communication. Young pinniped pups often crawl over their mothers, and sleep touching their mother. There is, however, no maternal grooming of the young.

Read full chapter

URL: https://www.sciencedirect.com/science/article/pii/B9780128043271000960

Communication in Marine Mammals

Kathleen M. Dudzinski, ... Justin D. Gregg, in Encyclopedia of Marine Mammals (Second Edition), 2009

2 Pinnipedia

Pinnipeds vary in their degree of gregarious behavior and thus tolerance for tactile stimulation by conspecifics. Leopard seals (*Hydrurga leptonyx*) are solitary predators and rarely seen in close proximity. In contrast, Weddell seals congregate in breeding colonies, but each mother–pup pair maintains an individual space. The more polygynous pinnipeds, such as walrus (*Odobenus rosmarus*) and California sea lions, often crowd onto beaches, piling on top of each other, with little regard for "personal space." This tolerance of body contact may provide a thermoregulatory advantage, as well.

Regardless of adult spacing, in pinnipeds a mother and pup maintain close tactile communication. Young pinniped pups often crawl over their mothers, and sleep touching their mother. There is, however, no maternal grooming of the young in pinnipeds.

Read full chapter

URL: https://www.sciencedirect.com/science/article/pii/B978012373553900064X

Pinniped Ecology

W.D. Bowen, ... D.A. Austin, in Encyclopedia of Marine Mammals (Second Edition), 2009

2 Aquatic-Breeding Species

Walruses and all other phocid seals (Weddell, Ross [*Ommatophoca rossii*], crabeater, leopard (*Hydrurga leptonyx*), bearded, hooded, ringed, Baikal, Caspian (*Pusa* caspica), spotted, harp and ribbon) give birth on pack ice or fast ice and mate in the water. Although Hawaiian monk seals and harbor seals give birth to their offspring on land, they too mate in the water. In species where pups are born on ice, females tend to be more widely distributed, although access to breathing holes in the ice may promote clumping in some species (e.g., walrus and Weddell seals). This broader distribution of females, on an unstable habitat, limits the number of females a male can monopolize at any given time, and as a result these species typically show reduced levels of polygyny (e.g., harbor seals; Coltman *et al.*, 1999). The fact that mating occurs in the water, a fluid three-dimensional environment, also may limit the ability of males to monopolize females resulting in reduced levels of polygyny.

Wells *et al.* (1999) classified the mating strategies used by ice-breeding species as: scrambling-males search for receptive females and move on to the next, sequential

defense-males sequentially defend single females through mating, and lekking-males aggregate and attract females using displays. At present, there is insufficient information on the breeding behavior of most aquatic breeding species to draw firm conclusions about the type of mating system used. Until recently, data on the mating behavior of these species is limited to that which can be observed on ice prior to copulation. For example, observational data suggest that hooded seals use a sequential defense mating system whereby males compete with one another to defend a single female and her pup on the ice. The dominant male remains with the pair until the pup is weaned and then enters the water with the female, presumably to mate. However, the application of newer methods, including genetic paternity assessment, animal-borne video, and positional analysis of vocalizations have clarified the mating systems of harbor seals (Boness *et al*., 2006) and bearded seals (Van Parijs and Clark, 2006).

In species that mate aquatically, there may be less selective advantage for males to be larger than females because of the limited ability of males to monopolize females in this environment. As a consequence, in most of these species, males and females are of similar size and in some cases females are larger than males. For example, male Weddell seals are slightly smaller than females and it has been suggested that smaller size makes the male more agile during underwater mating activities (Le Boeuf, 1991). Underwater vocalizations also appear to be an important component of the mating behavior in aquatically mating pinniped species. For example, in Pacific walruses, which exhibit a lekking mating system, males perform complex underwater visual and vocal displays in small groups next to female haul-out sites to attract females. Male Weddell, harbor, harp, hooded, and bearded seals also produce a range of underwater vocalizations during the breeding season that may be used to attract females or to establish underwater territories or display areas.

Ocean Environments

Paul C. Fiedler, in Encyclopedia of Marine Mammals (Third Edition), 2018

VIII Effects on Feeding

Marine mammals are generally apex predators at the top of the food chain, although some of them are preyed upon by killer whales and leopard seals. They are motile, social, and intelligent, so that they are able to take advantage of prey in locally dense patches. Like all aquatic and terrestrial predators, marine mammals cannot forage efficiently on average concentrations of prey. It has been shown that right whales and humpback whales require concentrations of prey that are greater than the maximum densities observed by net sampling. This is an indication of the limitations of oceanographic sampling, as well as the paucity of prey in the ocean environment. Sampling by acoustic backscattering from echo sounders and by photography with tethered cameras has now revealed small patches of prey of the required densities.

Prey consumed by marine mammals include crustaceans (copepods, euphausiids or krill, amphipods, shrimp), cephalopods (squid), and schooling fish (herring, capelin, cod, mackerel, myctophids or lanternfish, and others). Availability of these prey in dense patches has been linked to oceanographic features including bathymetry, fronts, eddies, and primary productivity. Except for bathymetry, these features or characteristics of the ocean environment vary over time.

Baleen whales feed on dense patches of zooplankton. Distribution of feeding North Atlantic right whales can be predicted by surface temperature and bathymetric variables including depth and slope. These are the simplest oceanographic variables to measure, but they explain the distribution of whales only indirectly through effects on prey. Zooplankton patches are available in productive coastal waters, where upwelling and wind mixing result in high primary production, and in polar seas, where high primary productivity results from summer insolation and enhanced phytoplankton growth at the melting ice edge and even under the ice. The patches

are often located at bathymetric features like the shelf edge, islands, and seamounts because bathymetry affects circulation and production and serves as a cue for aggregation of krill and fish. Blue whales feed on krill not only at the ice edge in the Antarctic, but also at the shelf edge off California (Croll et al., 2005).

Along the northeast United States continental shelf, cetaceans tend to frequent distinct regions based on food preferences (Kenney and Winn, 1986). Piscivores—humpback, fin, and minke whales; and bottlenose, Atlantic white-sided, and common dolphins—are most abundant over shallow banks in the western Gulf of Maine and midshelf east of Chesapeake Bay. Planktivores—right, blue, and sei whales—are most abundant in the western Gulf of Maine and over the western and southern portions of Georges Bank. Teuthivores (squid eaters)—sperm and pilot whales and grampus—are most abundant at the shelf edge. Most of these patterns can be related to availability of specific prey. Right whales feed on dense patches of copepods in the vicinity of the Great South Channel during summer. Humpbacks and fin whales feed on a small schooling fish, the American sand lance, which is very abundant on Stellwagen Bank and Jeffreys Ledge in the Gulf of Maine and is also abundant off Chesapeake Bay.

Cetaceans are distributed over distinct depth ranges along the continental slope in the northwestern Gulf of Mexico (Davis et al., 2002). Deep-diving teuthivores, such as Risso's dolphins, sperm whales, and beaked whales, are found near temperature fronts in deep water, where their squid prey may aggregate. Sperm whales are more abundant in regions of high zooplankton biomass and steep topography in the Pacific Ocean, where deep-living squid are aggregated. Most of the 19th-century sperm whaling grounds in the Pacific were in regions of coastal or oceanic upwelling where primary production is high (Jaquet, Whitehead, and Lewis, 1996). However, the occurrence of some whaling grounds in unproductive waters such as the region around Tahiti and the absence of catches in productive waters such as the California upwelling indicate that other factors affect the availability of prey to whales and/or whales to whalers.

In the Antarctic, both Antarctic fur seals and minke whales are found in the marginal ice zone, where primary productivity and, presumably, prey availability are enhanced (Ribic, Ainley, and Fraser, 1991). Winter pack ice extends out beyond the narrow Antarctic continental shelf and over the deep ocean. Minke whales, beaked whales, and several species of seals live in this ice and feed on krill (the euphausiid *Euphausia superba*), myctophid fish, and squid. As the pack ice retreats in summer, many of these winter residents and other predators including large baleen whales, male sperm whales, and killer whales follow the ice edge to feed on abundant plankton and nekton. Right whales, feeding on smaller copepods not concentrated at the ice edge, remain in open waters north of the retreating ice.

Ice is an important habitat component for breeding and shelter of pinnipeds. Antarctic ice floes in the marginal ice zone are a refuge for fur seals from predation by killer whales. Crabeater seals, in contrast, are found in the interior of the pack ice where larger, more stable floes provide breeding sites.

In the Arctic, gray, bowhead, and beluga whales migrate into the Chukchi and Beaufort Sea north of Alaska to feed in summer and fall (Moore and DeMaster, 1998). Bottom-feeding gray whales feed in shallow ice-free waters, piscivorous belugas feed in deep water near the ice edge, while planktivorous bowhead whales feed closer to the coast where ice cover is less. These distribution differences are clearly related to prey availability. River plumes formed by summer runoff into the Arctic have been shown to limit the distribution of prey and thus determine the distribution of foraging whales.

South American Aquatic Mammals

Enrique A. Crespo, in Encyclopedia of Marine Mammals (Second Edition), 2009

V Occasional Visitors from the Antarctic

Five species of pinnipeds that breed on subantarctic islands or the Antarctic ice (the Antarctic fur seal *Arctocephalus gazella*, subantarctic fur seal *A. tropicalis*, leopard seal *Hydrurga leptonyx*, crabeater seal *Lobodon carcinophagus*, and Weddell seal *Leptonychotes weddellii*) move erratically to more northerly waters of both sides of South America. Probably as a consequence of population increases over the last few decades, it has become more frequent to sight individuals moving as far north as the Equator. The southern elephant seal (*Mirounga leonina*) can be included in this list; while most breeding groups are circumpolar, there is an important and increasing breeding stock at Península Valdés, Patagonia, around 42°S in the Atlantic Ocean.

Read full chapter

URL: https://www.sciencedirect.com/science/article/pii/B9780123735539002431

Distribution

Jaume Forcada, in Encyclopedia of Marine Mammals (Third Edition), 2018

C Ecological Factors

Marine mammal distribution is highly related to prey distribution and the ability to exploit different trophic levels and resources. Top predators such as killer whales or leopard seals are more generalist and can exploit different habitats. In contrast, the abundance of a clustered prey source like copepods or krill determines the distribution of many baleen whales that migrate seasonally. Manatees, being specialist feeders, have restricted distributions where sea grass meadows provide sufficient food. Odontocetes and phocids use a wide range of prey items and therefore they occur over wide ranges, which may change seasonally. The killer whale as a species has a broad diet but different morphotypes or subspecies show specialized diets associated with distribution areas. Some species tend to use the same home range, such as coastal bottlenose dolphins, feeding on different prey that changes their distribution seasonally.

Interspecific competition also determines a variable or segregated distribution, and predation plays an important role in the selection of habitats and distribution areas. This is particularly true for small species of marine mammals, such as ringed seals, which select fast ice habitats to reduce predation by polar bears.

Read full chapter

URL: https://www.sciencedirect.com/science/article/pii/B9780128043271001060