

## **Marine Mammals Background Information**

### **MARINE MAMMALS**

Mammals live in a variety of habitats from jungles to mountains, plains, deserts, rivers, lakes and oceans. Of the approximately 4,000 mammalian species that exist today, only 118 are adapted to a marine life. Although they live in aquatic habitats, whales, dolphins, seals, sea lions, walruses, polar bears and other marine mammals have many of the same needs as their terrestrial, mammalian relatives—they must heat their warm-blooded bodies, breathe air, give birth to live young, and nurse them with rich milk.

From whales to seals, most marine mammals use thick layers of blubber to keep their warm-blooded bodies heated to constant, warm temperatures of 36.5°C to 37.5°C in the very chilly waters in which they live. Even in more temperate seas, marine mammals become colder more quickly than land mammals because water conducts heat away from their bodies about 25 times faster than air.

Most marine mammals have adapted to this heat-conservation challenge by packing on bulky walls of insulating blubber—up to half a walrus' weight is blubber and up to 45 percent of a beluga's body weight can be made up of this fat. To further prevent heat loss in cold conditions, marine mammals constrict an extensive network of blood vessels located immediately under their skins. This reduces the amount of cooled, venous blood that must be warmed up. During cold weather on land, seals and sea lions drape themselves over each other to retain warmth. These animals also lie on top of their flippers to reduce the amount of surface area exposed to the cold air. Marine mammals' fatty insulation fulfills several other needs—it is a source of reserve energy and usable, desalinated water, it makes them more buoyant, and it creates a smooth, sleek shape that is very energy efficient when swimming.

Unfortunately, marine mammals also accumulate and store chemical pollutants in their fat. Many marine mammals eat other aquatic animals that have consumed pollutants. The toxins that their prey have consumed are passed on to the mammalian predators and deposited in their fat. Marine mammal mothers pass these toxins on to their suckling offspring in their milk, which has high concentrations of fat.

Toxins are not the only hazard conferred by all of this fat—overheating is potentially a serious problem for these well-insulated animals! To help them cool down quickly, their skins are richly supplied with blood vessels. Blood is shunted to the flippers and flukes to cool near the surface of the animals' bodies. Overheated walruses appear to blush as the blood vessels in their skin fill with blood. Seals and sea lions bask on haul out sites and lazily fan their flippers through the air or dip them in cool water. In temperatures over 30°C, seals and sea lions splash into the water to take a refreshing swim in the sea. During the summer, when the males are defending their mating

## **Marine Mammals**

### **Background Information**

territories and cannot leave land, they cool off by dangling their flippers in the water, or by urinating on the back flippers.

Sea otters are the exception to this blubbery, marine mammal rule. They grow dense fur coats, which they must continually groom to keep filled with a thin layer of insulating air. They also constantly eat bellyfuls of food to keep themselves warm.

Sea otters and all marine mammals must come to the water's surface to breathe air. Most of these animals use the oxygen they transport across the membranes of their lungs two to three times more efficiently than terrestrial mammals. Marine mammals also have more oxygen carrying molecules, called myoglobin (mye-OH-globe-in), in their muscles, so they can store more oxygen than land mammals, including humans.

Seals also increase the amount of oxygen in their bodies by having more blood—55 litres of blood flow through the veins of seals compared to the five litres that pulse through the veins of an average human male. Most marine mammals also have a higher tolerance to carbon dioxide building up in the blood. To further conserve oxygen, marine mammals lower their heart rates. Seals, for example, can reduce their heart rates from 85 beats per minute to as low as 15 beats per minute. They also reduce the amount of blood they send to the extremities of their bodies by constricting their arteries and rationing the transport of oxygen-carrying blood to the fins and flippers. Their brains, lungs and hearts continue to receive a steady supply.

Whether on land or at sea, marine mammals give birth to live young. Whales are born near the ocean's surface, with calves being delivered from their mother's uterus tail first. Newborn calves are normally a little awkward and may be guided to the surface for their first breath by their mothers, or by a helper. Sea otter pups are also born at sea. Their newborn coats act as life preservers and keep them floating like corks at the water's surface for at least the first two months of their lives. Seals and sea lions give birth at specific breeding grounds called rookeries. Rookeries are found on rocky shorelines where these pups can be safely left when the mothers go to sea to feed.

## **ORDER CETACEA**

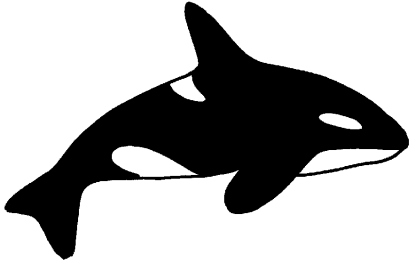
### **Whales**

*Whales are aptly named cetaceans (seh-TAY-shuns)—cetus is from the Latin for a large sea animal, and the Greek ketos, meaning sea monster. Whales have diversified into an assortment of sizes, shapes, and colours, and species differ from one another in body structure and some of the ways their bodies function, including the way they feed. Scientists have divided whales into two basic types—the toothed whales and the baleen (BAY-leen) whales.*

## Marine Mammals Background Information

### **SUBORDER ODONTOCETES—TOOTHED WHALES** (oh-DOHN-toh-seets; "odotes"= toothed; "cetes"= whales)

Toothed whales have teeth—and their teeth can grow to mythical proportions, as in the case of the spiraling, unicorn-like tusks of male narwhals. Or they may only appear for a short period before birth as in the case of female narwhals.



The dental arrangements of the Odontocetes are dictated by their feeding habits which are extremely varied. Their diets range from shrimps, squids and schooling fishes to marine birds, seals, sea lions and even other whales. Killer whales have sharp, conical teeth to grasp fast-swimming fishes and other marine mammals. Beluga whales have flatter, pegshaped teeth suited for capturing small

fishes and grinding up crustaceans.

Toothed whales swim in every ocean on Earth and come in all sizes. Sperm whales descend into deep-ocean valleys, while the Amazon River dolphins swim up freshwater rivers. Male sperm whales may reach 44 tonnes and 18 metres in length, while tiny harbour porpoises only grow to 90 kilograms and 2 metres in length. Odontocetes have a single blowhole, instead of the two that baleen whales have. The internal nasal passage of all whales' blowholes are divided in two separate parts by a single septum.

### **SUBORDER MYSTICETES—BALEEN WHALES** (mis-TEH-seets; "mysti"=moustache, "cetes"= whales)

Baleen whales are also called Mysticetes (mis-TEH-seets), or moustache whales, because of the way they feed. Baleen whales use stiff, fringed brushes of baleen suspended from the roofs of their mouths to strain small schooling fishes, krill and other plankton out of the water. Baleen is made from keratin, the same material as our hair and finger nails.

The long, wide bristles of the baleen plates intertwine to form a matted sieve. The length, density, flexibility and size of the bristles are related to the targeted prey of each species. Bowhead whales use fine, dense fringes of baleen to strain minute planktonic animals from the mid-water column. Gray whales force seafloor mud through their coarse bristles to sift out the small, sea bottom animals they feed on.

The largest of all living animals are the blue whales. Blue whales reach lengths of 30 metres and weigh more than 160 tonnes, the same weight as nearly 2,000 adult humans! If these titans lived on land, their enormous mass would cause them to collapse inward, crushing their internal organs. Surprisingly, the diet of this marine giant is almost completely made up of tiny shrimplike animals called krill—mere five-centimetre-long crustaceans.

## **Marine Mammals**

### **Background Information**

Baleen whales breathe through two blowholes and not one, as the toothed whales do. When baleen whales exhale, they form two columns of vapor which usually combine to create a single spout.

While there are differences between toothed and baleen whales, their shared ancestry and oceanic way of life give them much in common.

### **MARINE ADAPTATIONS**

Whales are descendants of terrestrial mammals that originally came from the sea. Whales have re-adapted to their marine environments by becoming streamlined, evolving into shapes similar to efficient, open-ocean fishes, such as sharks and salmon. Their lack of body hair has also helped them to develop sleek, smooth exteriors, beneficial for swimming. Whales' nostrils have migrated from the front of their faces to the roofs of their skulls, allowing quick, easy breathing at the water's surface. They use their paddle-shaped forelimb flippers, complete with hand and finger bones, for steering. Their hind limbs have evolved into tails that sweep up and down providing the power for swimming. Their external ears are reduced to tiny openings stopped with plugs to prevent water from entering. To withstand the enormous pressures involved with diving deep beneath the ocean's waters, their ears are structured so that they do not rupture while their lungs are structured so that they will collapse. Most whales also have a dorsal fin or ridge that may be used as a keel, a medium of heat exchange or an icebreaker.

#### *Breathing*

Unlike their terrestrial ancestors, whales must consciously breathe. Their blowholes are closed by nasal plugs, which they open with muscles to take in air. These muscles raise the lips that surround their blowholes, deflecting water away when they inhale. Whales replace 80 to 90 percent of the air in their lungs with each breath—a much greater exchange of air than terrestrial animals are capable of achieving. Some species of whales use this air in underwater dives of up to an hour or more at a time.

Whales always inhale and exhale air using their blowholes—they cannot breathe through their mouths, as the trachea that leads to their lungs and the esophagus that leads to their stomach are completely separate. (Water swallowed by a whale enters its stomach. If water enters the lungs, the whale will drown.) Whales do not exhale water, although their telltale spouts do make it appear that way. Some whales can be identified by the shape and size of their spout.

#### *Swimming*

The smooth skin and streamlined shapes of whales allow them to swim efficiently. They swim by pumping their mighty tails up and down—and not from side to side as fishes do. Like fishes, they use their front flippers, or fins, to steer. Whales swim far below the ocean surfaces, withstanding the immense pressures of the deep. Sperm whales can plunge as deep as 3,000

## **Marine Mammals**

### **Background Information**

metres into the ocean in search of their main prey, squids. On deep dives, the heart rates and body temperatures of all whales fall to conserve energy and their lungs collapse, forcing gases into reinforced bronchial passages.

#### *Seeing*

Most marine mammals have good vision both above and below the water. Whales spy hop, raising their eyes above the water's surface to see what is happening above water. A continuous stream of mucus flows over marine mammals' eyes to protect them from foreign particles and objects and to enable them to see clearly under water.

#### *Echolocating—seeing with sound*

Even though whales have excellent vision underwater, they can still have difficulty seeing far. Cloudy waters frequently reduce visibility and, of course, the moon does not provide enough light to guide them under night skies and sunlight cannot penetrate through very thickly-iced waters.

To overcome these challenges, toothed whales "see" using sound—they use a highly sophisticated form of sonar, called echolocation. Toothed whales produce clicking sounds from small air sacs in their nasal passages that travel through the water and bounce back, off objects. From these echoes, whales can detect where the object is, what shape it is, and how fast it is moving. Some scientists believe that killer whales have "acoustic maps" of locations well-known to them stored in their memories. Bowhead whales have a primitive echolocation system. Scientists have yet to discover if they use it to sense their surroundings.

#### *Communicating*

In addition to using sound for locating food and identifying their surroundings, whales use squeaks, clicks, whistles and cries to communicate, sometimes over long distances. Some whale sounds travel thousands of kilometres under water. Although scientists still have little idea what the whales are saying, they can identify discrete killer whale dialects and can tell what the whales are doing—resting whales use different calls than socializing or foraging whales do. Apart from humans, killer whales are the only animals

## **Marine Mammals**

### **Background Information**

that maintain separate dialects—calls usually only differ when there is a geographic separation in a species' range.

#### *Breeding*

Like all mammals, whales give birth to live young. Female whales usually give birth to one calf at a time. The newborns usually emerge tail first underwater, surfacing to take their first breath. Survival rates of calves vary among species. Forty percent of killer whale calves die shortly after birth from unknown causes.

While few whale births have been seen in the wild, a number have been observed in aquariums—and much has been learned from these births. Ultrasounds performed at the Vancouver Aquarium Marine Science Centre on the pregnant killer whale, Bjossa (bee-YOH-sah), revealed how killer whale fetuses develop. Marine mammal staff collected urine samples daily as part of their routine animal husbandry practices to measure changes in Bjossa's hormonal levels. These levels showed that Bjossa's pregnancy was much longer than had previously been thought based on studies of wild populations. Breeding in aquariums has been identified by international conservation organizations, including the World Wildlife Fund and the International Union for the Conservation of Nature, as perhaps the only hope for a number of endangered dolphins and porpoises. Animal care skills acquired in aquariums with non-endangered species are critical to the success of this program.

#### *Conservation*

Research can save whales in the wild. Knowledge gained by caring for killer whales in aquariums is used to assist stranded animals and wild populations. Reproductive studies of aquarium killer whales have saved the lives of wild killer whales. After hormone measurements from pregnant aquarium whales revealed a much longer gestation period than had been previously estimated from field observations, the International Whaling Commission halted all whale hunting. This type of data is impossible to collect in the wild. During the following decade, more than 500 whales were saved.

Historically, commercial whalers hunted vast numbers of whales. Whale parts were used in a wide variety of products—baleen was manufactured into whale-bone corsets, umbrella ribs, hair brushes and combs, and chimney brushes; oil was made into soap and burned in lamps; bone was engraved and carved into jewelry; skin was sliced up and manufactured into bootlaces; and the meat was ground up for animal and pet food. Intensive whaling pushed many species to the point of extinction.

In recent years, international treaties have reduced or halted whale harvests. Whales are still not out of danger, even with most of the hunting pressure removed. Protecting whales and other marine mammals involves protecting their habitats—whales and all marine creatures depend on the sea for most of their needs. Humans create pollutants that are eaten by whales or their

## **Marine Mammals Background Information**

prey, ever-growing coastal communities disturb whale habitats, noise from our shipping activities interfere with their abilities to communicate and echolocate, and our over fishing deprives them of their food sources. We must care for the aquatic environment to save marine mammals around the globe.

### **Order Carnivora Seals, Sea Lions, Walruses, Sea Otters and Polar Bears**

*Most members of the Order Carnivora are terrestrial. The marine branch of the order is specialized for life at sea, while retaining the four limbs of their land ancestors. Seals, sea lions, walruses, sea otters and polar bears, like all carnivores, are predatory animals that have developed a great variety of hunting strategies. These marine predators have sharp teeth adapted for stabbing, tearing, and eating prey. Most carnivores have keen senses of smell and many have powerful tails, which they use in the pursuit of their prey.*

*Walruses and seals are pinnipeds (pin-NI-peds; pin meaning feather; ped means foot), members of the Sub-Order Pinnipedia. Walruses are one of the largest pinnipeds and are distinguished from their close relatives by their powerful tusks, beards and watery, bloodshot eyes.*

Scientists divide the seals into two groups, the eared and earless seals. Harbour seals are earless seals, which are also known as true seals. Sea lions are eared seals.

Earless seals lack an external ear flap, but can still have acute hearing. These seals swim like fishes—they move the tail ends of their bodies from side to side and steer with their short, front flippers. Their small foreflippers cannot support the animals' weights on land, so they flop about on their stomachs when on shore. Earless seals can be very small or very large—ringed seals are 1.5-metres long and weigh 68 kilograms, while elephant seals are 5 metres in length and weigh in at 3.6 tonnes.

Ringed seals and other true seals grow an outer coat of one-centimetre long stiff hairs over a flat-haired underfur layer that is half as long. This fur is not waterproof, and when swimming, these seals become wet to the skin. These seals use their fat to insulate themselves in cold waters.

Eared seals can be identified by small, external ear flaps. Unlike their earless relatives, eared seals can move quickly on shore. These seals support their weight on their long, paddle-shaped front flippers. Their flippers bend outward at the wrists while their hind flippers rotate forward and are tucked underneath their bodies. Male eared seals are frequently much larger than females.

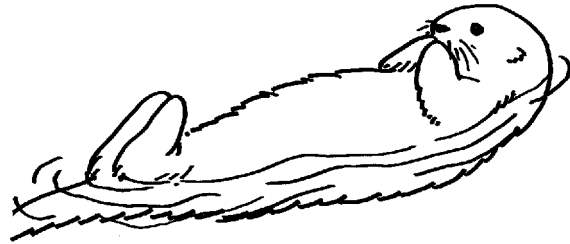
## Marine Mammals

### Background Information

Unlike whales, most seals and sea lions must “haul out” on shore to moult, mate and all must give birth on land. Some species prefer to sleep on land or on ice, safe from marine predators such as killer whales. A thick layer of insulating blubber, combined with a coarse fur coat, heats and protects their streamlined bodies as they heave themselves across the sharp rocks, crags and ice floes of their haul out locations. Their skins produce oily secretions that keep their coats lubricated and waterproofed. Fur seals have a layer of underfur which traps an insulating layer of air in it, keeping their skin dry.

The polar bear and the sea otter (not found in the Arctic) are the only marine members of two other families in the Order Carnivora. Polar bears, like most of their bear relatives, are good climbers. Unlike most other bears, polar bears do not hibernate. Like most bears, polar bears live solitary lives except during the breeding season.

Sea otters are also marine mammals, but they are related to weasels, skunks, badgers and other otters. Sea otters are the only marine mammals that lack blubber. To keep warm, these active animals grow the thickest fur coats of any animal on



Earth and trap an insulating layer of air within them. They also feast on approximately one quarter of their body weights in food each day.

Small sea otter populations inhabit kelp forests, bays and coastal waters near islands, reefs, and fjords in the north Pacific Ocean. In B.C., they are found along the windswept west coast of Vancouver Island and the central coast, near Bella Bella. Sea otters are ungainly on land and rarely venture away from the water. In the ocean, they frequently float on their backs, resting, grooming and eating.

Sea otters are social mammals that live in large groups called rafts, unlike the larger, “freshwater” river otters that can also live in the waters along B.C.’s coast. River otters are rarely seen in groups containing more than a single family which may include three to four young. River otters forage, but must return to land to rest and give birth. They often live much closer to human populations than sea otters.

#### *Sea otters, oil spills and the Vancouver Aquarium*

The *Exxon Valdez* oil spill emptied 400 million litres of crude oil into Prince William Sound, Alaska in April 1989. Of the 463 otters brought to rehabilitation centers, 120 died. No one knows how many other sea otters sank and drowned or died. The Vancouver Aquarium Marine Science Centre is now studying the long-term effects of the oil spill on the sea otters that were rescued. Since sea otters rely on their thick fur to keep them warm, they are seriously affected by oil spills. The oil causes the fur to mat and lose its insulating qualities. Oil is also toxic. Scientists wonder whether surviving sea

## **Marine Mammals Background Information**

otters suffer from permanent lung, kidney or liver damage when exposed to a spill. Perhaps their ability to successfully reproduce is affected. By studying the *Exxon Valdez* sea otters, we hope to find the answers to these questions and be better able to assess the damage.

### **THE ARCTIC REGION**

In the Arctic, the margins between land and water shift to and fro as the ice advances and recedes with the seasons. Conditions at the surface of the Arctic sea can be harsh and inhospitable. Air temperatures on the barren, frozen desert land can fall below  $-60^{\circ}\text{C}$ , but even this extreme cold is not as difficult to adjust to as the wide fluctuations in temperature—all tundra plants and animals must be able to withstand temperatures up to  $20^{\circ}\text{C}$ , an incredible range of close to  $80^{\circ}\text{C}$ .

Arctic waters far surpass the diversity and density of life on land because they provide a more sheltered and abundant habitat for the plants and animals that live there. Unlike the tundra, the ocean does not freeze solid in winter and Arctic marine life is insulated from subzero air temperatures by two metres of ice. An enormous ice pack permanently caps half the Arctic Ocean and most pack ice remains frozen from season to season. The ocean temperature is mild when compared to the air temperatures above, and hovers at  $0^{\circ}\text{C}$  throughout the year. This provides a stable environment for marine organisms.

While more sheltered than the Arctic terrestrial environment, the marine habitat is not stable—sea ice is restless. Constant movements unsettle the ice, continually creating open areas in the ocean. Winters are long, dark and cold. As ice closes in over the high Arctic, many marine mammals migrate south to the edge of the floe. Others find sanctuary in polynyas (pah-LYN-yahs), open areas of water surrounded by ice that recur in the same locations year after year. They vary in size and shape and may be caused by a variety of factors, including tidal current, wind, upwellings, or a combination of these forces. Millions of seabirds, fishes, and marine mammals flock to a few of these rich oases each spring.

Each spring—which in the Arctic may arrive as early as April or as late as July—some of the ice begins to melt and crack open, exposing water. A typical spring day, however, may include 30-kilometre per hour winds that scour ice fields and temperatures that drop well below freezing levels.

The change in seasons, from winter to spring and summer, brings about the birth of new icebergs, which are constantly calved from the rim of the pack ice, where its lip runs into the sea. This margin at the floe edge is where large chunks of landfast ice break away into the sea to become ice floes. Huge ten-storey icebergs similar to the one that sank the *Titanic* ocean liner are rare, but house-sized chunks of “bergy bits” are common. Automobile-sized bergs, known as “growlers”, are also frequently seen. The dimensions of these icebergs are deceiving as the portions that you see floating above

## **Marine Mammals**

### **Background Information**

the surface of the water are really only the “tip of the iceberg”—70 percent of an iceberg looms beneath the ocean’s surface. This makes them extremely hazardous to ships whose steel hulls are no match for their hard ice.

In the summer, the Arctic sea comes to life. The animal population swells in the warm, bright months of summer as millions of birds migrate north. The Arctic tern captures the avian long-distance migration title for its annual journey from the Antarctic to the Arctic. Small aquatic animals feast on phytoplankton (FYE-toh-plank-tun), the single-celled microscopic plants that float near the water’s surface and bloom under the thinning ice cover. These minute plants are so numerous that where warm-water and cold-water currents collide bringing nutrients to the surface, they colour the Arctic seas a deep shade of blue-green when they bloom. The phytoplankton provide the base for a food web that supports billions of krill and Arctic cod, which in turn support millions of dovekeys and other birds, and many thousands of marine mammals.

In autumn, the fringes of the ocean begin to freeze once more. Ice grows seaward from islands and the mainland for many kilometers, forming vast tracts of stationary, landfast ice. The fierce winds above and the ocean currents below constantly push about pack ice, the large area of floating ice at the edge of landfast ice sheets.

The plants and animals of the Arctic have adapted to survive, and thrive, in these severe conditions. Many Arctic fishes are well adapted to the continuously freezing ocean temperatures. Arctic cod carry anti-freeze like chemicals in their tissues. Most of these fine-tuned, cold-blooded fishes cannot tolerate a change of more than a few degrees in temperature.

Marine mammals, including seals, walruses and whales, conserve heat through adaptations including shapes that minimize surface area, small fins and extremities, and thick layers of blubber. Arctic animals are generally larger than their southern relatives as this reduces the amount of surface area from which to lose heat compared to their total mass. On the same principle, Arctic animals tend to have stubbier ears, noses, flippers, fins and tails which also reduces the exposed surface area that can radiate heat. Marine mammals also limit their heat losses by minimizing the flow of heat-bearing blood to their skins and their under-sized extremities—skin temperatures remain warm enough to prevent tissues from freezing, but low enough to stop substantial heat loss.

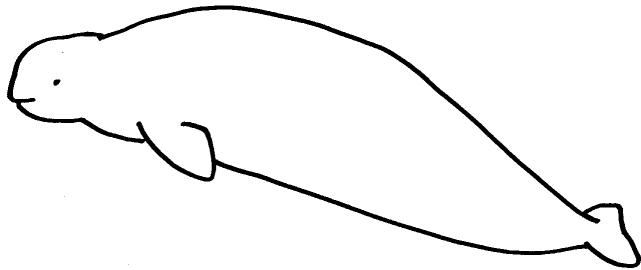
Many Arctic animals emulate the polar bear and have white-coloured fur, especially in winter. In the summer, or in more southern latitudes, the shafts of these animals’ hairs or feathers are filled with colour pigment. This pigment is lost in the winter, leaving the shafts filled with air, a great insulator. Their coats appear white simply because they lack any other colour.

## Marine Mammals Background Information

### ARCTIC MARINE MAMMALS

#### Beluga Whales

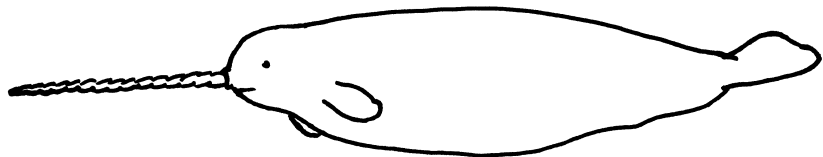
Old whalers called belugas “sea canaries” because of their diverse repertoire of squeaks, moos, clicks, trills and twitters—which can be heard above and below the water’s surface. They use these sounds to communicate with each other and to locate food and objects in the frequently dark waters where they live. These white whales are Canada’s most abundant whale. Although beluga means “white one” in Russian, belugas are grey when they are born and become paler as they grow older. Their mature white bodies blend well with the snow and floating ice in the Arctic, where most belugas live. Belugas do not have dorsal fins, but do have hard dorsal ridges which they use to crack open ice up to 7.5-centimetres thick. As much as 45 percent of their body weight is blubber, which helps them to keep warm in cold water. All this blubber, which can build up to 30-centimetres thick, does not make them fast swimmers. These pale whales can swim fast enough to catch Arctic cod and other fishes to eat, and also feed on a variety of bottom-dwelling animals, such as squids, other molluscs, worms and crustaceans. To feed on the bottom, they blow water out through their lips, uncovering a variety of sea-floor prey, and then vacuum the food into their mouths and crush it with their peg-like teeth. To assist them with this rummaging around on the ocean bottom, they have mobile necks, unlike killer whales, for example.



Polar bears, killer whales and humans prey upon belugas. Each summer these social animals congregate in the warm shallow bays and river mouths of the high Arctic. Adult belugas arrive fat and yellow and leave sleek and white. Scientists think they rub themselves against the sea bottom to remove their old skins. Warm water is believed to stimulate new skin growth. The shallows may also be important nursery areas, however, newborns are seen in both the shallows and offshore near the pack ice. Vancouver Aquarium Marine Science Centre staff have been studying the reproductive cycles of belugas, culminating in the birth of Qila (KEY-lah), the latest addition to the Aquarium’s beluga population. Whale researchers are also studying the effects human-generated noise has on these animals.

#### Narwhals

Narwhals are mottled whales similar in size and shape to their close relatives, the belugas. Male narwhals grow a single long, spiraling tooth, or tusk. They joust by crossing their tusks



## **Marine Mammals**

### **Background Information**

together, above and below the water's surface. Older males are often deeply scarred from these at-sea duels. The lengths of the males' tusks define their social status. Adult female narwhals are rarely visible. Narwhals live farther north than almost any other whale and are found only in Arctic waters. Their diet is mainly made up of Arctic cod, squids, octopuses and crustaceans. Hundreds of pods may join together for traveling, with thousands of animals spread over many square kilometres. A pod of narwhals may consist of a mixed group of animals, but usually there is segregation by age and sex. Females and calves form one group; juveniles and adult males form separate associations. These social mammals produce a cacophony of clicks, chain-saw buzzes, squawks, blares and whistles to communicate and to echolocate.

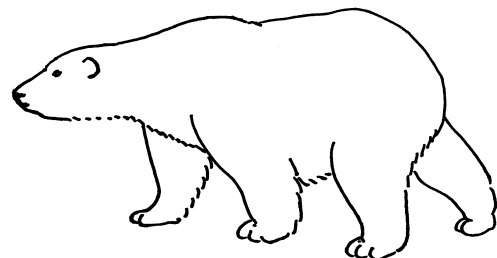
### **Bowhead Whales**

Bowhead whales, named after their backs which are said to resemble musicians' bows, are the only species of baleen whale that lives in the Arctic Ocean all year. Bowheads undertake short seasonal migrations hovering near the edge of solid pack ice, heading north in the summer and south in the winter. These enormous animals are well suited to this icy habitat. Their 90-tonne bodies are encased in thick 70-centimetre-wide walls of blubber. They lack dorsal fins and can use their backs to break open breathing holes in ice up to 30-centimetres thick. These white-chinned, bluish-skinned whales are believed to dive as deep as 200 metres, feeding mainly on krill located at or below the water's surface, and possibly on the sea floor. These whales can be very playful and have been seen tossing logs the size of telephone poles. Bowhead whales are endangered. Arctic populations once numbered more than 50,000 animals, but whalers severely depleted these stocks in the nineteenth century. There are now between 6,000 to 12,000 bowheads.

### **Polar Bears**

Like other Arctic animals, polar bears tend to be large. Males weigh between 450 and 500 kilograms and are up to 3.5 metres in length. They are very comfortable in the water. Remaining in the high Arctic all year, these sure-footed animals with non-slip paws hunt on the ice pack in the winter, waiting by breathing holes for their most frequent prey, ringed and bearded seals. Narwhal, beluga and walrus calves are also taken whenever possible. Polar bears have also attacked and killed humans. In summer, they are forced ashore and eat anything available: carcasses, seabirds, roots, grasses, berries and beach-kelp. These resourceful bears will even pull kelp to the surface through breathing holes, or dive in and retrieve it.

Polar bears are capable of great bursts of speed and are slow, but strong, swimmers. They perform a kind of a dog-paddle in which they use their front legs to propel themselves and their



## **Marine Mammals**

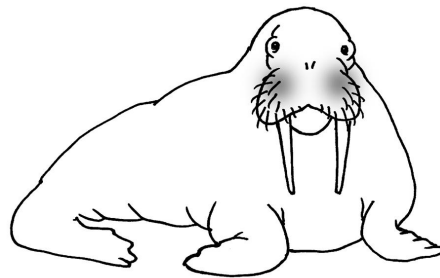
### **Background Information**

back legs as a rudder. Living up to their marine mammal designation, people have witnessed these animals swimming tens of kilometres from the mainland.

Polar bears are solitary except during the breeding season. They congregate in large groups on shore at locations, such as Churchill, Manitoba, while waiting for the sea to freeze and provide solid access to seals' breathing holes. Pregnant females build dens in late November. They usually give birth to two hairless cubs, each weighing less than 500 grams. In March, they move onto the ice where the young learn to hunt seals. Their black skins and dense, pale fur keep them warm even in the most severe conditions. An outer coat of long, guard hairs protects an undercoat of thick fur. These hairs stick together when they get wet, forming a waterproof barrier. Under the fur, a thick layer of blubber performs two roles—it insulates the bear against the cold and acts as a reserve larder to help the bear survive in hard times.

### **Walruses**

Walruses are enormous, tusked marine mammals—the males weigh almost two tonnes, or as much as 23 adult men! They are most easily recognized by their tusks, which grow up to one-metre-long. The females grow to 1200 kilograms and have shorter tusks. The tusks are enlarged canines, similar to those you see in a dog. Male walruses use their tusks in combat when fighting for mates and both sexes may use them to rake up the ocean floor in search of food. They also use their stiff whiskers to feel for the extended siphons of clams, their favourite food. They suck the clams, worms and snails they discover into their mouths. They also eat slow-moving fishes. Some "rogue" walruses are believed to feed on seals and small whales.



Walruses are very gregarious. During summer, enormous groups of walruses lie around on land, packed together in large, noisy groups. They live in shallow waters, rarely diving deeper than 75 metres for food. They stay near the seasonally fluctuating water's edge, moving back and forth as the ice melts or builds up.

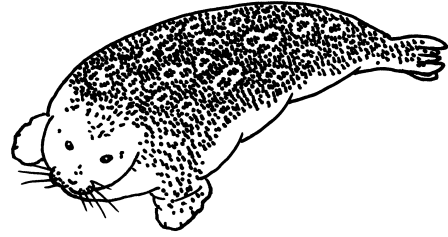
These huge animals are awkward out of the water—they walk by hoisting their bulky bodies off the ground and rotating their hindflippers beneath their bodies, but this is a laborious process.

## **Marine Mammals**

### **Background Information**

#### **Ringed Seals**

Ringed seals are the most common species of seal in the Arctic. These wary seals prefer to live on landfast ice, but can also be seen on ice floes. They are the only seals to give birth in dens, which the females excavate in the snow using their sturdy, sharp claws on their front flippers. These cryptic dens give the seals access to the sea, but are invisible to their main predators, polar bears and humans.



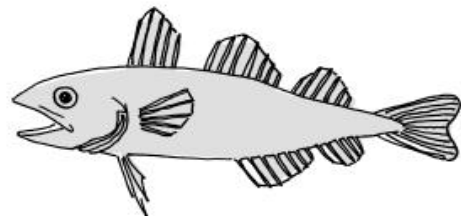
Ringed seal pups are born with thick, woolly, whitish fur. The fur of their succeeding coat is finer and slightly longer than those of the adults. They are dark grey above, merging to silver below which makes them difficult to see from both above and below in the water. They may have a few scattered dark spots on their undersides, but have few if any of the rings that the adult seals are named for.

Ringed seals pass much of their day cruising through frigid waters under the layers of jumbled ice that covers the majority of the Arctic. They are most vulnerable to predators when they surface for air, either at new openings in the icy crust or their previous breathing holes.

During their ocean dives, these seals use their sensitive whiskers to feel around for food in the dark icy waters. Ringed seals eat Arctic cod, other fishes and shrimp like crustaceans. Like most seals, they grip onto their slippery food with their small pointed incisors and swallow it whole without chewing.

#### **Arctic Cod**

Arctic cod play a key role in the food chain of the Arctic region. They are the main food source of seals, narwhals, belugas, and other marine mammals, fishes and seabirds, such as murre. Arctic cod, in turn, feed heavily on other species of fish and invertebrates—they are the main consumers of plankton in the Arctic seas.



In the North, there are fewer species of plants and animals than in more temperate climates, so the loss of one species could seriously disrupt the food web. This is particularly true of the Arctic cod.

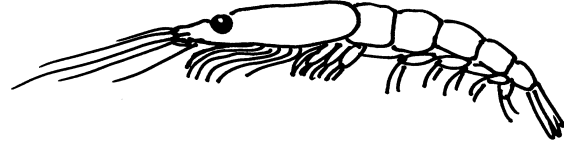
These important fish are easy to recognize. Arctic cod have three dorsal fins, two anal fins and a tiny, single barbel that dangles from their chins. They prefer to live in extremely cold waters and are often found near ice floes, or in the layer of water just below the sea ice. They also inhabit deep waters greater than 900 metres below surface. Arctic cod have anti-freeze proteins

## Marine Mammals Background Information

in their blood that prevent them from freezing into a solid mass. Their proteins bind to ice crystals which halts the growth of the ice in their bodies.

### Krill

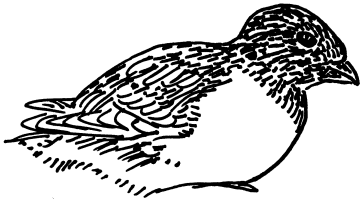
Krill are shrimplike creatures the length of a paper clip. They filter other species of plankton, plants and animals that drift with the current at the ocean's surface with their feathery feeding



apparatus. They graze, like tiny cows, on dense mats of algae that grow on the undersides of ice that is thin enough to allow light to penetrate through it. These numerous little animals are the basis of the marine Arctic food web, providing a vital food resource for whales, seals, fishes and seabirds. Huge concentrations of krill can turn the ocean red in the daylight, and at night, if it is dark, their luminescent organs shimmer.

### Dovekies

Millions of smallish black-and-white dovekies (DOVE-keys) live in the Arctic. They spend much of their time at sea in cold waters close to the edges of pack ice, and can be seen resting on ice edges. Even when they move farther south in the winter months, they search out colder waters and avoid warm ocean currents. Dovekies can remain north of the Arctic Circle in winters if water close to the pack ice remains open.



While at sea, dovekies feed on swarms of tiny crustaceans that occur near the surface, including krill. To forage, they use both their wings and feet to dive and swim underwater. They come ashore to build well-hidden nests on the crevices of cliffs or among rocks. The females lay pale blue-green eggs in these nests, constructed of thin layers of pebbles, filled in with scattered bits of grass and lichens.