

Marine Mammals of the Salish Sea

Compiled by Albert Shepard

Introduction

This chapter will provide an introduction to marine mammals found in the inland marine waters of Washington State and British Columbia, also known as the Salish Sea. Although seals, sea lions, and sea otters are worthy examples of marine mammals, you will notice that information - especially in sections III and IV - is oriented primarily towards whales, dolphins, and porpoises - the cetaceans.

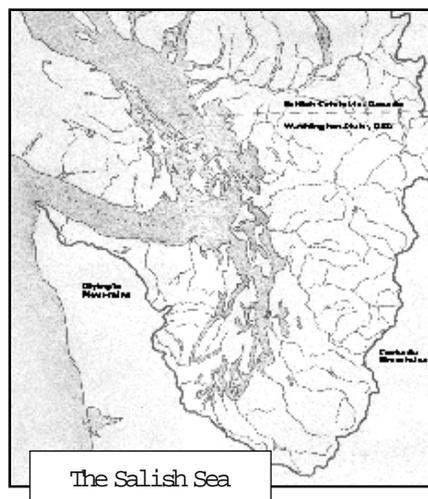
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I. The Salish Sea

Welcome to the Salish Sea, a large inland sea that reaches from the Pacific Ocean into the North American continent, named in honor of the peoples who first inhabited the region. A glacial ice sheet that covered the area approximately 14,000 years ago during the Vashon glacial period formed this bioregion. The retreating ice sheet created a trough, or a lowland basin, which is about 10,000 square miles in size and is bordered by mountains.

Twice daily, tidal fluctuations averaging about eight feet - and ranging up to 15 - produce strong currents that push cold, nutrient-rich salt waters from the northeastern Pacific Ocean into this area through the straits of Juan de Fuca. Incoming currents sweep the tidal waters over submerged ridges where it surges upwards with massive force. This upwelling movement allows the water to mix with oxygen at the surface, resulting in an extremely potent mix for the production of life. The additional influx of sediment-rich fresh water flowing from surrounding highlands and shallow protected estuaries, seasonal periods of extended light during the summer months, and a generally temperate climate support the existence of a large and diversified ecology. This broad web of life includes the pinnipeds and cetaceans - the marine mammals - which have found their niche in the fertile waters of the Salish Sea.



A. Shepard

II. What is a Mammal?

There are four common characteristics shared by all terrestrial and marine mammals:

1. Mammals have **warm blood** and a special four-chambered heart to circulate the blood throughout their bodies. An adult gray whale reportedly has a heart the size of a washing machine!
2. Mammals **breathe air** and do so with amazing efficiency. Ninety- to ninety-five percent of a whale's life is spent beneath the ocean surface, so those few seconds at the surface are critical for replenishing oxygen.
3. Mammals **give birth to live young and nurse them with milk**. Whale calves are born looking very similar in shape to an adult whale. Immediately after birth, a calf has to surface, breathe, and begin swimming. It is a very different scenario from human babies who require months before they develop the proper physical dimensions enabling them to balance on two feet. As with humans, the marine mammal mother/calf relationship is extremely strong, but has the added challenge of nursing in a gravity-free environment.
4. Mammals **have hair** – some more, some less. Seals, sea lions, and otters have hair covering their bodies. Believe it or not, whales have hair at some point in their development. Gray whales and humpbacks have hairs on the tip of their rostrum, or nose.

III. Development of the Whale

Whether whales are part of the long process of change known as evolution or the result of some unknown phenomena, cetaceans have held our curiosity, fear, and appreciation throughout human history. Highly suited for their aquatic life, marine mammals are found in every ocean and in five major rivers around the world. Although originally thought to be fish, whales are indeed mammals. Oddly enough, enveloped in the front flippers of every marine mammal is the assembly of bones necessary to walk. Perhaps the discovery of this common anatomical feature prompted a search into the mysterious history of the whales and their connection to land.

Modifications over the Millenniums: Evolution of the Whale

Evolution incorporates the idea of change and adaptation over some period of time. If you think about it, everything that lives, evolves. The earth has evolved in shape, geographical condition, and physical composition through natural events such as shifts in the earth's crust and climatic change. As for ourselves, we evolve from children into adults throughout our lifetime and our own long-term history possibly takes us back to ape-like ancestors. Evidence to support the theory of cetacean evolution is fueled by fossil records. Fossils are impressions or remnants left in sediment that have been deposited over time. Scientists have attempted to put together a logical timeline of whales based on the location of fossils in geographic strata and the incremental changes apparent in the skeletal structure.

Cetaceans have a particularly interesting 55 million-year old history that began with predatory land mammals known as *Mesonychids*. These animals probably filled the same niche as modern river otters, seals, or sea lions. They had hoof-like claws and were possibly related to animals that developed into *ungulates* - cows and deer. The story became interesting when these wolf-like critters began spending more and more time in the marine environment. Was it due to a lack of food on land, or was it an effort to avoid becoming a meal? In any case, the fittest survived by entering the marine habitat and the result was an evolutionary path that took cetaceans from the land into the sea.

The first cetacean-like ancestor appeared 45-million years ago and its fossil remains reconstruct an animal known as *Protocetus*: *Proto* meaning "first" and *Cetus* meaning "whale." Notable features of this animal include the presence of hind flippers, a forward positioned blow hole, and a wide tail without a flattened fluke section. The bones of 25-40 million year old whales known as *Archaeoceti*, meaning "old whale," have been unearthed in the United States, Egypt, Antarctica, and Pakistan in sediments that were once ocean floors. This group of whales made the final departure from land back into the sea and, through evolution, into baleen and toothed whales. More recent ancestral examples from approximately 25-15 million years ago include: *Squalodon*, ancestor of the *Odontoceti*, or toothed whales; *Auleophyster*, ancestor of the sperm whale, which some scientists proposed were genetically similar to baleen whales, even though they possessed teeth; and *Cetotheriidae*, ancestor of the *Mysticeti*, or baleen whales. Fossil remains of "modern" whales have been dated at approximately 5 million years old. Debate over what drove this phenomenal change from land to sea still persists - was it an environmental demand that began shaping whales into more familiar forms or was it something that remains unanswered?

Creation of the Whale

Various cultures, religions, and individuals also accept a different story for explaining the existence of whales. In most stories, some form of a supernatural entity - such as a god, goddess or god-like being - is responsible for creating the creature that we know as the whale. Historical evidence of these stories can be found in the written and graphic materials of the various sources. Below is a sample of a creation story of the Tlingit people.

The Origin of Killer Whales *Originally recorded by John R. Swantan*

There was once a shaman named Natsilane, who constantly quarreled with his wife. Her brothers became ashamed of Natsilane's discord, but they stayed to protect their sister. Finally, the brothers had enough and took Natsilane to an island far out to sea and left him.

There, all alone, he began to carve killer whale forms out of cottonwood bark. He put two of the carved whales into the water and began to shout incantations. He thought they looked as if they were swimming, but when they came up, they were only bark. He then made two more whales out of alder. As he put them in the water, he whistled four times, "Whu, whu, whu, whuuu," but they too floated up. He tried other kinds of wood, hemlock and red cedar. He took each set of carvings to the beach and tried to make them swim out, but each time, they floated up to the surface.

In a last attempt, he tried yellow cedar. When he tossed the carvings into the water, they swam away in the form of whales. They swam far out to sea and when they returned, they changed back into wood. He then carved holes in each of their dorsal fins and holding onto them, he took them out to sea. The next time he saw his brothers-in-law in their canoes, he put his whale spirits into the water. The whales smashed the canoes and killed the brothers. Natasilanee then told the killer whales, "You are not to harm humans again. You must be kind to them from now on." They then became the canoes of spirits and dwelt in the Inland Sea.

IV. Adapting to the Sea: Life as a Whale



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While sharing some important common features, cetaceans also have striking differences from their land counterparts. Life in a dense, aquatic environment requires special adaptations to exist successfully. Special features allow whales to swim efficiently, keep warm, breathe, eat, and reproduce.

Bodyform

Whales have a unique teardrop shape that allows them to move easily through the water. Their streamlined, or fusiform, bodies have a smooth rubber-like skin. Appendages and genitalia that would otherwise cause drag or resistance in the water are encapsulated within the body contour. The head is bulbous and elongated with the nasal passages on top of the head; external ears are small or nonexistent. Cetacean spinal vertebra interlock and the neck or cervical section is short - in some species actually fused - providing structural support during powerful swimming maneuvers. The forelimbs are finlike flippers and the hindlimbs are completely absent. The end of the tail, or flukes, has a broad, flattened area for underwater propulsion. Most cetaceans have a dorsal fin for stability similar to the tail fin on an airplane.

Keeping Warm

Mammals have hair and fat to insulate their bodies and guard against the loss of heat. Water can draw heat away from the body up to 25 times faster than air, so it is critical for marine mammals to maintain their core body temperature. Marine mammals, such as seals, sea lions, and sea otters,

have a coat of hair or fur that helps keep them warm. They will also haul themselves completely out of the water to warm up. Cetaceans rely on a thick layer of blubber to minimize heat loss since the few hairs that cetaceans sprout have little effect on insulation.

Besides blubber, cetaceans maintain heat with a specially adapted circulatory system. Their blood retains more oxygen than land mammals, which means they lose less heat when breathing. During deep dives, their system can limit blood flow to cooler extremities such as flippers to ensure that vital core organs receive ample supplies of blood. Whales also possess an intricate layout of paralleling veins and arteries that circulate warm blood next to cooler blood creating a heat exchange in the countercurrent process.

Some whales, such as the gray whale, migrate to warmer waters to give birth to their young. Mothers feed their new calves fat-rich milk, which they transform into blubber for insulation and fuel before the long trip to feeding grounds located in the northern ocean regions.

Breathing

Mammals are dependent on breathing to replenish oxygen in their bodies. Cetaceans breathe through "blow holes" located on the top of their heads. Air passes directly to the lungs by way of nasal passages that are exposed when the whale surfaces to breathe. Baleen whales have two nostril openings while toothed whales only have one. In comparison to humans who can only dive, at the most, for only a few minutes, cetaceans such as the sperm whale, can remain underwater for up to 90 minutes.

Senses

Smell: It is doubtful if cetaceans have the capability to smell, which is critical for land mammals that rely on sensitive olfactory senses to detect predators or prey.

Taste: It is known that cetaceans have a sense of taste although there are many varying theories to explain how they use taste in their aquatic environment.

Touch: Physical contact is commonly observed amongst whales and implies that they have a developed sense of touch. Northern resident orcas have been observed rubbing themselves on rock beaches and other orcas have been observed playing a tactile game with kelp stalks.

Sight: Most cetaceans have functionally good eyesight although the placement of the eyes on the side of the head probably does not allow them to have stereoscopic vision as we do. The dark emerald green waters of the Salish Sea limit the use of sight to the shallower depths.

Hearing: Cetacean sense of hearing is exceptional and they use sound frequently in the dense submarine environment.

Communication and Echolocation

Seawater is eight hundred times denser than air and transmits sound more efficiently as a medium. Sound travels almost 5.5 times further in water than in air and cetaceans use their watery world to produce a variety of vocalizations, clicks, whistles, and calls. The resident populations of orcas in this region have developed their own unique dialect, or form of language. Toothed whales echolocate by producing a series of clicks that are emitted at various frequencies. These sound pulses are emitted through the whale's melon-shaped forehead, reflect off objects, and are retrieved through their lower jaw which has a foam-like construction. Whales "read" the reflected sound similar to the way we read reflected light with our eyes. Baleen whales use low frequencies to communicate, sometimes over long distances.

Marine mammals utilize a wide variety of physical behaviors to communicate. They use subtle or dynamic displays to signal others, herd prey, issue a warning, or to help dislodge parasites. Examples of these behaviors include tail lobbing, pectoral fin slaps, and breaching.

Feeding and Finding Fresh Water

Using vision and acoustic senses, cetaceans hunt down and consume their prey with teeth or baleen plates. Hunting autonomously or cooperatively, whales need to eat considerable volumes of food to replenish fat reserves and retain energy. Scientists estimate that an individual orca in the Salish Sea eats between 200-300 lbs. of salmon per day. The southern resident community of almost 100 individuals is capable of consuming approximately 20,000 lbs. of salmon per day! Local baleen whales strain through thousands of gallons of water each day to attain their diet. One scientist has estimated that a full-grown gray whale needs to eat the equivalent mass of two African elephants every day!

Whales get water from a variety of sources. Eating fish that have already filtered saltwater is a common source of fresh water for marine mammals. Extremely efficient livers and kidneys process salt water that is consumed by the animals. Salts are extracted and excreted in highly concentrated urine. Water can also be extracted from fats and fat-rich milk. Slow respiration rates limit water loss and lack of perspiration also helps retain liquids.

Reproduction

Marine mammals encounter distinct challenges when mating, birthing, and rearing their young. Some marine mammals, such as gray whales, have gestation periods that coincide with their migratory path to warmer waters. After feeding in rich Alaskan waters during the summer, gray whales return to lagoons along the coast of Baja California, Mexico, for birthing.

Some marine mammals even delay fertilization so that birthing coincides with proper birthing locations. After birth, Calves are fed a rich mixture of fatty milk to ensure rapid growth in preparation for the demands of life in the ocean.

V. Common Marine Mammals of the Salish Sea: Classification & Species Accounts

Classification of Salish Sea Marine Mammals

Just like our school system separates kids by age, scientists have devised a classification system, based on biological differences, to divide marine mammals into different classes.

There are approximately 4,000 to 5,000 species or types of mammals which comprise only nine percent of the total number of vertebrates - animals with backbones. One of the largest groupings of this classification system is called an order. There are two orders of marine mammals that live in the Salish Sea; the Cetacea (whales and dolphins) and the Carnivora (seals and sea lions).

The classification system works from general to specific characteristics for the purpose of organizing the members of the chart. Cetaceans, for example, have been classified into two suborders based on how they feed: The strainers - baleen or Mysticeti (such as the gray whale or minke); and the biters - toothed or Odontoceti (such as orcas or Dall's porpoises). The chart funnels down to unique features of the individual type, known as species. There are at least seventy-nine species, or specific types of cetaceans. Eleven of these species are baleen whales that sift and strain their food. The other sixty-eight cetacean species like to bite and gulp their food, as do all of the seals and sea lions.

Below are some of the commonly observed cetaceans, seals and sea lions of the Salish Sea. Sightings of less common, rare, and "accidental" marine mammals also occur and The Whale Museum's Whale Hotline has recorded some unusual observations over the years.

Order Cetacea

Suborder Mysticeti (Baleen Whales)

Family Balaenopteridae

Balaenoptera acutorostrata (minke whale)

Balaenoptera novaeangliae (humpback whale)

Family Eschrichtiidae

Eschrichtiidae robustus (gray whale)

Suborder Odontoceti (Toothed Whales)

Family Phocoenidae

Phocoenoides dalli (Dall's porpoise)

Phocoena phocoena (harbor porpoise)

Family Delphinidae

Orcinus orca (orca, killer whale)

Lagenorhynchus obliquidens (Pacific white-sided dolphin)

Order Carnivora

Family Otariidae (Eared Seals)

Eumetopias jubatus (Steller sea lion)

Zalophus californianus (California sea lion)

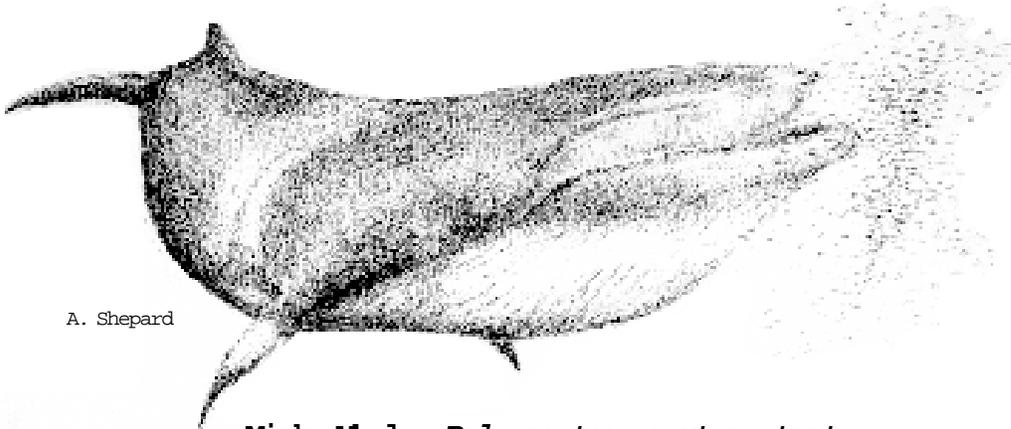
Family Phocidae (Earless Seals)

Phoca vitulina (harbor seal)

Mirunga angustirostris (northern elephant seal)

Salish Sea Species Accounts

Cetaceans / Mysticeti



A. Shepard

Minke Whale, *Balaenoptera acutorostrata*

Max. Length: 30 feet (8-10 feet at birth)

Max. Weight: ~ 10 tons

Identification:

- medium-sized dark gray or brownish-colored whale with white bands on pectoral fins, swaths of lighter pigmentation on sides, and small crescent-shaped dorsal fin
- commonly observed to be solitary, or occasionally seen in small groups in the Salish Sea
- generally observed in slow-paced (one knot) surfacing behavior with subtle blows; often exposing the top of its head
- although sexes cannot be distinguished by sight, individuals can be recognized by the shape of the dorsal fin, the distribution of small scars, and the unique swath pattern on the side

Natural History Notes:

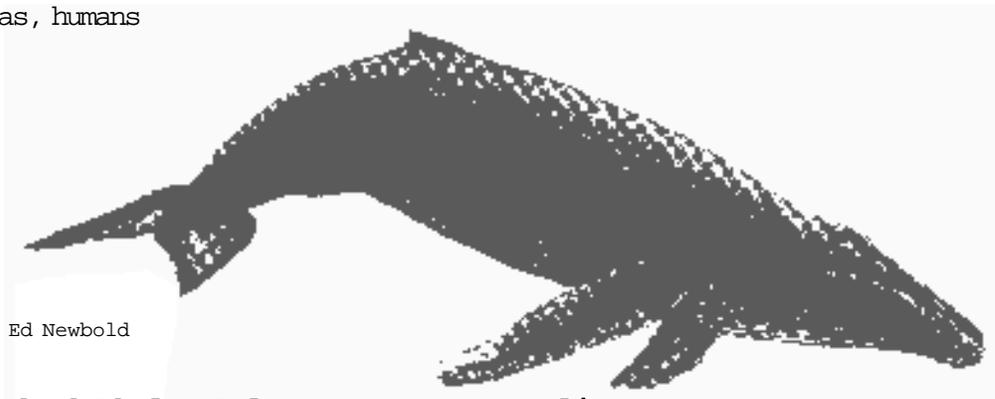
Minke whales are smallest of the *roqual* whales – whales with throat grooves. Population estimates make minke whales the most numerous of the baleen whales on earth. By the 1980s, the minke became the most heavily hunted whale in the world. The Salish Sea has an established population of minke whales, which are protected by the Marine Mammal Protection Act of 1972. Minke whales tend to use the same feeding ground locations in the San Juan Islands, with observations peaking between July and September. Their winter range is unknown, but individuals return to the islands annually.

Diet:

Locally, minke whales have been observed using one of two methods to find prey. Some minke whales feed by driving small schooling fish to the surface and then engulf their meal by thrusting upward, sometimes lunging partially above the surface in a spectacular display. The other preferred method takes advantage of fish that have been congregated into a large ball near the surface by other predators such as birds or larger fish. Minke whales have been observed surfacing amidst the feeding frenzies, scattering screaming gulls as they suck in their prey.

Predators:

orcas, humans



Humpback Whale, *Balaenoptera novaeangliae*

Max. Length: up to 55 feet (~ 15 feet at birth)

Max. Weight: up to 40 tons

Identification:

- large-sized black or slate gray-colored whale with long pectoral fins that reach 25 percent of the entire body length; flexible pectoral fins have scalloped or knobby leading edge
- dorsal fins appear almost mutated and range in form from sickle to triangular shape; dorsal ridge behind fin has knuckle-like bumps
- irregular patterns of knobs – hair follicles – on the head and jaw; body parasites such as barnacles and lice create patterns or scarring on the skin

- also a *roqual* whale, humpbacks will sometimes expose their pleated throat grooves
- obviously audible and visible blows; often display percussive behaviors at the surface
- often will surface numerous times, then dive deep, raising the tail out of the water

Natural History Notes:

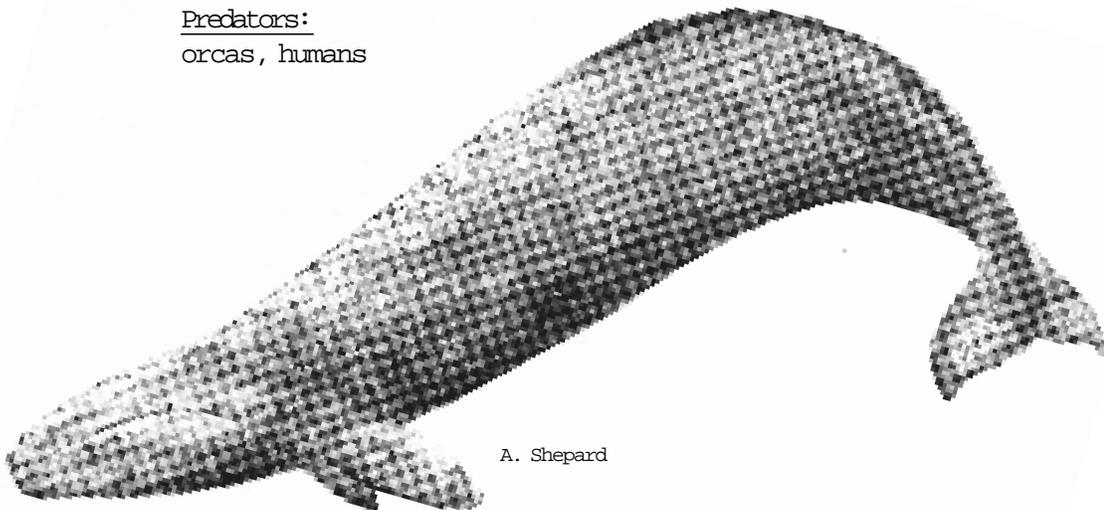
Humpbacks are considered to be occasional visitors to the Salish Sea. Extensively studied and individually identified, their eastern-north Pacific migratory route takes them from their summer feeding grounds along the west coast of the U.S. and Canada to their winter birthing grounds along the west coast of Mexico and Hawaii. Male humpbacks are known for creating songs that can last for 25 minutes and evolve new lyrical elements over time. Humpbacks have a complex social structure including a wide spectrum of behaviors that range from blood-drawing fights between males during mating season to cooperative feeding between the animals during the summer season.

Diet:

Humpbacks use a variety of feeding techniques including setting a cylindrical bubble net to concentrate prey such as krill, a favorite food. The whale then surges upward through the column of krill expanding its huge throat pouch before straining out unwanted water.

Predators:

orcas, humans



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Gray Whale, *Eschrichtiidae robustus*

Max. Length: up to 40 feet (16 feet at birth)

Max. Weight: up to 30 tons

Identification:

- large-sized mottled gray-colored whale with patterned skin due to pigmentation, mottling, scarring, and barnacles

- no dorsal fin; instead have a pronounced “knuckled” dorsal ridge on their tail stock
- generally observed in slow paced (approx. 12 knot max.) surfacing behavior with brushy obvious blows
- generally seen in shallow areas and within 20 miles of shore

Natural History Notes:

Gray whales may migrate over 9,000 miles during a 12-month period, further than any other species of whale. Their route takes them from the polar waters of Alaska to the warm waters near the peninsula of Baja California, Mexico. Migration allows gray whales to sample the best of two worlds; the seasonal abundance of food found in colder regions, and the nurturing climate for giving birth and rearing young in warmer lagoons.



One of the less fortunate residents of the Salish Sea gray whale population. Found on Orcas Island, July 1995

The predictable near-shore migration route has brought the gray whale both tragedy and salvation. Their migratory route, which is usually within 20 miles of the shore, made them a prime target for harvesting. Whale hunters pushed the population to the brink of extinction twice in less than 150 years. Protected by strict laws, gray whales have recovered to a current population of nearly 23,000 individuals. A growing number of gray whales are beginning to “summer-over” in the Salish Sea, spending three to four months foraging in the rich sediments. It is interesting to note that the close proximity to land that initially put gray whales at risk has also given whale biologists and observers the chance to study these great creatures up close.

Diet:

During their five-month feast in the cold, nutrient-rich northern seas, the whales must restore their blubber layers and body weight. They have adapted a unique feeding strategy that minimizes competition with other whale species. Rummaging sideways through bottom sediments, the gray whale retracts its 2,500 pound tongue creating a suction capable of inhaling 67 tons of invertebrates over the five month period. They may sift through 100 acres, straining through 150 tons of bottom sediment before heading south for the fall.

Although this feeding behavior leaves the coastal shallows pitted with depressions, it actually benefits the marine habitat. Nutrients stirred up

from the bottom stimulate plankton growth, a fundamental ingredient in the food chain. Amphipods, one of the primary food resources for gray whales, also benefit from the bottom feeding strategy. Amphipods live on the ocean floor and their habitats can be smothered by siltation of incoming sediments. Gray whales redistribute marine nutrients and recolonize the sea floor with juvenile amphipods that pass through their baleen plates during expulsion of unwanted water and sediment.

Predators:

orcas, humans

Cetaceans / Odontoceti



A. Shepard

Dall's Porpoise, *Phocoenoides dalli*

Max. Length: up to 6.5 feet (3-4 feet at birth)

Max. Weight: up to 420 lbs.

Identification:

- black with prominent white on flanks, belly, and tips of dorsal and tail
- small triangular dorsal fin with gray shading on top edge
- caudal peduncle, or tail stock, has a pronounced "kink" - appears to be broken
- commonly observed riding boat bow waves, splitting the surface with a characteristic "rooster tail" splash
- sometimes incorrectly referred to as "baby orcas"

Natural History Notes:

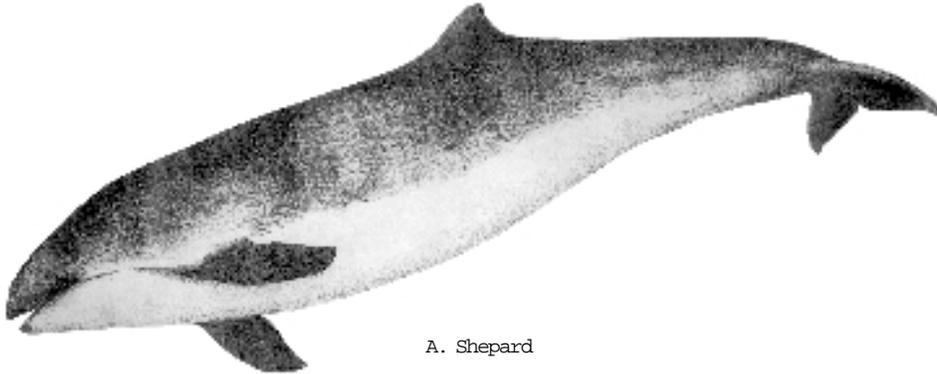
Dall's porpoises are observed in the Salish Sea year-round and appear to have a large established population. Researchers have photo-identified individuals, but with some difficulty as the markings are subtle and hard to capture on film. Dall's porpoises can sprint up to 30 knots and are considered to be the fastest of the smaller cetaceans.

Diet:

schooling fish, such as herring and squid

Predators:

orcas, humans and occasionally sharks



A. Shepard

Harbor Porpoise, *Phocoena phocoena*

Max. Length: up to 6 feet (3 feet at birth)

Max. Weight: up to 300 lbs.

Identification:

- small-sized porpoise with grayish-brown top, and off-white flanks that gradate to white on the belly
- small triangular dorsal fin with longer leading edge than trailing edge
- sluggish swimmer that is usually seen in groups numbering less than ten individuals
- reclusive animal that retreats from vessel traffic and never bow rides like the Dall's porpoise

Natural History Notes:

The harbor porpoise population, estimated to be around 22,000, has a wide distribution throughout Oregon and Washington. The Salish Sea has approximately 2,600 individuals. Most of the population seems to prefer areas north of Puget Sound proper. Harbor porpoises are most frequently seen in waters shallower than 300 feet deep. Occasionally they venture into bays, mouths of large rivers, and have even been seen up freshwater streams. During their expedition from 1804-06, Lewis and Clark recorded sightings of harbor porpoises in the mouth of the Columbia River. Population trends show that the overall number of harbor porpoises is declining due to a number of factors including water contamination, entanglement, and concentrated human activity.

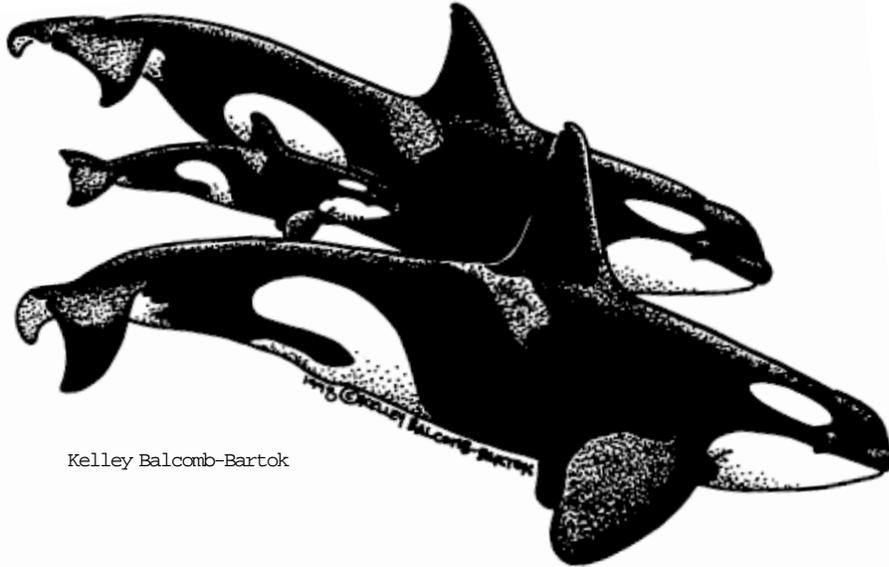
Harbor porpoises live between fifteen to twenty years - relatively short in comparison to other whales. Sexual maturity occurs at about four years and females give birth after a gestation period of approximately eleven months.

Diet:

pacific herring, market squid and smelts

Predators:

orcas, humans



Kelley Balcomb-Bartok

Orca, or Killer Whale, *Orcinus orca*

Max. Length: males - up to 30 feet; females - up to 26 feet (8 feet at birth)

Max. Weight: males - up to 8 tons; females - up to 5 tons

Identification:

- most commonly seen during late spring through early fall in this area
- black on upper body with distinctive white or gray "saddle patch" marking behind dorsal fin, white oval eye patch, white undersides with elliptical patterning that extends from the lower jaw to flukes and onto flanks
- adult females have a 3- to 4-foot crescent shaped dorsal fin; adult males have up to a 5-foot tall, triangular dorsal fin with the height being more than the width of the base
- resident population is seen in groups called pods, traveling, foraging, playing, or in sleep-rest behavior; transient orcas are less commonly seen in the marine waters of Washington State
- much larger in size than Dall's porpoises and harbor porpoises

Natural History Notes:

Largest of the dolphin family, orcas inhabit every ocean on this planet. The marine inland waters of British Columbia and Washington State have approximately 300 orcas that are organized into about thirty pods or social groups. The pods vary in size from five to fifty animals, with the average pod having between five and twenty animals. Scientists use an alphanumeric system to distinguish between pods and identify individual animals.

Three distinct communities of orcas have been observed in the Salish Sea since the early 1970s. Each community has its own dialect, or unique vocalizations. The southern resident community is comprised of J-, K-, and L-pods, currently totaling 89 individuals. Their 200-mile range extends from Olympia, Washington, to Campbell River, British Columbia. Summer sightings are concentrated in an area extending from the Straits of Juan de Fuca to the San Juan Islands and Gulf Islands. They have also been sighted along the outer coastal areas of Washington State and Vancouver

Island. The northern resident community consists of 16 pods totaling approximately 225 animals. Population surveys are more difficult to obtain for the northern pods as the range extends from Campbell River, British Columbia, up to Alaskan waters. The third community is comprised of 15 smaller pods known as transients. These groups have a less defined range and observers have recorded sightings from Alaska to Oregon. In recent years researchers have identified another group known as the "off-shores." Very little is known about this population, although observations of the same individuals have been made from Canada to California.

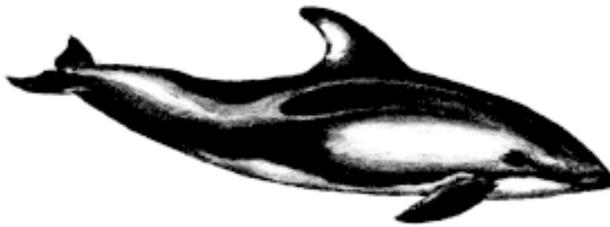
Orca pods have a complex social structure. Resident pods may travel together for days or weeks, but there has never been a recorded incident of an individual changing pods. The pod is divided into maternally centered subgroups consisting of mothers, calves, and siblings. These maternal subgroups have a strong social bond and individuals remain with their maternal elders for life. Through their long-term study of the northern and southern resident, Canadian and American researchers have compiled one of the most extensive studies of any wild animal population in the world.

Diet:

resident pods eat salmon; transients eat fish and other marine mammals

Predators:

none



Ed Newbold

Pacific white-sided dolphin, *Lagenorhynchus obliquidens*

Max. Length: up to 8 feet (3 feet at birth)

Max. Weight: up to 330 lbs.

Identification:

- less commonly seen than other Odontoceti
- grayish-black on upper body, white belly and grayish sides with pale "suspenders" stripes
- crescent shaped dorsal fin with prominent pale area on trailing edge
- commonly observed riding boat bow waves, leaping in acrobatic behavior
- larger body and more exposure when surfacing than Dall's and harbor porpoises

Natural History Notes:

White-sided dolphins are mostly seen west of the San Juan Islands toward the Strait of Juan de Fuca. Most sightings occur during the summer months.

During the fall, Pacific white-sided dolphins are seen in smaller groups consisting of five to fifteen individuals. The population ranges from the Gulf of Alaska in the summer to Baja California, Mexico, during the winter.

Most sightings in this area occur during summer and fall, which appears to be their calving and breeding season. Sexual maturity is estimated at six to ten years of age and calves are born after a twelve-month gestation period.

Diet:

Small fish, squid

Predators:

unknown

Carnovoria / Otariidae



Ed Newbold

Steller Sea Lion, Eumetopias jubatus

Max. Length: males - up to 10 ft. / females - up to 7 ft. (28-36 in. at birth)

Max. Weight: males - up to 2200 lb. / females - up to 600 lb. (35-50 lb. at birth)

Identification:

- light to golden brown coloration
- external, rolled flap over ears
- long flippers, with fur on top half
- nails located mid-flipper
- walks on all four flippers when on land
- deep roar like a lion when vocalizing

Natural History Notes:

Most Steller sea lions are observed north of Washington State. No breeding colonies have been found in local waters. They are most often seen in the Salish Sea in the spring, resting on remote beaches and offshore rocks. Male Stellar sea lions have a bear-like appearance in comparison to other locally seen seals and sea lions.

Diet:

squid and wide variety of fish

Predators:

transient orcas, humans



A. Shepard

California Sea Lion, *Zalophus californianus*

Max. Length: males - up to 10 ft. / females - up to 5 ft.

Max. Weight: males - up to 600 lb. / females - up to 110 lb.

Identification:

- external, rolled flap over ears
- long flippers, with fur on top half
- nails located mid-flipper
- walks on all four flippers when on land
- deep bark
- dog-like snout

Natural History Notes:

California sea lions are commonly used as performers in zoos and marine parks. At about five years of age, males develop a large bump on their forehead called a sagittal crest. Groups often rest at the surface with their flippers exposed above the water surface.

Diet:

fish, squid and octopus

Predators:

transient orcas, humans



Ed Newbold

Pacific Harbor Seal, *Phoca vitulina*

Max. Length: males - 8 ft. / females - 6 ft. (25-35 in. in birth)

Max. Weight: males - 800 lb. / females - 250 lb. (13-15 lb. at birth)

Identification:

- coat varies from white to black with spots
- obvious hole at ear opening, no flap
- short flippers, covered with fur
- nails located at end of flippers
- drags rear flippers behind body when moving on land
- pups make "maah" call; adults do not vocalize

Natural History Notes:

Pacific harbor seals are the most commonly seen marine mammal in the Salish Sea. Pups are born in early July around the San Juan Islands. They remain with their mothers through the nursing period (three to six weeks) and are weaned when they reach 50 - 60 pounds. Harbor seals are the only local seal or sea lion with spots.

Food:

variety of fish, squid and lamprey

Predators:

transient orcas, humans



Ed Newbold

Northern Elephant Seal, *Mirunga angustirostris*

Max. Length: males - 20 ft. / females - 10 ft. (60-72 in. at birth)

Max. Weight: males - 8000 lb. Females - 2000 lb. (70-100 lb. at birth)

Identification:

- Brownish-gray coloration
- slight hole at ear opening
- short flippers, covered with fur
- nails located at end of flippers
- drags rear flippers behind body when moving on land
- guttural growl or belch when vocalizing

Natural History Notes:

Northern elephant seals have been observed in increasing numbers in the Salish Sea in recent years. Young animals weighing 200-300 pounds are occasionally found hauled out on local beaches (usually in spring and fall). Adult males have large protruding elephantine snouts. They are the only pinniped in this area to undergo an annual molt that involves the sloughing of the outer layer of skin and fur.

Food:

squid and a variety of fish such as sharks, rays and ratfish

Predators:

transient orcas, humans

VI. Resources / Additional Reading

Any of the material in this section could be expanded into a book, so consider this a sampling to encourage further studies in the topic areas. Ultimately, the author's objective is to provide the instructor with a brief introduction, stimulate class curiosity, and then hand the "controls" over to the students.

Remember: There is still a lot more *unknown* about whales than *is known*. Expect student questions that you cannot answer. Some of the brightest, most inquiring minds that pioneered studies of marine mammals are still alive and living on this island – *use them!*

Curriculums

Hoelzel, A. Russ et. al. Gentle Giants of the Sea. Friday Harbor, WA : The Whale Museum, 1991..

Kolb, James. The Year of the Gray Whale. Poulsbo, WA : Marine Science Center, 1996.

Books, Brochures and Publications

Ford John K.B. et. al. Killer Whales: The Natural History and Genealogy of Orcinus orca in British Columbia and Washington State. Seattle, WA: University of Washington Press, 1997.

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Heyning, John E. Masters of the Ocean Realm: Whales, Dolphins, and Porpoises. Seattle, WA: University of Washington Press, 1995.

King, Judith E. Seals of the World. Ithaca, NY: Cornell University Press, 1991.

Leatherwood, Stephen et. al. Whales, Dolphins, and Porpoises of the Eastern North Pacific and Adjacent Arctic Waters. New York, NY: Dover Publications, 1988.

Osborne, Richard, et. al. A Guide to Marine Mammals of Puget Sound. Anacortes, WA: Island Publishers, 1988.

Osmek, S, et. al. Assessment of the Status of Harbor Porpoise, (Phocoena phocoena) in Oregon and Washington. Springfield, VA: MOAA Technical Memorandum NMFS-AFSC-76, 1996.

Richardson, Scott. Washington State Status Report for the Gray Whale.
Olympia, WA: Washington Department of Fish and Wildlife, 1997.

Other Resources

The Whale Museum exhibit hall and associated experts.

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Getting, Co-Director of the San Juan County Marine Mammal Stranding
Network.