

MARINE MAMMAL SUMMARY SHEET

A) General

1. warm blooded
2. bear live young
3. suckle their young
4. stream-lined body
5. have, at some time, hair
6. have fat or blubber (except sea otters)

B) Order *Pinnepedia*

1. Seals

- a. have no external ears
- b. roll or move like an inch-worm
- c. have an even coat
- d. reach 6 feet in length
- e. weigh up to 300 pounds

2. Sea lions

- a. have external ears
- b. walk with fore-flippers
- c. have an uneven coat
- d. reach 8 feet in length
- e. weigh up to 1000 pounds

3. Walruses

- a. have huge tusks to dig out shellfish
- b. reach 9 to 14 feet in length
- c. weigh up to 3000 pounds

C) Sea Otters (order *Carnivora*)

1. eat sea urchins and shellfish
2. have fur instead of blubber

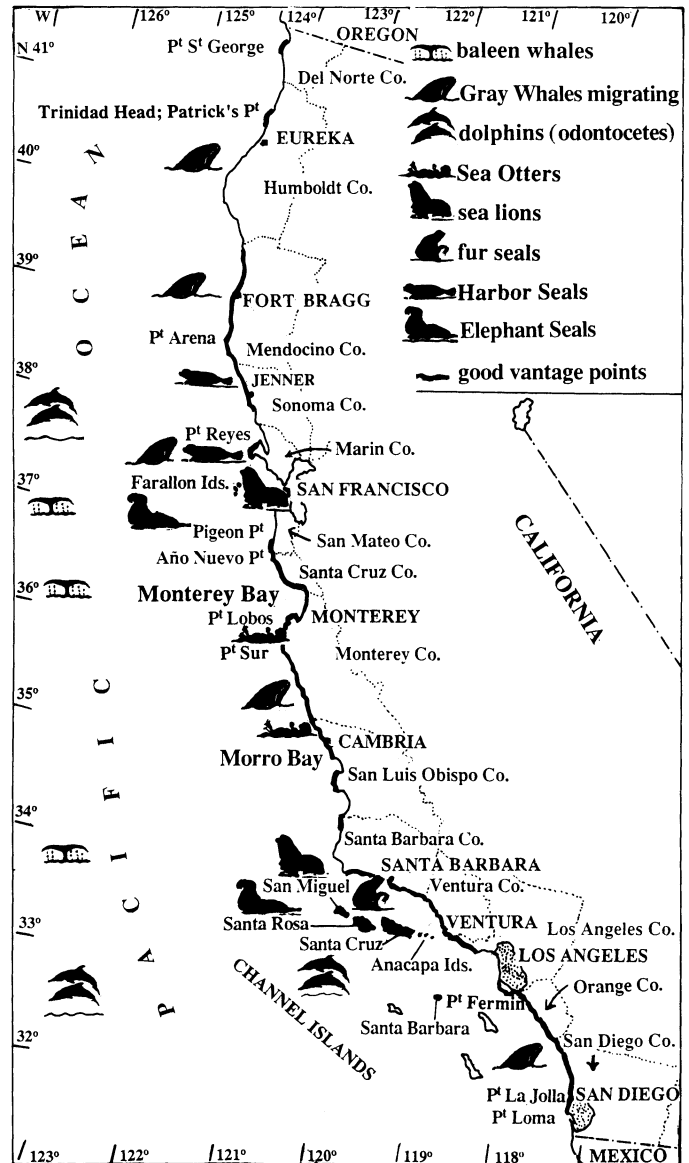
D) Whales (Order *Cetacea*)

1. Toothed Whales (Odontocetes)

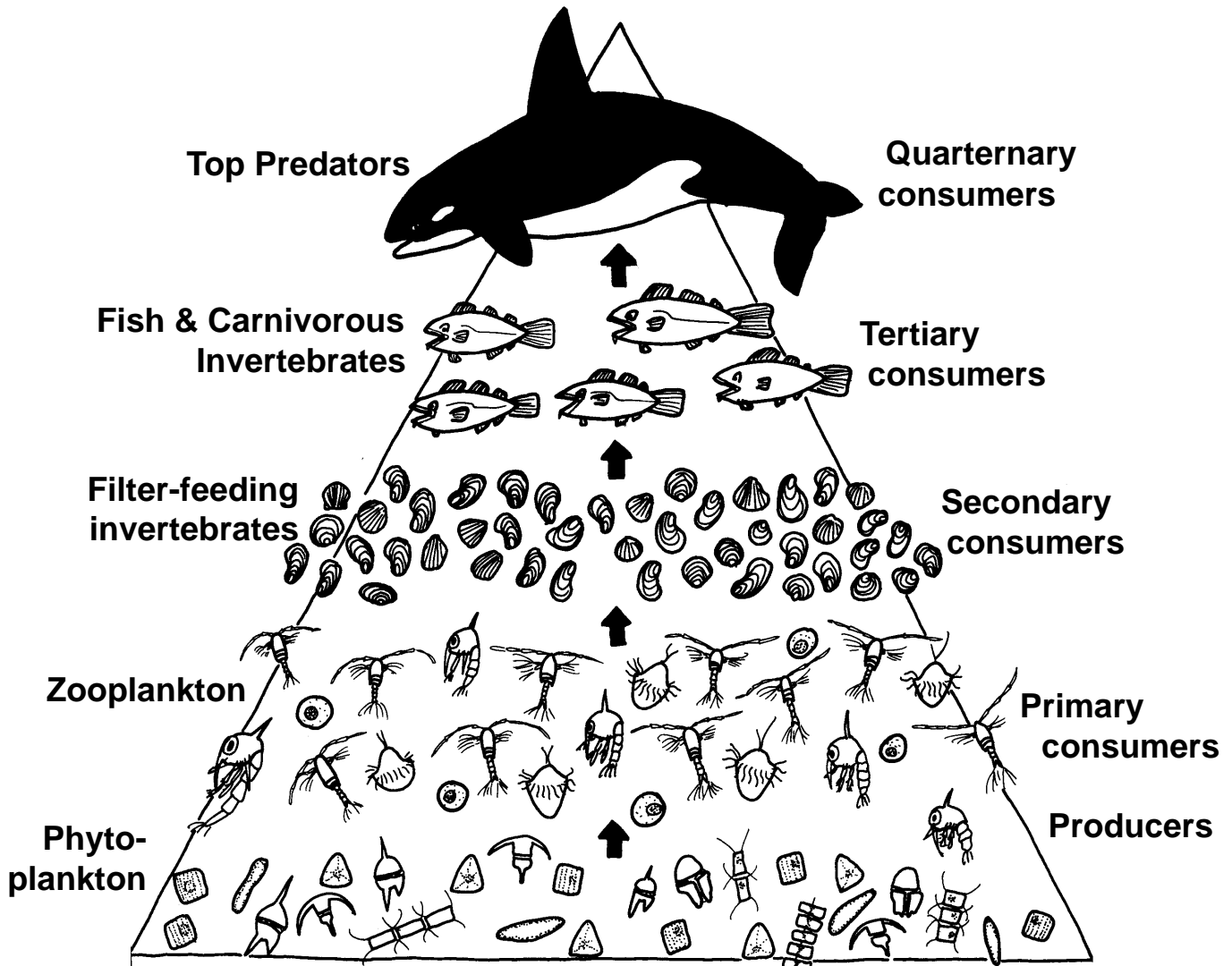
- a) have teeth, relatively small, predatory, can communicate
- b) Dolphins: have snouts and are the most intelligent
- c) Porpoises: have no snout

2. Baleen Whales (Mysticetes)

- a) filter feeders, relatively large
- b) largest: Blue Whale (110 feet in length)
- c) well developed communication: e.g., Humpback whales sing songs 40- 50 minutes long.



THE FOOD WEB

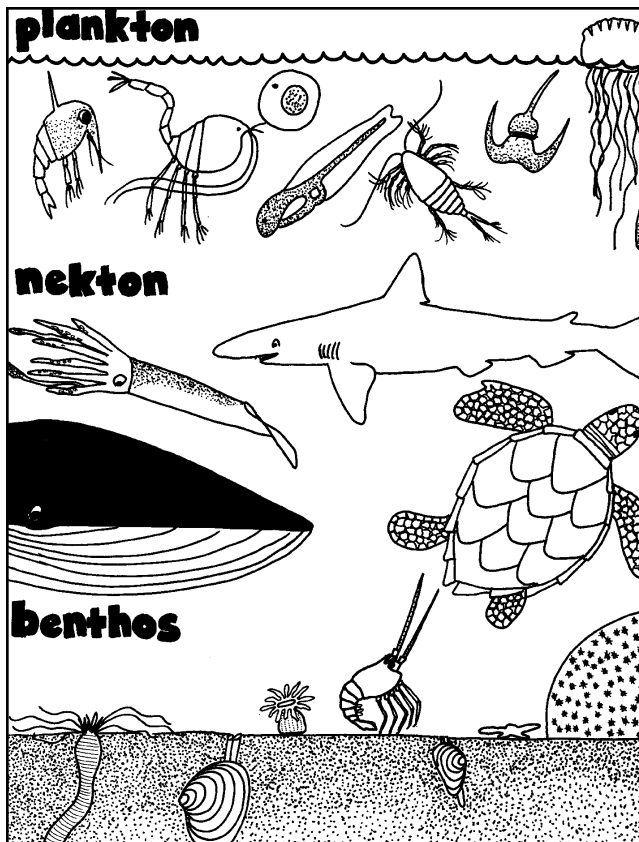
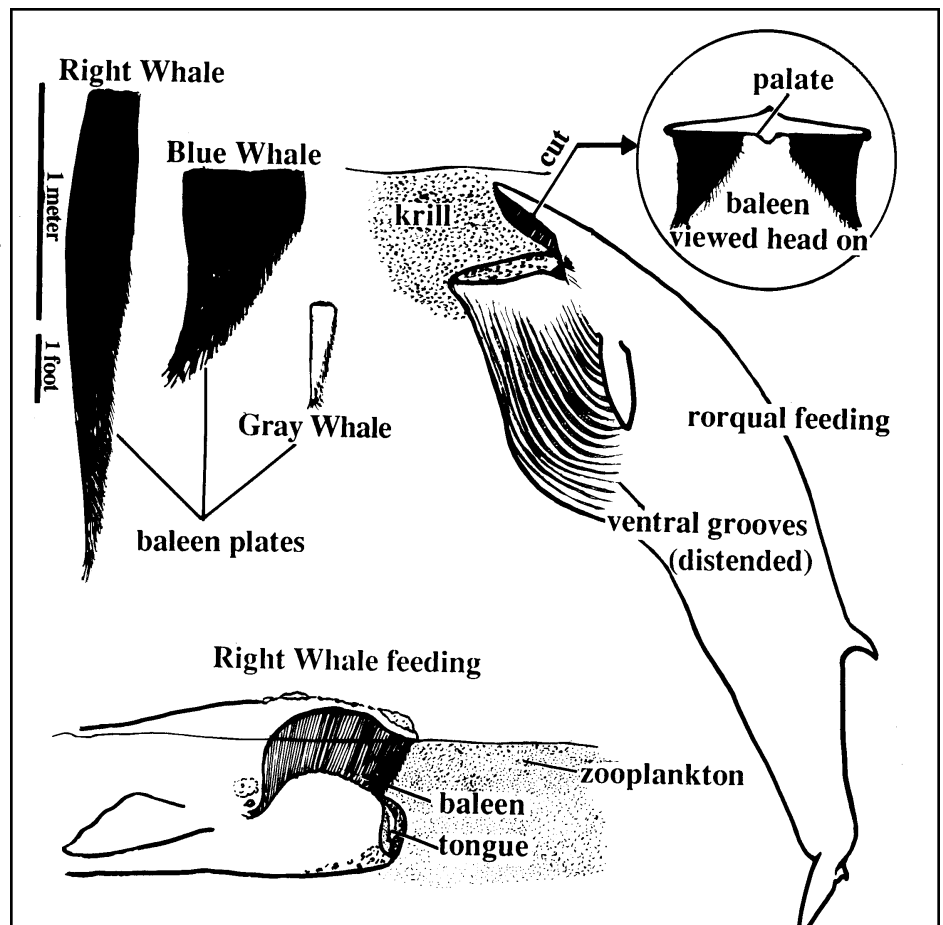


Animals which feed on zooplankton are considered secondary consumers since they eat animals which eat producers. The animal which feeds on the filter feeder must be a tertiary (3rd level) consumer, and the one who eats him is a quarternary (4th level) , consumer, etc. Beginning with the secondary consumer, all animals are considered to be predators or carnivores. Finally, there will be some rare predator which may have no natural enemy. This "top" predator's numbers are limited only by the habitat and food resources. Examples of such a top carnivores are the Killer Whale and some of the larger sharks.

Normal feeding habits do not result in a simple chain of producers and consumers, but rather in a "web" of predators who feed upon various levels of consumers. Therefore "food web" is a better description of production-consumption relationships.

FILTER FEEDERS

A substantial number of invertebrates in the sea filter their food from seawater. Most of this food consists of plankton. Certain fish are also plankton feeders. They often swim in huge schools while filtering out vast quantities of planktonic life. The anchovy is a good example. Gill rakers of these fish, which normally are used for keeping gills clean, are employed for collecting plankton for food. The largest animals in the ocean, the baleen whales, consume tons of the planktonic euphausiid "krill" in the cold polar waters where krill is abundant.



THE NEKTON ANIMALS THAT SWIM

The animals which swim about in the ocean are called "nekton" in contrast to "plankton" which are dependant on currents for mobility. The nekton are primarily fish but include swimming invertebrates such as the squid as well as higher forms like seals, dolphins and whales. The nekton are suited for their life in the sea in that they have a means of propulsion and a streamlined shape. They must also have an efficient respiratory system to obtain enough oxygen from the environment to maintain a high metabolic rate for swimming.

Still other animals are attached or move about on the sea floor (referred to as "benthos") These "benthic" animals include a huge variety of invertebrates that attach to rocks, crawl along the sea floor or burrow into the soft mud or sand.

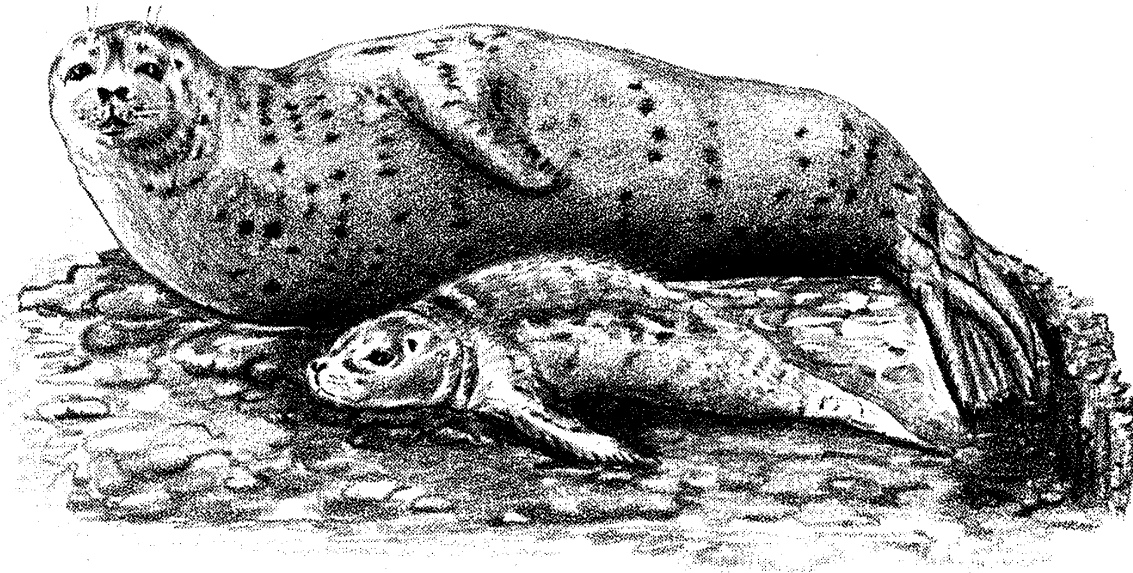
Order Pinnipedia

Seals, Sea Lions and Walruses

The word "pinnipedia" actually means "fin-footed." In some instances, it may be said that animals that belong to this order virtually walk on their flippers. Seals, sea lions, and walruses haul themselves out on shore to rest, escape predators, mate and calve. Lazy sea lions can often be seen piled up on bell bouys which mark harbor channels and navigational hazards. There are eared seals and earless seals. The external ear, or "pinna," is present in fur seals and sea lions (family *Otariidae*), but greatly reduced. The earless seals (family *Phocidae*) include the harbor seal and elephant seal. All are remarkably well designed for life in the sea. Their bodies are streamlined, basically fusiform in shape, and their eyes are large and well developed for seeing under water.

Pinnipeds, being marine mammals, must conserve and maintain body heat in a cold aquatic environment. Like the cetaceans, pinnipeds have a layer of blubber just beneath the skin, which is thick and covered with hair or fur (except for the walrus, whose hair is sparse).

In Southern California, we tend to observe only two of the pinnipeds, so it is with these species that we will concern ourselves. They are the California Sea Lion and the Spotted Harbor Seal.

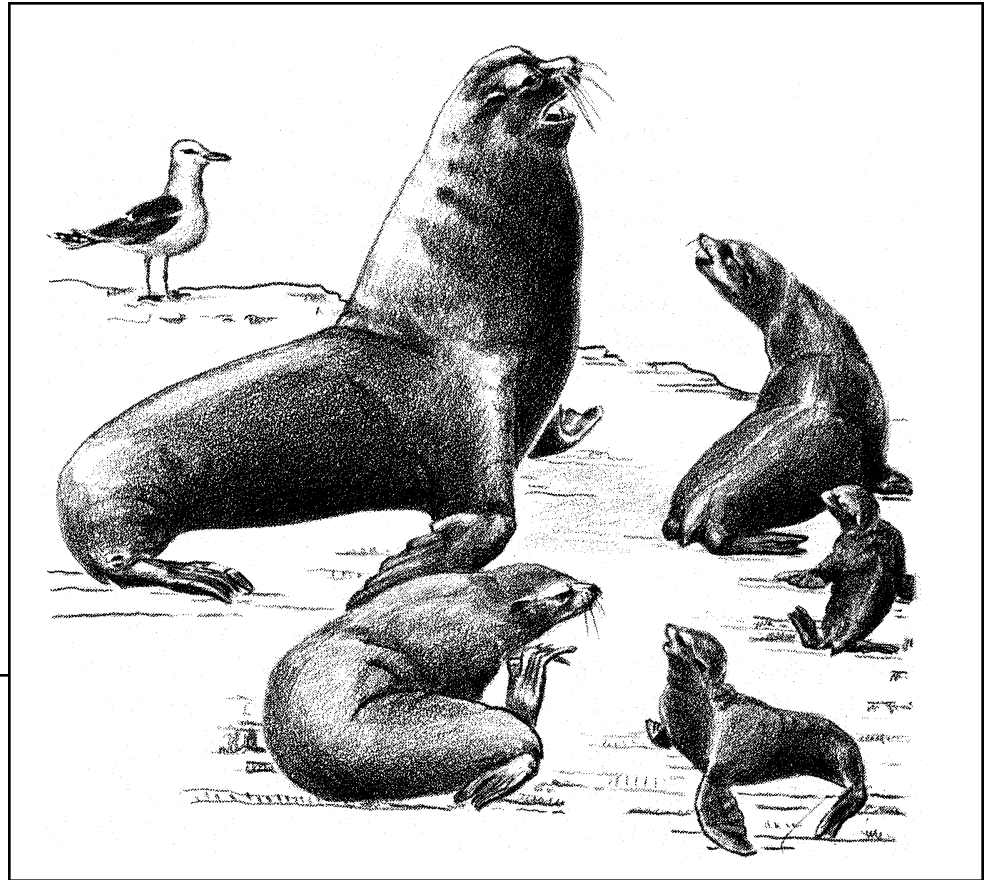


SPOTTED HARBOR SEAL (*Phoca vitulina*)

Four species of seals are known to inhabit California waters: the harbor seal (*Phoca vitulina*) is the most common. Northern elephant seals (*Mirounga angustirostris*) is the largest of the seals. The fur seals (*Callorhinus ursinus*) and the Guadalupe fur seal (*Arctocephalus townsendi*) are making a comeback from near extinction having been enthusiastically hunted by fur traders.

The most common of these is the harbor seal, but fewer seals are sighted by boaters than sea lions. The harbor seal has a slug-like shape to its body, large eyes, and no visible ears. They swim with their hind flippers and steer with their front flippers. Incidentally, their front flippers are not as well developed as the sea lion's, so, as a consequence, they are more restricted in their land movements. In fact, when one observes a seal moving on a beach or on a rock, it is hard not to laugh, for the movements are not unlike that of a slug or an inchworm. Seals are very graceful in the water, exhibiting some very impressive maneuvers.

Harbor seals are polygamous and promiscuous. That is, they are not very particular concerning with whom they mate. They have a much less organized social structure as that of sea lions. Mating appears to take place in the water, and the young are born from March to early May. There is little difference in the appearance of males and females, except for the fact that males are generally larger, some reaching a length of 6 feet and a weight of 300 pounds.



CALIFORNIA SEA LION

(*Zalophus californianus*)

This member of the Otariidae family is by far the most common pinniped in California. Sea lions prefer to gather in groups and can be seen together, when on land, in either a rookery or a hauling out site, depending on the season. During the non-breeding season from August through April, it is common to see females and pups gathered together in groups at haul out beaches or on buoys and other structures. During the breeding season, however, the social structure is much more rigid. Their behavior changes considerably. Adult males become strongly territorial and defend their plots of beach vigorously from any intrusion save that of a breeding female. There may be as many as 14 females in the bull's harem. Sea lions make a migration north at the end of their breeding season, that is, in and around July of each year. They move south in late winter and early spring. This means that we would be likely to find more sea lions in the Long Beach area in March and April than we would in the fall months.

Male sea lions may reach 10 feet in length and weigh more than 700 pounds. Female sea lions may reach lengths near 8 feet and weigh close to 250 pounds. The male has generally darker coloring, close to black when wet. The females are considerably lighter. Their color ranges from a dirty yellow to brown. The neck of the male is very thick, and he has a "v" shaped light-colored crest at the top of his head where the jaw muscles wrap his skull. All sea lions have visible external "pinna" (external ear flaps) and large prominent fore flippers with which to swim and walk. Their hind flippers, used as a rudder in the water, turn forward beneath them to assist in land mobility. Seals lack this capability.

Sea lions bark loudly to warn off intruders and may bite if pressed. However, there are few, if any, cases of sea lion attack on humans. They are very curious animals and, if approached carefully in the water, may perform a graceful display of under water acrobatics. It would not be a good idea, however, to approach breeding males during rookery season.

Cetaceans

Whales and Dolphins

Whales are mammals that live in the water. Their bodies are very streamlined. They have a tail, known as flukes, for swimming. The tail flukes are moved in an up-and-down motion. Whales have a pectoral flipper on each side of their body just behind the head. Their



flippers are used for steering, turning and stopping. Some whales have a dorsal fin along their backs. This fin acts like the keel of a boat; it keeps the whale from rolling from side to side while the whale swims. Since whales are warm-blooded they need a way of reducing the amount of body heat lost to the cooler surrounding waters. A thick layer of tissue similar to fat lies just under the skin. This layer is called blubber and acts as an insulator, streamliner and source of energy during migration.

All whales together belong to a group known as *cetaceans*. There are two groups of whales within this group. There are the **mysticetes**, or "baleen whales" and **odontocetes** or "toothed whales." Baleen and toothed whales differ in a number of ways, including physiology and behavior.

The science that studies whales is called *cetology*, and the scientists are called "cetologists." Much of our past knowledge about whales has come from the study of dead animals on beaches and from whaling expeditions. Today, cetologists are studying live

whales to learn more about how they live. Some whales are studied in the wild. This is very difficult because all one usually sees of a whale is the blowhole, the back or the tail flukes. Some cetologists study whales underwater and analyze underwater photographs of whales. A great deal of information has also come from the study of whales in the controlled environments of research facilities and oceanariums like Sea World and the Hubbs/Sea World Research Institute, because it is easier to study an animal that you can see clearly. Even though there are many people studying whales, and even though we know a great deal about whales, we cannot answer all the questions. We still have a long way to go before we will fully understand these fascinating marine mammals. Perhaps you can help. Would you like to become a Cetologist?



THE CALIFORNIA GRAY WHALE *(Eschrichtius robustus)*



The California gray whale is a baleen whale, or mysticete, with fringed plates called baleen instead of teeth. It is the seventh largest of all whales, and the one most often seen along the California coast.

A mammal like us, the gray whale is dark gray with white markings, and has barnacles and other parasites clustered on its body. It has no dorsal fin; a series of ridges runs from the middle of the back to the tail. At birth, a calf is about 15 feet long and weighs about a ton, and at one year the animal is about 25 feet long and weighs 5 tons. Adults may grow to a length of 50 feet and weigh 40 tons—the size of a Greyhound bus! The female is slightly larger than the male.

Grey whales spend the summer in the Arctic Ocean (see map). Here they feed on abundant quantities of plankton and small crustaceans, which are strained from the water through the baleen. In winter, grays travel south in small groups called pods, to the warm, shallow lagoons of Baja California, where they calve, mate and play for 2 to 3 months. They return to the northern feeding grounds in spring. This is the longest known mass migration by a mammal.

The trip is 5,000 to 7,000 miles each way, and takes two and a half to three months. Gray whales are believed to swim 60-80 nautical miles each day, at an average speed of 4 knots, with a top speed of 10 knots. There is evidence that they feed during migration and in Mexico, but amounts taken are very small.

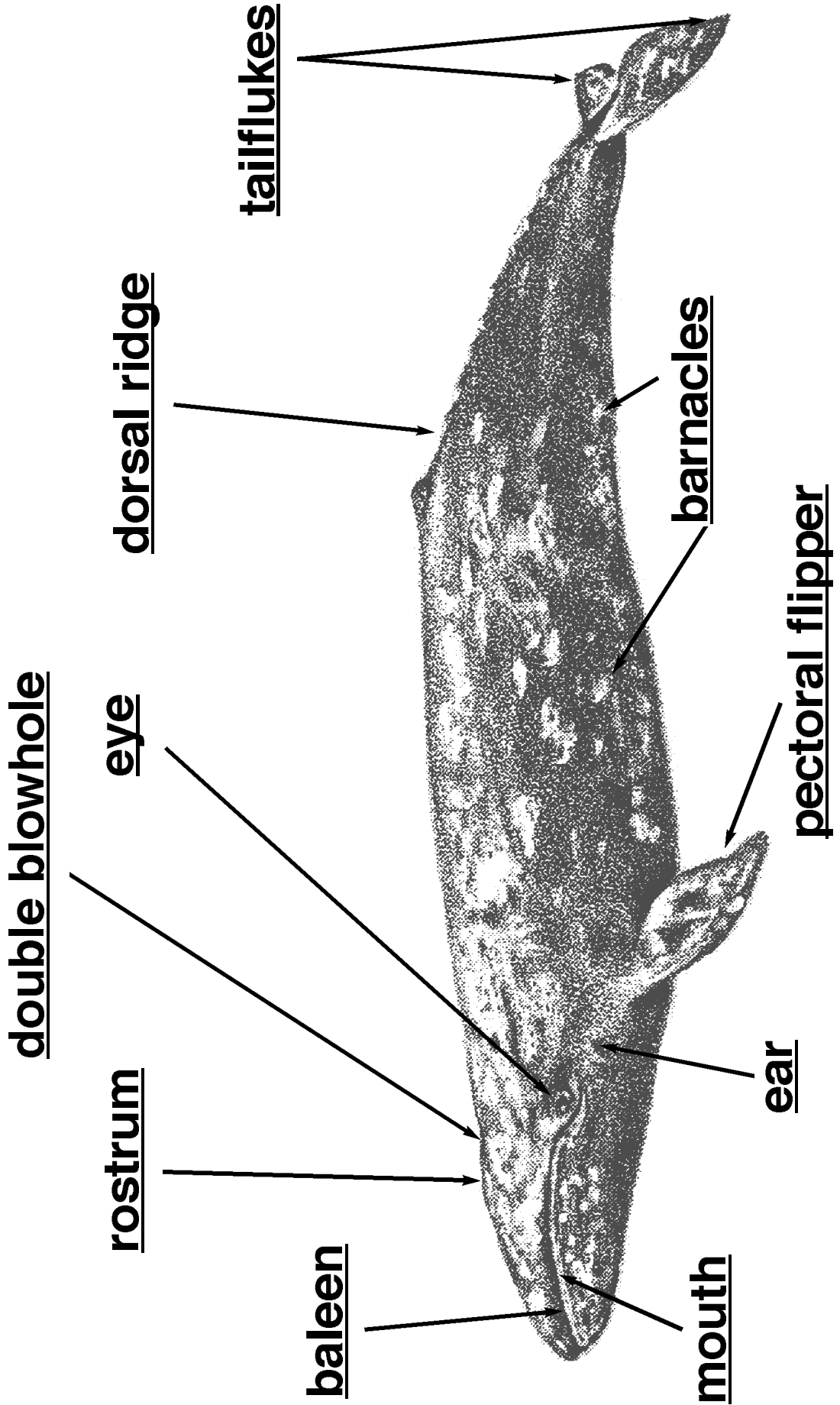
Grays travel close enough to shore to be seen from land. When they surface to breathe through their blowholes (nostrils on top of the head) the spout, or exhaled condensed vapor, is visible for miles. Like all baleen whales, the gray has two blowholes. Its spout is characteristically heart-shaped.

Sometimes the whales raise their heads out of the water and seem to be looking around. This is spy-hopping. Occasionally they breach, leaping most of the way out of the water and falling back with a splash. No one knows why they do these things, but many speculate. Before making a deep dive, or sounding, they often show their flukes, the horizontal, butterfly-shaped lobes at the end of the tail. Most of the migrating grays are seen off the California coast in January and February on their way south, and in March and April on their northward journey. They are best observed from whale watching boats. During the height of the migration, and estimated 80 to 100 whales swim past daily in sight of a given point, such as Cabrillo Beach in southern California.

Twice in the past 100 years the gray whale has been almost killed off by man. Between the 1850's and 1900, the population was reduced to a tiny fraction of its original size. It recovered rapidly, and whaling resumed in the 1920's. In 1937, with only a few hundred left, hunting of grays was forbidden. They have been protected by international agreement since 1947. Experts believe the population has now stabilized at 11,000, and that the original stock was probably 15 to 20 thousand.

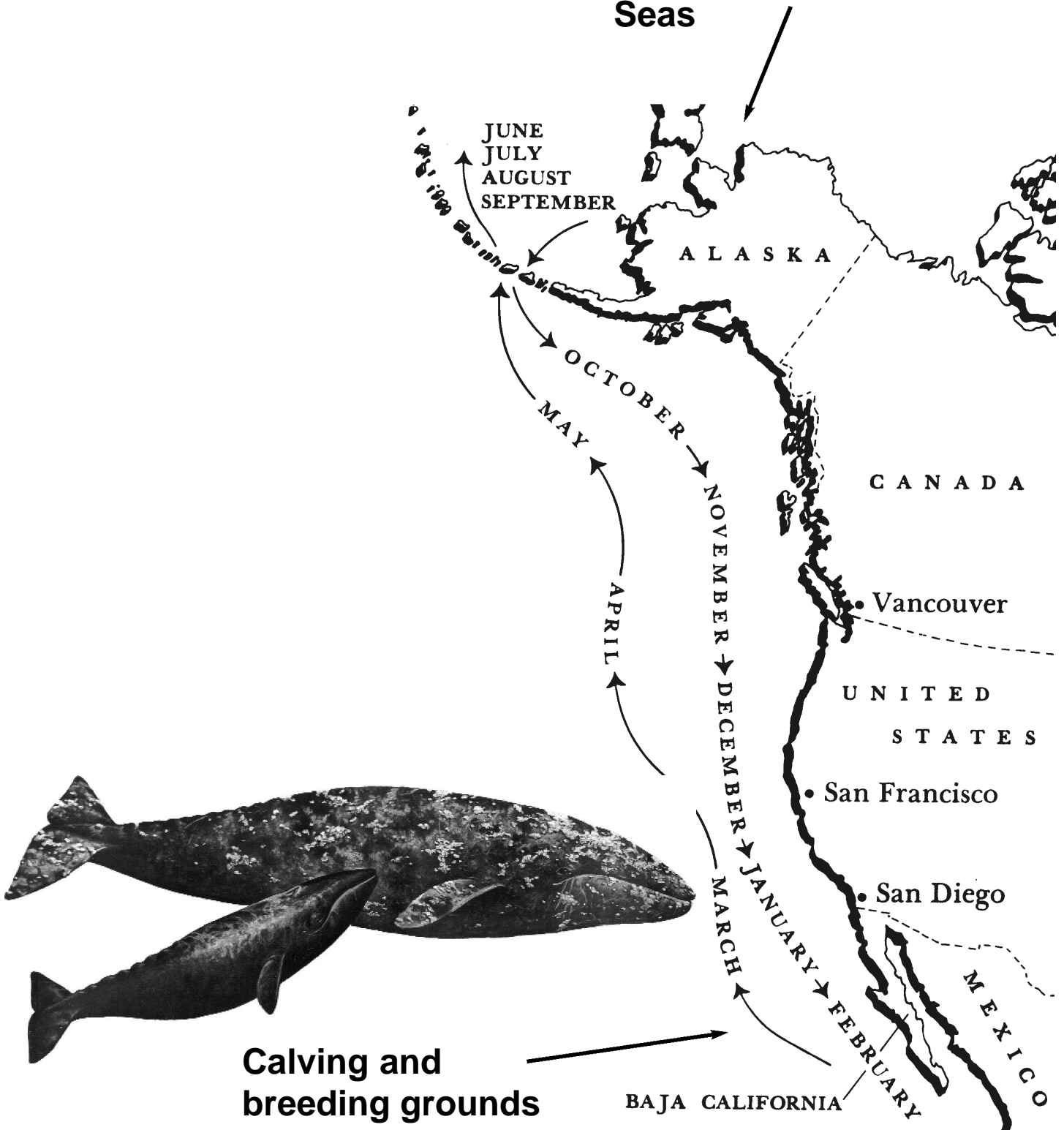
Gray Whale

Eschrichtius robustus



Gray Whale Migration Map

Gray Whales spend summers feeding in the Bearing and Chukchi Seas



RISSO'S DOLPHIN

(*Grampus griseus*)

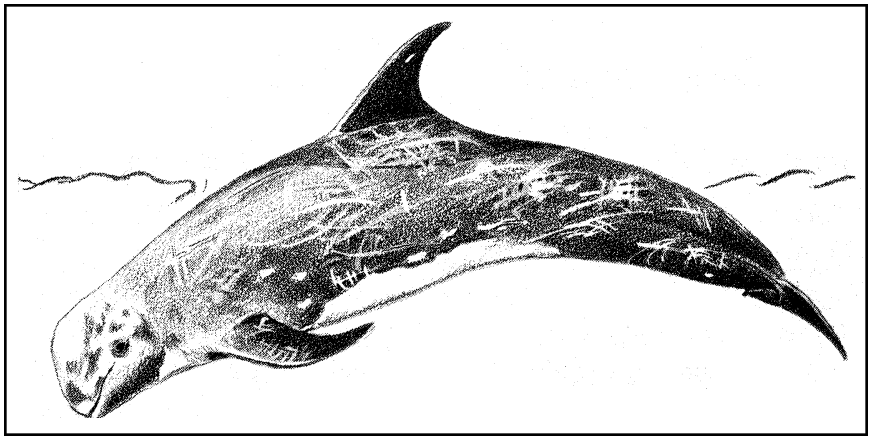
There is a probability of seeing many species of cetaceans near our Southern California coast, including pilot whales, gray whales, fin whales, minke whales, pacific white-sided dolphins, common dolphins, bottlenose dolphins, hump-back whales, Risso's dolphin, and even killer whales. However, there are a few species which grace our presence more often than others. One of these is the

Risso's Dolphin, known also as *Grampus griseus* which means "grand fish of grey color." Of course, the Grampus is not a fish, but a mammal like you or me, but nonetheless, this species among other globiocephlid (or blunt headed) whales were referred in whaling days as "Grampus" (grand fish).

We find that these animals are rather shy, as they tend to swim away as our vessel approaches. However, they do not exhibit a fear which would compel them to dive deep or swim away fast. Risso's dolphins simply make a steady, deliberate but slow retreat. In the process, it is not uncommon to see one or two in the pod breach, exposing a nearly complete body to the delight of whale watchers.

Risso's are easily identified by their gray color, tall rounded dorsal fin, blunt head, and severe scarring. On average, males reach lengths of 11 feet. They usually swim rather slowly and travel in pods of 10-40 individuals. Occasionally, many pods coalesce into roughly the same area, dotting the coastline within a several mile radius with several hundred specimens. They converge where food is abundant, usually where squid, their favorite food, are present. Risso's have about 3-7 pairs of teeth, usually only on the lower jaw. They feed on fish and cephalopods by sucking in their prey.

Little is known of the life history of these strange and elusive creatures. It used to be thought that Risso's dolphins are uncommon, but we now know that their population is wide-spread, with as many as 30,000 California residents. Their numbers are greatest near shore in winter, which allows our observation to coincide with searches for the California Gray Whale.



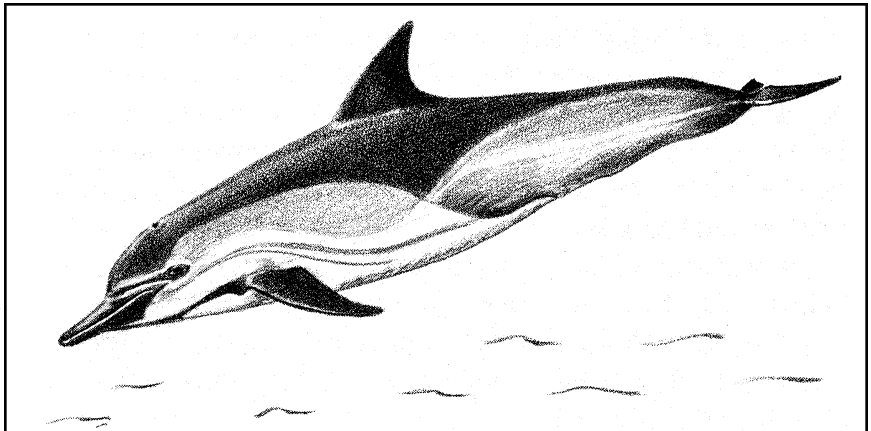
COMMON DOLPHIN

(*Delphinus delphis*)

Found nearly world wide, the Common dolphin has earned its name. These playful frolicking dolphins grow to about 8 feet in length and weigh nearly 300 pounds. They are one of the most colorfully arrayed cetaceans, bearing yellowish tan forward flanks, a white under belly, and a deep blue gray dorsal surface. The dark upper surface contrasts sharply with the criss-cross sectional forward flanks and the grayish posterior. Commons are spindle shaped, streamlined, and sport the very familiar bottle-shaped rostrum.

Common dolphins are frequently seen in pods of several tens to thousands of individuals. An occasional "scouting party" of 3 or 4 are observed searching for food sources. Their cooperative feeding habits are exciting to experience. They perform a sort of "round-up" on schooling fish such as sardines, herrings, and anchovies. Pods may dive below a school of fish and drive it to the surface, surround it, and proceed to feed. Birds and other predators also enjoy the benefits of the fish round-up. Usually, however, Commons feed at night as the Deep Scattering Layer of marine organisms (DSL) migrates to near surface waters. During the day, *Delphinus delphis* can be seen leaping (or breaching) out of the water, riding the bow wave of passing boats, or even surfing!

Birth and mating probably occurs year round. Calves are born measuring about 2.6 feet after 10-11 months gestation period. They nurse 14-19 months after birth. Once in a while, one might spot an entire pod of 2-3 year old Commons about 2 or 3 feet in length.



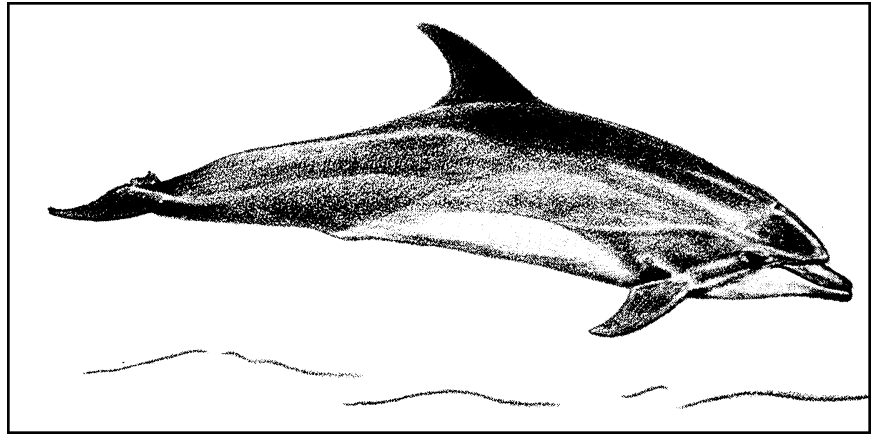
BOTTLENOSE DOLPHIN

(*Tursiops truncatus*)

The bottlenose dolphin is probably the most familiar dolphin. The bottlenose dolphin is only one of over thirty species in the Delphinidae family. The name "bottlenose" refers to the elongated rostrum (snout), which looks something like a bottle. The rostrum is not really the nose, so this dolphin should actually be called a "bottle-rostrum dolphin." Bottlenose dolphins are inshore, coastal mammals found in the temperate and tropical waters of the world.

Bottlenose dolphins can be found in both the Atlantic and the Pacific Oceans. Atlantic bottlenose dolphins grow to about 7 -10 feet (2 -3 m) in length and weigh between 300 and 500 pounds (136-227 kg). The Pacific and the eastern Atlantic bottlenose dolphins are 10-12 feet (3-3.5 m) in length and weigh between 500 and 1000 pounds (227-453.5 kg).

Bottlenose dolphins swim and hunt together in pods. They are very social animals and work together to catch their prey, usually fish. Bottlenose dolphins, both young and old, play. These animals have been seen chasing one another, nosing and carrying objects around, tossing seaweed and surfing. Dolphins are very protective of one another. Pod members will stay close to an injured animal and some will actually help the injured dolphin to the surface to breathe. According to some myths and stories, dolphins will do the same for humans in similar distress.



KILLER WHALE

(*Orcinus orca*)

Most Californians are first introduced to the Orcas while visiting a local oceanarium like Sea World in San Diego. These highly intelligent and trainable cetaceans survive well in captivity, and their displays of power, agility and sheer size are fascinating. Orcas are the top predators in the ocean, consuming nearly anything that crosses their path.

Orcas are the largest of the Delphinidae family. Adult males measure over 30 ft and adult females average 23 feet in length. Their distinctive black and white markings are known to visitors of oceanariums the world over. The erect triangular dorsal fin of adult males, which can measure up to 6 feet contrasts sharply with the 2-foot moderately falcate fin of females. Each jaw usually contains 11 strong sharp conical teeth that are ideally suited for grasping and tearing prey.

Killer whales, called such because they are known to kill other whales, occur in all oceans, being found mostly in cooler temperate areas. In the eastern North Pacific region, they are found from Monterey Bay north to the Aleutian Islands. They occur near shore, but groups are mostly sighted in both deep ocean and inlet areas. Off California, Orcas are known to shift their distribution seasonally in response to changing food resources.

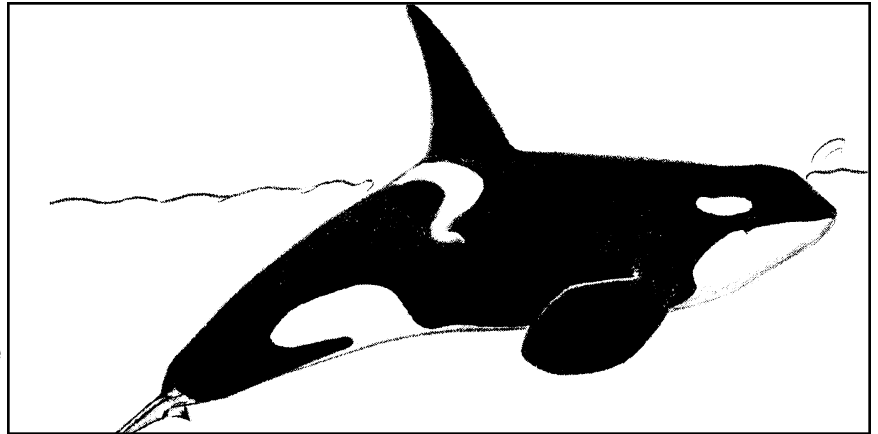


CHART YOUR COURSE

Using the worksheet on the opposite side, keep track of marine life encountered on your voyage.
Use this chart and coordinate system to plot your course and sightings.

You boarded the boat here

