

# Programas Educativos

*educar es el primer paso para conservar*

Actividades didácticas para  
el trabajo en el aula

## A lesson of life

**The Dolphins - Teacher's Guide**



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## Objetives

- Understand the concepts related with biological areas in English Language.
- Give both the teacher and the pupil a work tool in order to enhance the marine mammals knowledge.
- Stimulate the interest and increase the knowledge about the sea and its fauna.
- Teach and show the habits, characteristics, behaviors and adaptation of Cetaceans and Pinnipeds through theoretical and practical activities.

## TO THE TEACHER

The Dolphins Teacher's Guide for students grades EP 2º-6º to ES 1º-6º was developed at Mundo Marino Foundation to help you to teach your students—in an active, hands-on way—about dolphins and their adaptation for a marine environment. The brief background information in this Guide was written for you, the teacher. It will help you to do these activities with your students.

Mundo Marino Foundation strives to provide teachers with up-to-date information and activities that motivate students to appreciate and conserve wildlife, the oceans, and the natural world.

Do you have comments or suggestions regarding the activities in this Teacher's Guide?

We'd love to hear your opinion. Write the Mundo Marino Foundation, Environmental Education Department

Email: [educacionambiental@mundomarino.com.ar](mailto:educacionambiental@mundomarino.com.ar)

## VOCABULARY

**Adaptation** — a modification of a species, occurring as a result of natural selection. Adaptations enhance a species' ability to survive.

**Blow** — the visible exhalation of a whale.

**Calf** — the young of certain large mammal species such as whales, manatees, and walruses.

**Caudal fin** — the tail fin.

**Conservation** — taking care of our environment by wisely managing its resources.

Ecosystem — a unit of plants, animals, and nonliving components of an environment that interact.

Endangered — in danger of becoming extinct.

Dorsal fin — the appendage on the back or top of an aquatic animal.

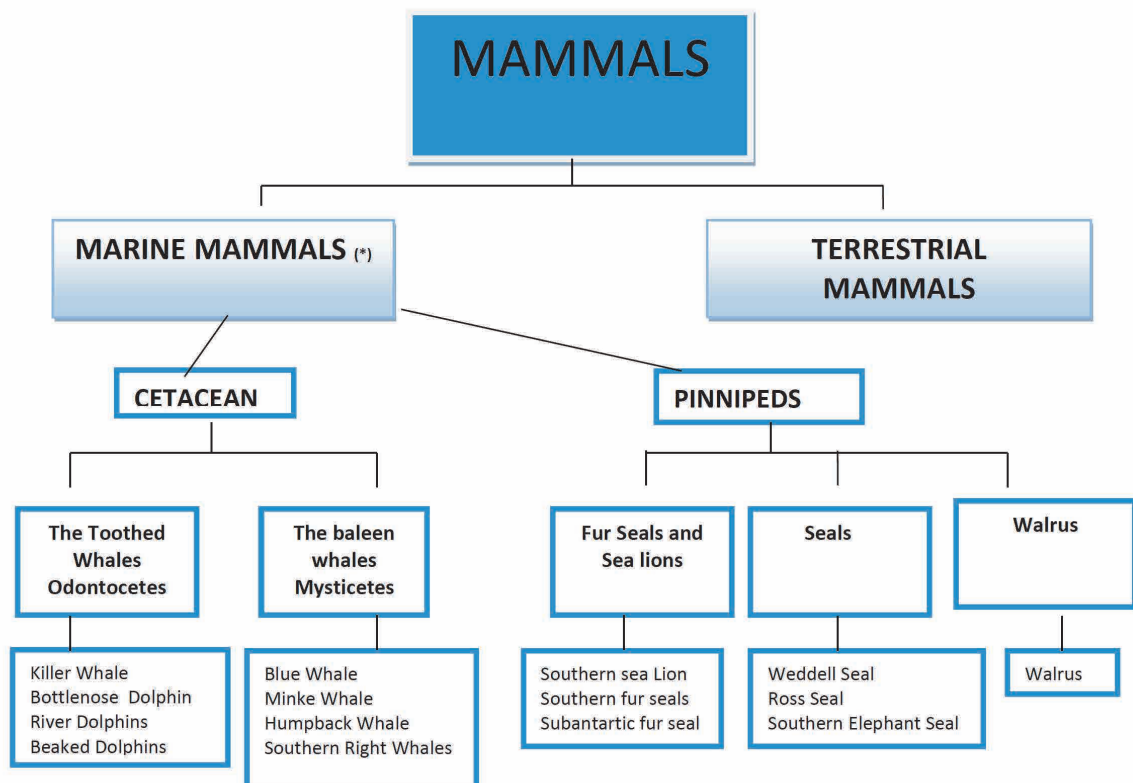
Echolocate (eck-oh-LOW-kayt) — to locate objects by emitting sound waves and interpreting the resulting echo.

Flipper — a broad, flat limb supported by bones and adapted for swimming.

Flukes — the horizontal lobes of the tail of a whale, dolphin, or porpoise, made of connective tissue (not bone).

Marine mammal — a mammal adapted to live in the marine environment and dependent on the ocean for food.

Plankton (PLANK-tuhn) — tiny plants and animals that drift in oceans, lakes, ponds, and rivers.



(\*)There are other groups inside the marine mammals group.

There are two different suborders of whales: Toothed Whales (Odontocetes).

<b>Toothed Whales (Odontocetes)</b>	<b>Baleen Whales (Mysticetes)</b>
Only <b>one</b> blowhole	<b>Two</b> blowhole
They have teeth in their mouth, which are used to catch preys. They do not chew it, they swallow their food whole or in very large pieces.	Baleen whales are characterized by having baleen plates for filtering food from water
They feed fishes and squid	They feed plankton and small fishes.
They live both in the sea and rivers	They live only in the sea
They live in big family groups	They travel alone or in small groups
Examples Sperm Whales (18 m. long) La Plata River Dolphin (1,60 m. long)	Examples Blue Whale (30 m. long) Pygmy Right Whale (7 m. long)

## What is a Cetacean?

The scientific order Cetacean includes all whales and dolphins. This large order is further divided into three suborders: the toothed whales or Odontoceti (killer whales, dolphins, porpoises, beluga whales, and sperm whales), the baleen whales or Mysticeti (blue whales, humpback whales, gray whales, and right whales), and the Archaeoceti (which are now extinct).

**Dolphins are aquatic mammals.**

**Dolphins live in the water, but they aren't fishes—they're mammals. All mammals are warm-blooded (maintain a high and constant body temperature), breathe air, give live birth, nurse their young, and have hair**

**Whales have lungs and breathe air.**

**A dolphin breathes air through nostrils called a blowhole, located on top of its head. When it needs oxygen, a dolphin surfaces, thrusts its blowhole clear of the water, exhales (blows), and then inhales (takes in a deep breath of air).**

**Baby whales drink milk.**

**Like other mammal mothers, whales give birth to live young. A whale calf is born under water and can swim at birth. Soon after birth, the calf begins nursing.**

**A mother whale's nipples are concealed in a pair of mammary slits. Dolphin milk is rich in fat and protein and baby whales grow quickly.**

**What?! Whales have hair?**

**Yes, they do! But they usually shed their hair while they are very young. Adult dolphins rarely have hair.**

**A young dolphin may be born with sparse hairs along its rostrum.**

**Whales are adapted for water.**

Dolphins' bodies are streamlined. A streamlined shape glides easily through water and helps a whale conserve energy as it swims.

A whale's powerful tail is made up of a pair of flukes. The tail flukes move up and down for swimming. Forelimbs are called flippers. Whales use their flippers for steering and, with the help of the flukes, for stopping. Most whales have a dorsal fin, which helps regulate body heat and also helps stabilize a swimming whale. Layers of blubber keep whales warm.

Whales are warm-blooded, with a core body temperature about the same as ours. Because they live in cool water, they have adaptations for retaining body heat. A thick layer of fatty tissue— called blubber—lies just under the skin.

Blubber insulates a whale's internal organs and muscles.

Where did whales come from? Have they always lived in the sea?

Many scientists today believe that the whale's ancestors may have been four-footed, hairy mammals, possibly wolf-like, that spent much of their time feeding in coastal mud flats and swamps. Gradually, over millions of years, these animals spent more and more time in the sea searching for food. Eventually they left the land forever. To do this the whale's body had to undergo many changes. The nostrils moved from the snout, like a dog, to the top of the head. Now the dolphin could breath without taking its head out of the water. The hind legs slowly disappeared while the front legs became flippers. Many other changes occurred as whale evolved into the many forms we know today. These kinds of changes are known as evolution. This happened over a long period of time, perhaps as much as 65 million years.

What is a Cetacean?

## ***Mysticetes – The Baleen Whales***

Baleen whales have big mouths, but no teeth. Instead, they have large sheets of baleen, also called whalebone, that hang from their upper jaw and help them catch food. Baleen are made of the same material as your fingernails.

## ***Odontocetes – The Toothed Whales***

There are about 40 kinds of dolphins and 6 kinds of porpoises. Porpoises are the smallest of all the toothed whales. Both dolphins and porpoises are very fast swimmers.

Odontocetes don't chew their food. The odontocetes' teeth are adapted for grasping, gripping, and tearing food not for chewing it. Toothed whales swallow their food whole or in very large pieces. They eat a variety of prey.

Most species eat fish, but some also eat invertebrates such as crabs or squid. Killer

whales (*Orcinus orca*) are top predators.

They eat fishes, seabirds, and marine mammals—including other whales.

The size, shape, and number of teeth vary with species. Bottlenose dolphins (*Tursiops truncatus*) have about 88 teeth; killer whales have about 48.

Narwhals (*Monodon monoceros*) have only two teeth. In males, one spirals forward through the gum. This “tusk” can of the whale.

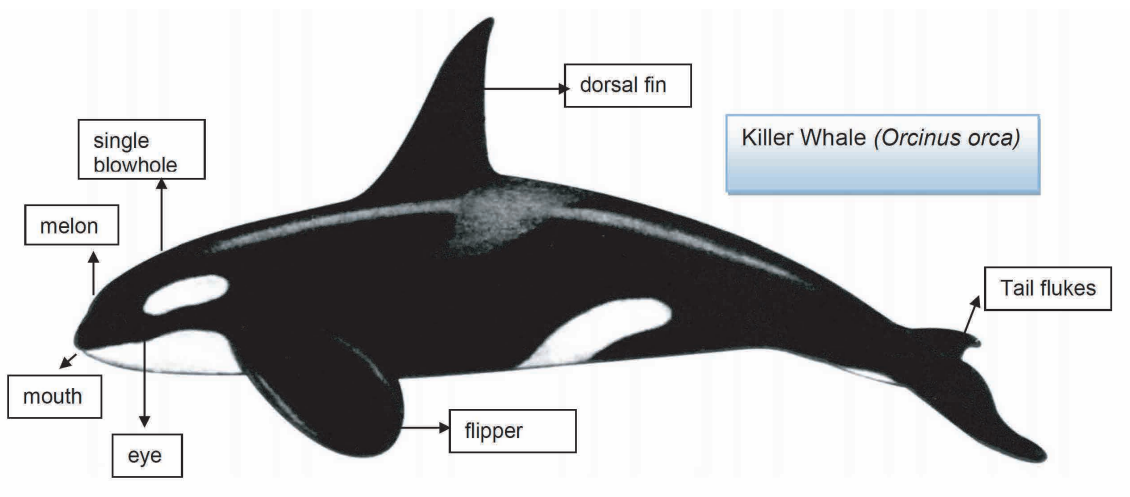
More about odontocetes. Most odontocetes are smaller than baleen whales. They are more social than mysticetes, and live together in family groups called pods.

Males are generally larger than females.

Although all whales have two nostrils, an odontocetes’ nostrils are covered with a muscular flap, so an odontocete has a single blowhole.

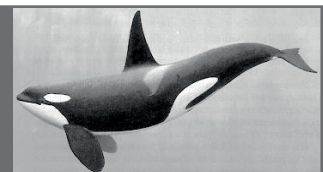
There are at least 65 species of living odontocetes. The largest is the sperm whale (*Physeter macrocephalus*), which may grow as long as 18 m (59 ft.).

Among the smallest is the Hector’s dolphin (*Cephalorhynchus hectori*), which reaches only about 1.3 m (4.3 ft.).



## KILLER WHALE (*Orcinus orca*)

Suborder Odontoceti  
Family Delphinidae



**Adult** Male killer whales average 6.7-8.2 m. and usually weigh between 3.628–5.442 kg. Females average 5.2-7.3 mt. and usually weigh between 1.361-3.628 kg

**Distribution:** Worldwide. Killer whales are found in both the open ocean and coastal waters.

**Prey:** Fishes, squids, and marine mammals. They are the oceans’ top predators. Their diets vary from region to region. They are active predators. Opportunistic feeders, their diet varies from one region to another. In the Antarctic, killer whales eat about 67 % fishes, 27 % marine mammals, and 6 % squid. They also eat other marine mammals

and seabirds. Killer whales prey on both mysticetes and odontocetes whales, seals, sea lions, walrus, and occasionally sea otters and penguins.

**Predators:** none.

**Migration:** of fish and other prey accounts for the movements of killer whales to and from certain areas.

**Population:**

1-The worldwide population of killer whales is unknown. Specific killer whale populations in a few areas have been estimated. For instance, in some areas of the Antarctic alone, their numbers are estimated at about 180.000.

2- Killer whales are not endangered.

3- Researchers have recently learned to recognize many individual killer whales from photographs, especially of their dorsal fins. Photo-identification promises to be an important new research tool for studying various aspects of cetacean biology, including movements, reproduction, behavior, and population dynamics. Photo-identification has the potential to document the lives of individual whales in great detail. The features they use for identification include dorsal fin shape and relative size, pigmentation patterns, scars, deformities, detail of tail flukes edges, encrustations, and blemishes.

5- The size of resident pods varies from as few as 5 to as many as 50 individuals. Transient pod size varies between 1 and 7 individuals.

### **BOTTLENOSE DOLPHIN** **(*Tursiops truncatus gephyreus*)**

*Suborder Odontoceti*  
*Family Delphinidae*

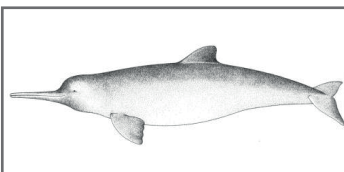


**Adult:** 2,5 to 3,5 mt., weight 300 – 400 kg. Calves 1,20 mt.

**Distribution:** Coastal, tropical and temperate waters. From Peninsula Valdez up to the estuary of La Plata River

**prey:** wide variety of fishes, squids and octopus, although only four or five locally abundant prey species usually form most of their diet.

The bottlenose is the most familiar of the dolphins to Americans. They get their name from its long snout, which looks like the neck of a bottle. Bottlenose dolphins are both friendly and smart. These are the dolphins you are likely to see in a marine park.



### **LA PLATA RIVER DOLPHINS**

They have poor eyesight, but their sonar is so good. Incidental entanglement in gillnets is by far the greatest threat for La Plata River Dolphins, because they can't detect or "see" them. This is the only river dolphin that lives in an estuarial area. It is distributed in Argentinean, Uruguayan and Brazilian waters.



## SPINNER DOLPHINS



Dolphins are the acrobats of the sea. They do somersaults, twist in the air, jump, and leap over waves. The spinner dolphin leaps out of the water and spins over and over again. Distribution Spinner lives in warmer oceans all around the world, both near land and far out to sea.



## SPINNER DOLPHINS

They all are much the same size, and they have similar body shapes, without the dolphin's pointed nose or "beak".

**Distribution:** the six species inhabit along the North Pacific and North Atlantic waters, as well as in The Bering Sea and Baltic Sea, North America's west coast. North Pacific. Burmeister's porpoise lives around southern South America and the spectacled porpoise is found around the islands of South America, such as the Malvinas. A typical porpoise has about 80 to 100 small teeth shaped like spades.

Compare con dolphin, porpoise are more likely to swim alone or in small groups of less than 10.

## NARWHAL AND BELUGA WHALES



The male has a long, twisted tooth like an elephant's tusk. It looks like a horn, so the narwhal is sometimes called the unicorn whale. The tusk can grow 3 mt long! When male narwhals fight, they use their tusks like swords.

Beluga whales are also called white whales. They are nicknamed sea canaries because they make so many different sounds. Belugas can sing, whistle, clang, moo, squeal, chirp, bark and yip. They can also change the shape of their lips so they look like they are smiling or frowning.



## BEAKED WHALES

The "beak" of a beaked whale is formed from the jutting-forward jaw bones. However, male beaked have far fewer teeth, and most of the female have no visible teeth at all.

The “tusked” whales are beaked whales with just two teeth, in the lower jaw. The members of this family live in the oceans, far from land. The dive to great depths (100 to 300 m), where they feed in the blackness on deep-water fish and squid. Little is known about this family.

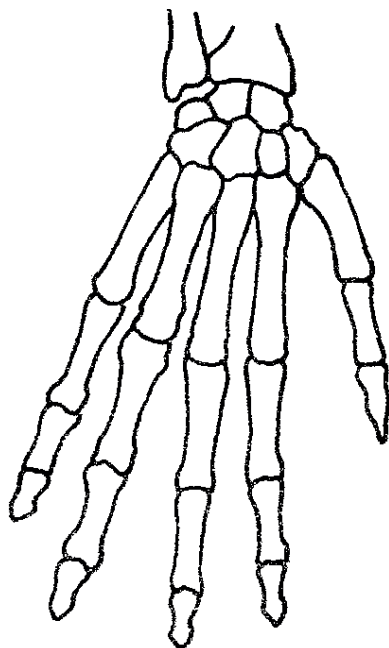
They can also stay underwater for long periods. They are called “whales” just because of their size!

## FINS, FLUKES AND FLIPPERS

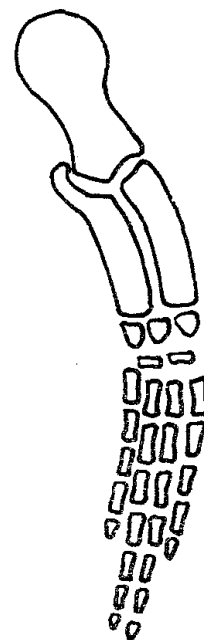
Dolphin’s body is very specially made for life in the sea. Look at the shape of a dolphin.

It might remind you of other things: a submarine, a torpedo, a shark. It is very smooth and streamlined. The dolphin has a thick layer of fat called blubber under its skin to keep its body warm. The only parts that do stick out of the dolphin’s streamlined body are its two flippers, one on each side, its dorsal fin, sticking up from the back, and its tail flukes, which are at the very end of the dolphin’s spine. Different species of dolphin have different sizes and shapes of dorsal fin. The killer whale has a very tall dorsal fin. The fin points straight up on the male orca and curves back on the female. The female’s fin is much smaller than the male orca’s.

If you look at the skeleton of a dolphin, you can see the bones inside the flippers. The flippers bones are very similar to the bones inside your hands and arms. This is because the earliest whale ancestors were once land mammals. When they evolved back into the oceans, their bodies changed. Their arms became flippers and their hind legs disappeared. The dorsal fin and tail flukes do not have any bones inside them so there is no sign of them skeleton.

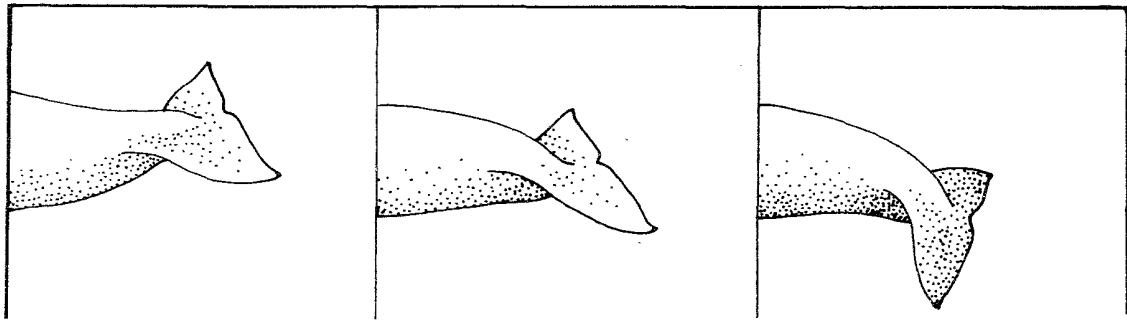


*The bones of the human hand*

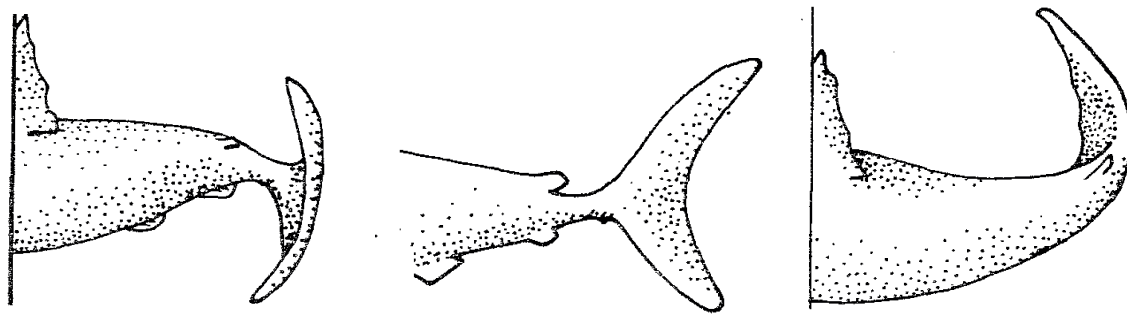


*The bones of the cetacean flipper*

One of the main differences between dolphins and fish is in their tails. A fish's tail is vertical. That means that the fins of the tail stick straight up and down. To move forward, a fish waves its tails from side to side. A dolphin's tail is horizontal. Its tail flukes stick out on either side and push the dolphin along by moving up and down. While the dolphin is propelled forward by the flukes, its dorsal fin and flippers help keep it right side up.



*The whale's tail moves up and down*

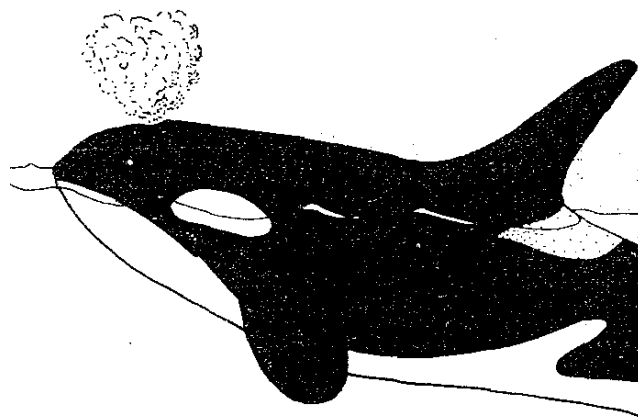
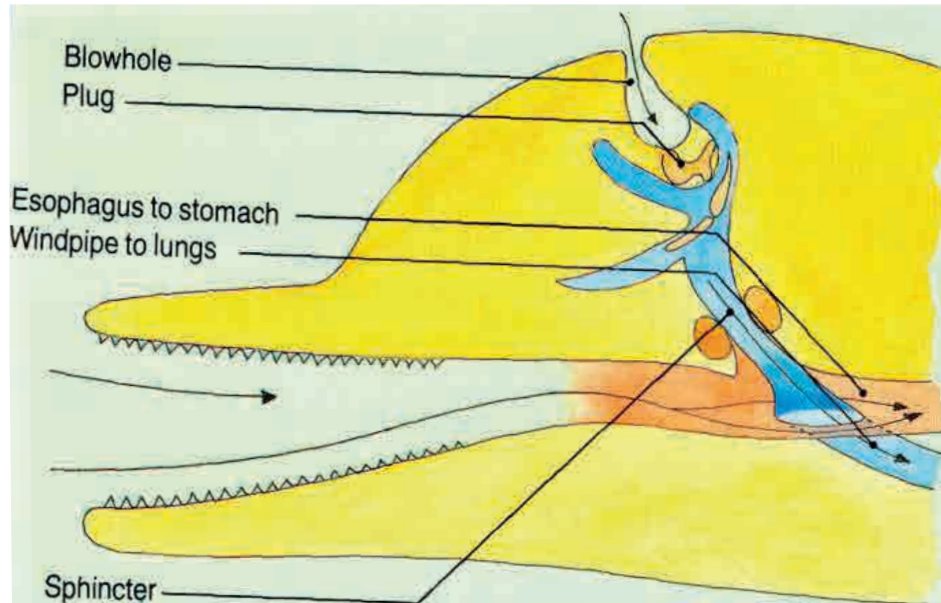


*The fish's tail moves from side to side*

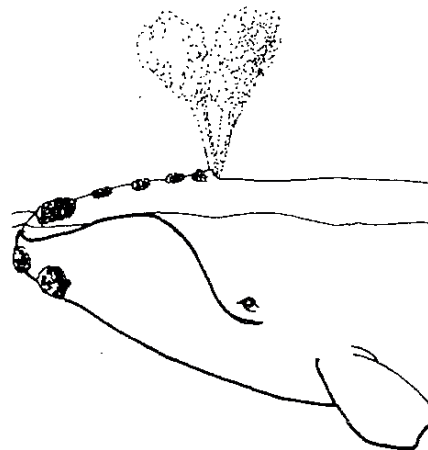
## BREATHING

A dolphin rarely breathes through its mouth, as you might when you have a cold. It takes air in and blows it out through its nostrils. During evolution, the dolphin's skull bones changed shape, and the nasal passages and nostrils moved up and back so that they are now on top of the dolphin's head. This means the dolphin needs only to push a small part of its head clear of the water to breathe quickly before submerging again.

In toothed whales, the nasal passages join inside the skull, so there is only one nostril at the top. The slit-shaped hole in the skin above the nostril is called the blowhole. It's surrounded by strong muscles that close the hole as the whale dives. Baleen whales have two nostrils and two blowholes, usually side by side.



*The orca spout*



*The right whale spout*

## MYSTERIOUS STRANDINGS

There are many theories about why this happens, including sickness or mistakes in finding their way with their magnetic sense. The species which strand the most are sperm whales, false killer whales, killer whales and long-finned pilot whales.

## EARS THAT "SEE"

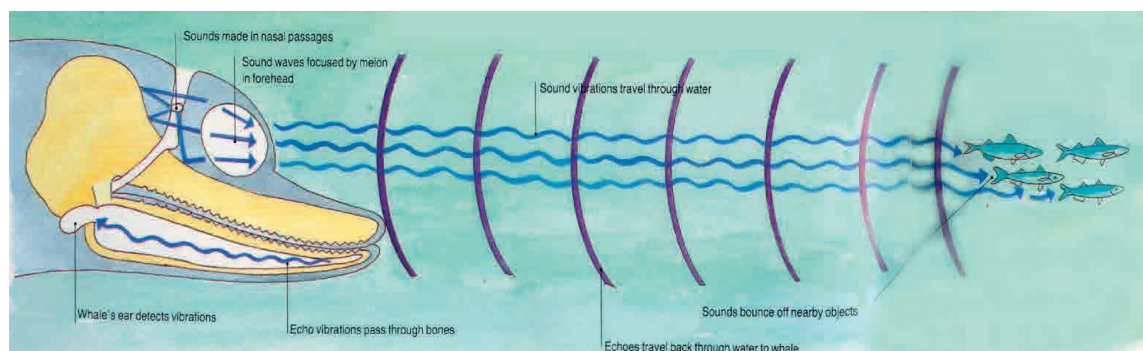
Whales and dolphins have the five main senses that you have (they can see, hear, and feel, and also taste and smell –but not very well).

Their hearing is particularly sensitive. Sounds travel well underwater, and whales and dolphins can hear the noises made by other whales far away, as well as the sound of fish and other sea creatures and our noisy ships and boats.

To make up for this, they have evolved a way to "see" by using sound. This is called echolocation; 'to locate an object by using echoes from sound.

Echolocation: What is it?

To use echolocation, the dolphins send out a series of clicks that resemble the sound you would make by running a fingernail along the teeth of a comb. The clicks travel through the water as sound waves. When they strike an object, they bounce back (echo). This echo is picked up by the whale who compares it to sounds it already knows. The animal then decides whether the echo is coming from a fish, a rock or something else in its environment.



## CAMOUFLAGE

Killer whales are black on the dorsal area and white on the ventral area. This pattern is the same than in dolphins, although not so striking. They show a dark gray color on the dorsal area, and a lighter gray color on the ventral area. This type of coloration is called "cryptic coloration" and is useful to mimic with their environment.

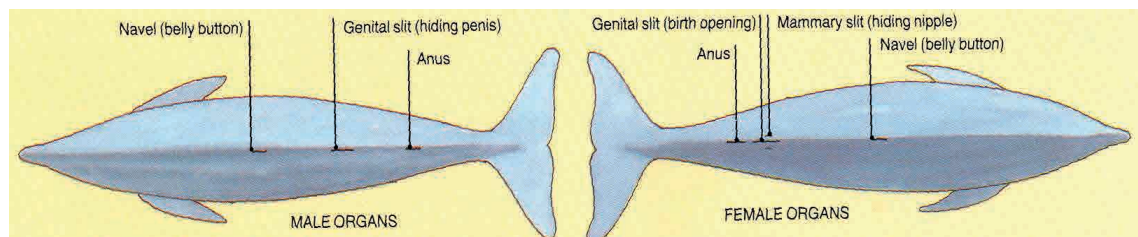
If we were at the sea and could observe the killer whales from the surface of the water, we could see that the black color of their back will mimic the dark under-sea. On the other hand, if we could observe killer whales from underneath, we could see the white belly which will fade with the sea surface, which is very shiny because of sunshine. This provides the killer whales a form of camouflage to hide their presence when they are in search of preys.

## BREEDING AND BABIES

The basic life cycle in whales, dolphins and porpoise is the same as in all the mammals, including land-dwelling mammals. They are born alive, take milk from their mothers, go through a period of immaturity, reach puberty, reproduce and subsequently die. The normal time required to complete a cycle range from about two years in some species to three or four years in others, but in a few species (killer whale, for example), this period can exceptionally stretch to eight or even ten years. Alternatively, if two cycles can continue simultaneously, as in the case of female that are both pregnant and lactating.

### SEXUAL MATURITY

The stage at which an animal is physically able to reproduce or breed, is attained between the ages of about 2 and 20 years, depending on the species and sex. Studies of killer whales in marine zoological parks suggest that females become sexually mature when they reach about 4.6-4.9 m., at about 6 to 10 years. Males become sexually mature when they reach about 5.5-6.1m, at about 10 to 13 years. The bottlenose dolphin begins breeding at 9-10 years old in females and 10-13 years old in males.



### PREGNANCY

The length of pregnancy (the gestation period) varies between about 10 and 16 months according to species. Gestation in killer whale is about 17 months, in bottlenose dolphin is eleven months.

### MATING ACTIVITY

Females come into estrus or "heat" several times during the year. Breeding may occur in any season, but is most common in summer. In the North Atlantic, mating seems to peak in October and November; in the western North Pacific, mating seems to peak between May and July.

### BIRTH AND CARE OF YOUNG

**Frequency of birth:** Based on limited data collected from populations at sea, a female may bear a calf every three or four years.

**Calving:** Calves are born in the water. Deliveries can be either tail-first or head-first. The umbilical cords snap during or soon after delivery

**Calf at birth:** The calf of a killer whale is about 2.4m long and weighs about 136-181 kg This color usually turns White by the age of one year. In the first few days after birth, the dorsal fin and flukes gradually stiffen

# ACTIVIDADES

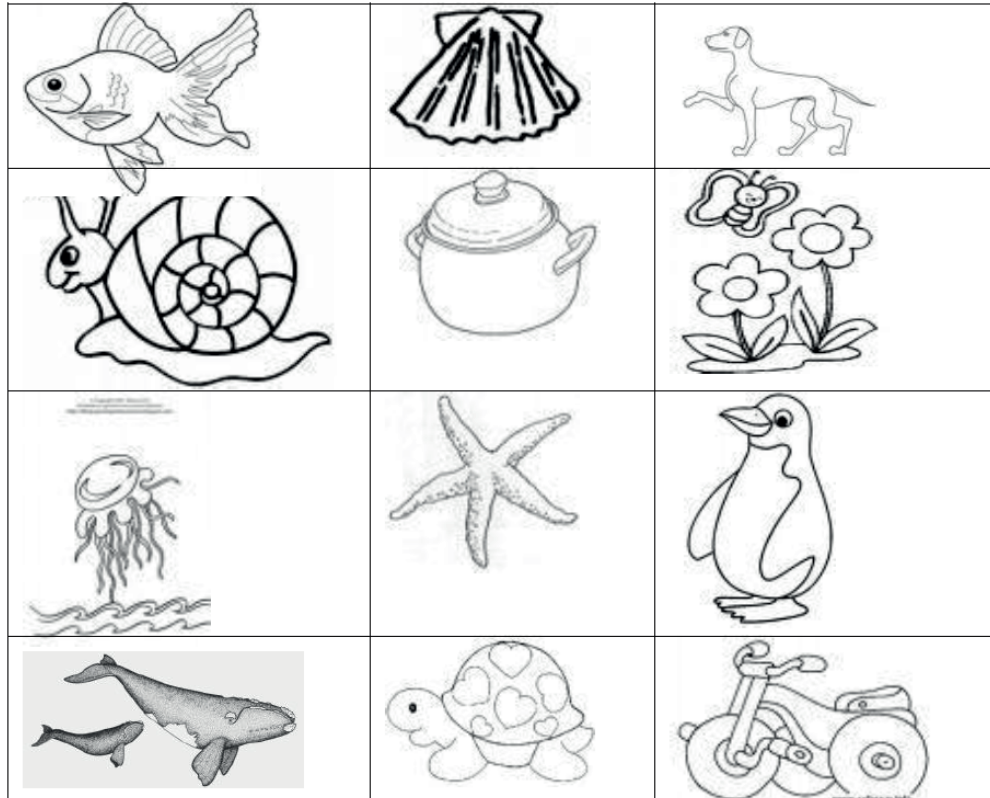
A LESSON OF LIFE

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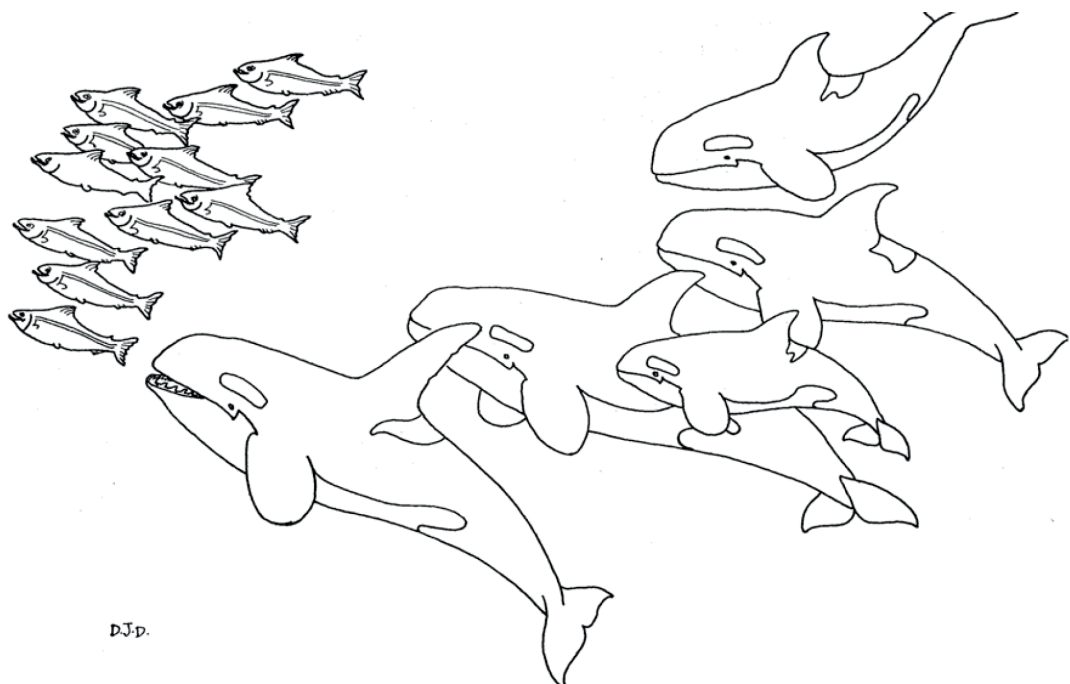


Activities suggested for kids older than seven years?

1- Find the pictures of everything related with the marine environment.



2- Paint pictures of killer whales chasing a fish shoal/school.





Activities suggested for kids older than eleven years.

3- Match the FACTS ABOUT Dolphins with the correct Dolphin by putting the letter of FACTS

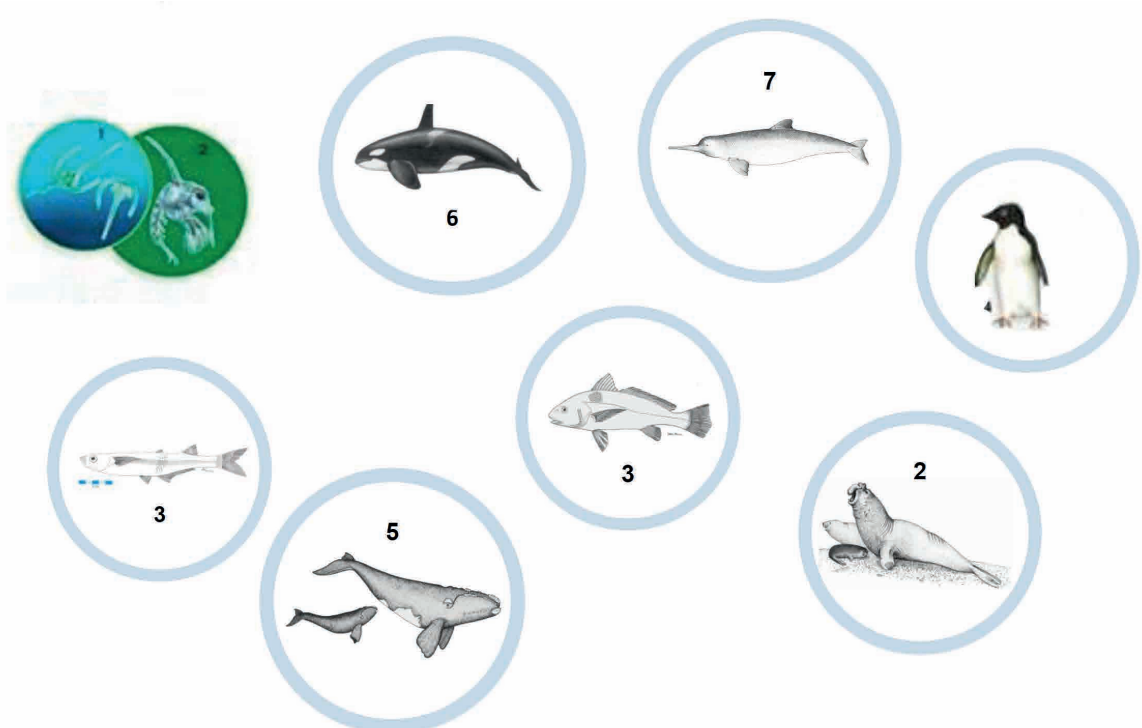
DOLPHIN

1. River Dolphin
2. Spinner Dolphin
3. Orca
4. Narwhal
5. Bottlenose Dolphin
6. Beluga
7. Beaked Whales

FACTS ABOUT DOLPHIN

- A. Has about 80 to 100 small teeth.
- B. The tusk can grow 3 mt.
- C. They have poor eyesight
- D. They dive to great depths.
- E. They are the oceans' top predators.
- F. One of the rorqual whales.
- G. Are the acrobats of the sea.

4- Who eats whom? The following organisms are relative through food or trophic chain. Match with the arrow from predator to prey.



1 y 2: Phytoplankton and zooplankton; 3: Fish ( Silver side and White Croaker ); 4: Magellanic Penguin; 5: Southern Right Whale; 6: Killer Whale; 7: La Plata River Dolphin.

5- Complete the following picture, considering the following characteristics: Dorsal fin, Caudal fin or flukes, Pectoral fins, blowhole, eye, ear, melon, genitals, anus.



6- In the map of America indicate the greater number of dolphin species, according to the previously given information.



7- Find in the alphabet soup the following words which characterize the dolphins:  
Mammal-Cetacean-Calf-Flipper-Tooth-Fish.

The direction of the words may be horizontal, vertical, backward or forward.

I	M	Q	H	T	O	O	T
C	A	A	A	A	C	N	I
E	R	A	M	I	A	E	M
T	I	C	E	M	N	S	E
A	L	B	L	L	A	F	R
C	C	A	L	F	R	L	P
E	C	O	I	R	E	I	A
A	H	R	W	E	S	P	S
N	P	D	A	N	T	P	T
I	A	A	R	W	O	E	I
A	T	T	E	T	N	R	G
S	L	I	H	F	I	S	H

8- Do you know how long a La Plata River Dolphin is? And a killer whale?

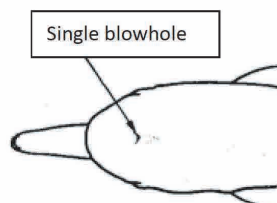
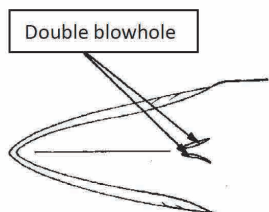
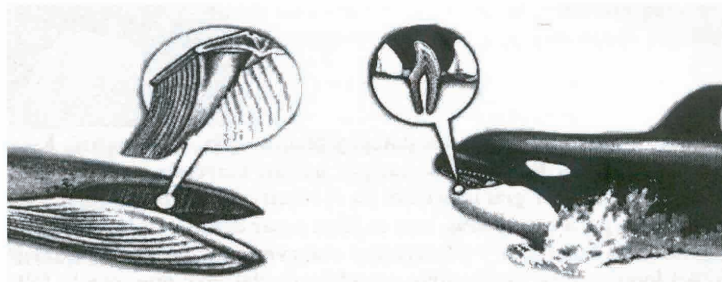
Draw a scaled picture of a La Plata River Dolphin, a Killer Whale and a Southern Right Whale. Consider the following average lengths:

La Plata River Dolphin or franciscana: 1.50 meters.

Killer Whale: 7 meters.

Southern Right Whale: 15 meters.

9- Look at the following pictures: classify them by their physical characteristics in Baleen Whales or Toothed Whales.



10- Killer whales are white in their ventral area (belly) and black in their dorsal area (back).

Considering that:

- The water visibility is very poor.
- If you submerged in the sea and look towards the surface of the sea it is very shiny because of sunshine, and if you look towards the bottom, it is very dark because of the lack of light.

Could you see the whales? Why? So, why is this color pattern useful for killer whales?

11- Scientists use Greek and Latin words to form an animal's scientific name. Use the word fragments below to help you decode whale names.

<b>alb</b> — white ( <i>Latin</i> )	<b>musculus</b> — muscle ( <i>Latin</i> )
<b>anglic</b> — English ( <i>Latin</i> )	<b>myst</b> — (1) mystic. (2) mustache ( <i>Greek</i> )
<b>atus</b> — provided with ( <i>Latin</i> )	<b>nov</b> — new ( <i>Latin</i> )
<b>balaena</b> — whale ( <i>Latin</i> )	<b>obliqu</b> — slanting sideways ( <i>Latin</i> )
<b>cavus</b> — hollow ( <i>Latin</i> )	<b>odon</b> — tooth ( <i>Greek</i> )
<b>cephal</b> — head ( <i>Greek</i> )	<b>-oides</b> — like ( <i>Greek</i> )
<b>cer</b> — horn ( <i>Greek</i> )	<b>orca</b> — great killer ( <i>Latin</i> )
<b>cet</b> — whale, sea monster ( <i>Greek</i> )	<b>orcinus</b> — belonging to the underworld ( <i>Latin</i> )
<b>crass</b> — thick, heavy ( <i>Latin</i> )	<b>-ops</b> — appearance ( <i>Greek</i> )
<b>delphin</b> — dolphin ( <i>Greek</i> )	<b>phocaen</b> — porpoise ( <i>Greek</i> )
<b>dens</b> — tooth ( <i>Latin</i> )	<b>physeter</b> — blower ( <i>Greek</i> )
<b>-ella</b> — suffix added to noun stem to indicate "small" ( <i>Latin</i> )	<b>pseud</b> — false ( <i>Greek</i> )
<b>eu</b> — true ( <i>Greek</i> )	<b>pter</b> — wing or fin ( <i>Greek</i> )
<b>fero</b> — to bear ( <i>Latin</i> )	<b>robustus</b> — strong, robust ( <i>Latin</i> )
<b>glacialis</b> — frozen ( <i>Latin</i> )	<b>rostr</b> — beak, snout ( <i>Latin</i> )
<b>glob</b> — globe, ball ( <i>Latin</i> )	<b>rhynch</b> — beak, snout ( <i>Greek</i> )
<b>-inus</b> — like ( <i>Greek</i> )	<b>sten</b> — narrow, straight ( <i>Greek</i> )
<b>-is</b> — daughter of ( <i>Greek</i> )	<b>-tes</b> — having to do with ( <i>Greek</i> )
<b>lagen</b> — flask ( <i>Greek</i> )	<b>trunc</b> — trunk, stem ( <i>Latin</i> )
<b>leuc</b> — white ( <i>Greek</i> )	<b>tursi</b> — porpoise ( <i>Latin</i> )
<b>lip</b> — (1) fat, lard. (2) to quit or fall. (3) perseverance ( <i>Greek</i> )	<b>vexill</b> — banner, flag ( <i>Latin</i> )
<b>long</b> — long ( <i>Latin</i> )	<b>ziph</b> (from <b>xiph</b> ) — sword ( <i>Greek</i> )
<b>macro</b> — long or large ( <i>Greek</i> )	
<b>meg</b> — great ( <i>Greek</i> )	
<b>mon</b> — single ( <i>Greek</i> )	

- |   |   |
|---|---|
| 1. Balaena mysticetus   | 9. Lagenorhynchus albirostris                               |
| 2. Balaenoptera musculus  | 10. Lipotes vexillifer                                      |
| 3. Cephalorhynchus commersoni<br>(Commerson was an 18th-century<br>French medical doctor and botanist.) | 11. Megaptera novaeangliae                                  |
| 4. Delphinapterus leucas  | 12. Orcinus orca  |
| 5. Delphinus delphis  | 13. Phocoenoides dalli<br>(Dall was an American zoologist.) |
| 6. Eschrichtius robustus<br>(Eschricht was a 9th-century Danish<br>Zoology professor.)                  | 14. Physeter macrocephalus                                  |
| 7. Eubalaena glacialis  | 15. Pseudorca crassidens                                    |
| 8. Globicephala macrorhynchus   | 16. Stenella longirostris                                   |
|   | 17. Tursiops truncatus                                      |
|   | 18. Ziphius cavirostris                                     |
|   | •   |

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# Programas Educativos

*educar es el primer paso para conservar*

Actividades didácticas para  
el trabajo en el aula

## A lesson of life

**The Pinnipeds - Teacher's Guide**



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## Objetives

- Understand the concepts related with biological areas in English Language.
- Give both the teacher and the pupil a work tool in order to enhance the marine mammals knowledge.
- Stimulate the interest and increase the knowledge about the sea and its fauna.
- Teach and show the habits, characteristics, behaviors and adaptation of Cetaceans and Pinnipeds through theoretical and practical activities.

## TO THE TEACHER

The Pinnipeds Teacher's Guide for students grades EP 2º-6º to ES 1º-6º was developed at Mundo Marino Foundation to help you to teach your students -in an active, hands-on way - about dolphins and their adaptation for a marine environment. The brief background information in this Guide was written for you, the teacher. It will help you to do these activities with your students.

Mundo Marino Foundation strives to provide teachers with up-to-date information and activities that motivate students to appreciate and conserve wildlife, the oceans, and the natural world.

Do you have comments or suggestions regarding the activities in this Teacher's Guide?

We'd love to hear your opinion. Write the Mundo Marino Foundation, Environmental Education Department

Email: [educacionambiental@mundomarino.com.ar](mailto:educacionambiental@mundomarino.com.ar)

## VOCABULARY

**Blubber** — layer of fat between the skin and muscle of most marine mammals.

**Calf** — the young of certain mammal species such as whales, manatees, and walruses.

**Colony** — a group of organisms of the same kind living together.

**Ecosystem** — a unit of plants, animals, and nonliving components of an environment that interact.

**Endangered** — in danger of becoming extinct.



Flippers — broad, flat limbs supported by bones and adapted for swimming.

Food chain — a diagram showing the transfer of energy via “who eats whom” in an ecosystem.

Habitat — the normal, usual, or natural place where a plant or animal lives.

Haul out — to leave the water to get on land or ice

Herd — a group of certain large animals that associate together.

Marine mammal — a mammal adapted to live in the marine environment and dependent on the ocean for food.

Molt — n. The shed exoskeleton, hair, feathers, or skin of an animal. v. To shed the exoskeleton or the outer layer of hair, feathers, or skin.

Pinnipedia — the scientific order that includes seals, sea lions, and walruses.

Predator —an animal that eats other animals.

Prey — n. an animal eaten by another animal. v. to hunt and eat other animals.

Pup — the young of certain animals such as seals, sea lions, and otters.

Threatened —likely to be in danger of becoming extinct.

Vibrissae — stiff, tactile whiskers on the face of certain mammals.

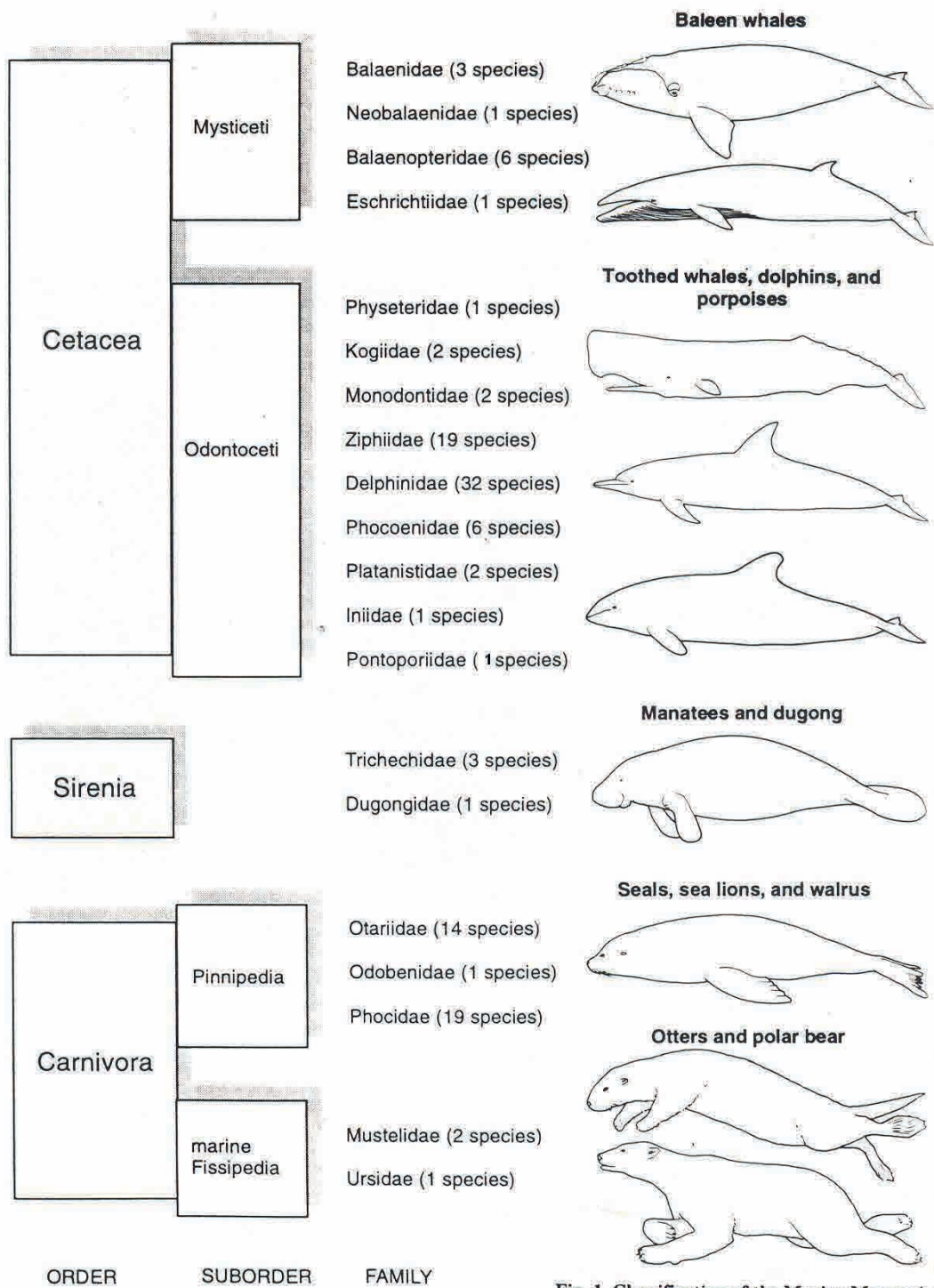


Fig. 1 Classification of the Marine Mammals

## ***What are Seals, Sea Lions and Walruses?***

The scientific order Pinnipeds are sufficiently like one another, and sufficiently different from all other groups of mammals, as to be instantly easily recognizable. There is a high degree of aquatic specialization which shows all over the body, from its general streamlined shape with all the attendant characters such as the reduction of pinnae and external genitalia, to the characteristic flippers.

These animals are pinnipeds.

Scientists group seals, sea lions, fur seals, and walruses together in the scientific order called Pinnipedia (Pinni-pedia foot with shape of a paddle). All pinnipeds have four flippers—one pair in front (foreflippers) and one pair in back (hind flippers), a thick layer of blubber, and sensitive whiskers called vibrissae.

Pinnipeds are divided into three families—the walruses, the true seals, and the eared seals. The eared seals, which include both sea lions and fur seals, have visible, external ear flaps.

Pinnipeds are mammals.

Pinnipeds share five characteristics with other mammals. They are warm blooded (they keep their body temperature at a roughly constant level, regardless of the ambient temperature), their pups are born alive, nurse their young, breathe through their lungs or have lungs, and have hair.

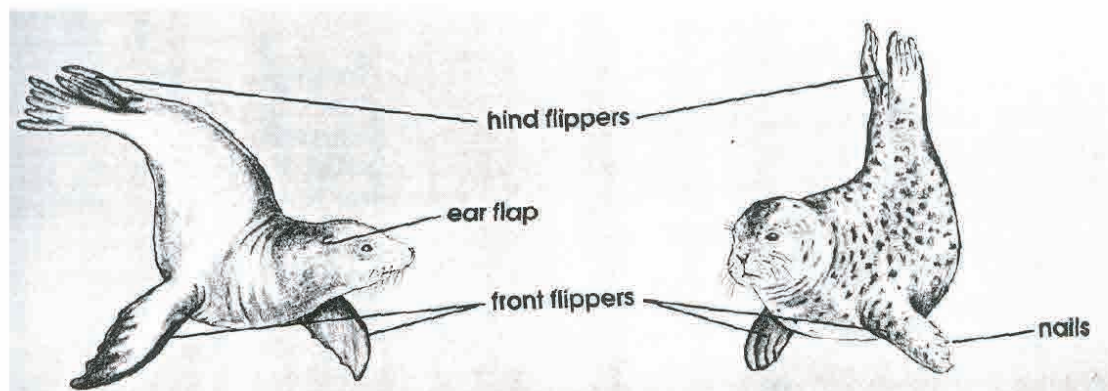
Pinnipeds live on land and in the sea.

Because these animals live in the marine environment and they find their food at sea, pinnipeds are marine mammals. Other marine mammals include whales and sea otters. Although pinnipeds spend most of their lives in the water, they come ashore to rest, give birth, and molt.

Once every year, usually in the spring, they gather on beaches or sea ice to give birth and breed. After the pupping season, adults often come ashore again to molt: they shed the outer skin layers with old fur and hair. They also haul out on shore to rest and bask in the sun throughout the year.

## What's the difference between Phocid, Otariid and Odobenid Seals?

PHOCIDS	OTARIIDS	ODOBENIDS
No external ears	Visible external ears	No external ears
Furred hind flippers that cannot be turned forward under the body	Hairless hind flippers that can be turned forward under the body and used for movement on land	Hairless hind flippers that can be turned under the body and used for movement on land
Mammae with 2 teats	Mammae with 4 teats	Mammae with 4 teats
Mostly marine; also freshwater and estuarine	Marine; occasionally ascend freshwater rivers	Exclusively marine
Variable breeding systems	Uniform breeding systems; all polygamous	Polygamous breeding system
Variable sexual dimorphism	Pronounced sexual dimorphism	Pronounced sexual dimorphism
Variable time of mating	Mating takes place a few days after birth	Mating takes place during lactation
Lactation period generally brief, from 4 days to several weeks	Lactation period relatively long, from several months to over 2 years	Protracted lactation, lasting 2 or more years.
Annual parturition	Parturition usually annual; sometimes biennial	Parturition biennial; longer interval between births elapses in older females
Females and males of many species fast or feed little during breeding and lactation	Females of all species feed during lactation; territorial males often fast during breeding	Females and males feed throughout breeding and lactation; feeding is reduced during northward migration
Milk tends to be rich in fat	Milk tends to be less fatty	Milk tends to be less fatty
Rapid growth rate of pups	Slower growth rate of pups	Slower growth rate to pups

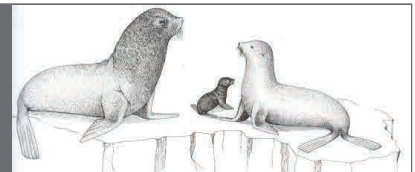


## PINNIPEDS PICKS

Use these cards to help your students get started exploring pinnipeds. Here are some ideas for ways to use these cards in your classroom:

- Use the facts on the cards to help you prepare lesson plans and lead discussions in class.
- Visit the school library to learn more about the animals. Groups may even adopt that animal as their “mascot” while working on this unit.
- Students compare similarities and differences among various pinnipeds

### **SOUTH AMERICAN FUR SEAL** *(Arctocephalus australis)*



**Size:** Male: about 2 m to 200 kg

Female: about 1.4 m to 50 kg

Calf: about 60 cm to 4 kg.

**Distribution:** On the coasts and offshore islands of South America between, Lima and Uruguay.

**Prey:** fish, cephalopods, crustaceans.

**Predators:** killer whales and sharks.

**Population:** 350.000 – 400.000.

**Status:** not endangered or threatened.



### **ANTARCTIC FUR SEAL** *(Arctocephalus gazella)*

**Size:** Male: about 2 m to 300 kg.

Female: about 1.5 m to 50 kg.

Calf: about 60 to 70 cm to 5 y 6 kg.

**Distribution:** Breeding colonies in islands surrounding the Antarctic. Also seen in Argentina, Uruguay, Southern Brazil coasts And South American Pacific 'Krill, adult males can prey on several species of penguins.

**Population:** 3.000.000.000 (95 % in Southern Georgias Islands).

**Status:** Least Concern (IUCN).

***SUB ANTARTIC FUR SEAL***  
***(Arctocephalus tropicalis)***



**Size:** Male: about 1.9 m to 160 kg.

Female: about 1.3 m to 55 kg.

Calf: about 60 cm to 4-5 kg.

**Distribution:** Mostly distributed in Islands that lie north of Antarctic Convergence.

**Prey:** squid, krill, fish, sometimes, penguin and other birds marine.

**Population:** 300.000-350.000.

**Status:** Appendix II (CITES). Low risk species (IUCN).



***SOUTHERN ELEPHANT SEAL***  
***(Mirounga leonina)***

**Size:** Male: about 4-5 m to 3-6 tn.

Female: about 2-3 m to 900 kg.

Calf: about 1.3 m to 40 kg.

**Distribution:** Is circumpolar and is found on most of the subAntarctic islands. Breeding colonies are to be found near Punta Norte, Tierra del Fuego and Antarctic Islands.

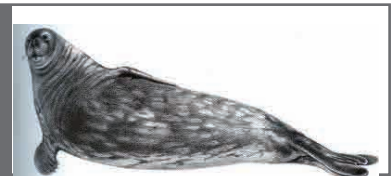
**Prey:** fish and cephalopods.

**Predators:** Leopard seal and killer whale.

**Population:** 600.000 – 700.000.

**Status:** Appendix II (CITES). Low risk species (IUCN).

***WEDDELL SEAL***  
***(Leptonychotes weddellii)***



**Size:** Male: about 2.5 to 320.

Female: about 3.5 m to 550 kg.

Calf about 1.5 m to 29 kg.

**Distribution:** Is the most southerly of the Antarctic seals. It's circumpolar and coastal, being normally found on fast ice within sight of land.

**Prey:** fish, cephalopods, various crustaceans, (larger shrimps and amphipods).

**Predators:** polar bear and killer whale.



**CRABEATER SEAL**  
*(Lobodon carcinophaga)*

**Size:** Male: about 2.6 m to 200 kg.

Female: about 2.6 m to 250 kg.

Calf: 1.15 m about to 20 kg.

**Distribution:** Is the most abundant seal in the world. It's gregarious, circumpolar and pelagic, being found on the drifting pack ice.

**Prey:** krill and crustacean (Euphasiids). Species of pelagic-benthonic habits.

**Predators:** Leopard seal and killer whale.

**Population:** 11 – 12.000.000.000.

**Status:** Low risk species (IUCN).

**LEOPARD SEAL**  
*(Hydrurga leptonyx)*



**Size:** Male: about 3 m to 350 kg.

Female: about 3.5 m to 450 kg.

Calf: about 1.5 m to 30 kg.

**Distribution:** Coast of the Antarctic Continent.

**Prey:** This seal is near the top of the Antarctic food chain, krill, marine birds, fish, squid.

**Predators:** killer whales and sharks.

**Population:** 250.000 to 800.000.



**ROSS SEAL**  
*(Ommatophoca rossi)*

**Size:** Male: about 3 m to 180 kg.

Female: about 2.5 m to 180 kg.

Calf: about 1 m to 17 kg.

**Distribution:** All round the Antarctic.

**Prey:** Squid, fish and krill.

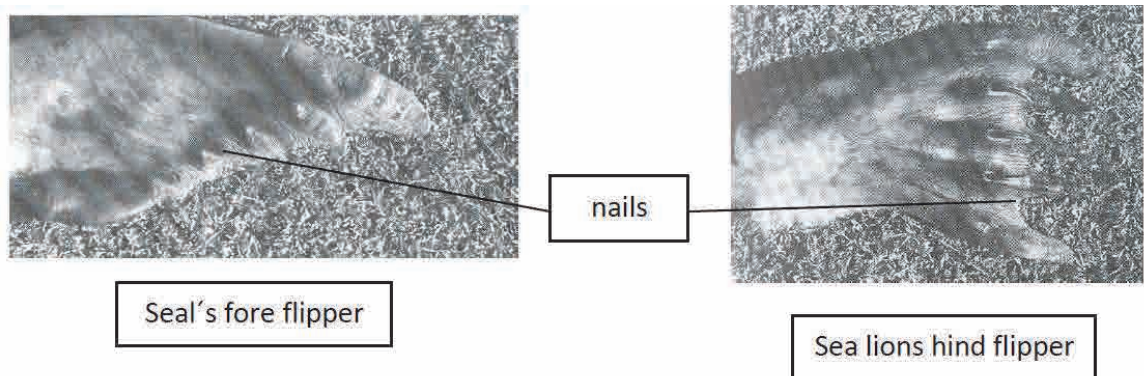
**Predators:** Leopard seal and killer whale.

**Population:** 100.000 to 150.000.

**Status:** Low risk specie (IUCN).

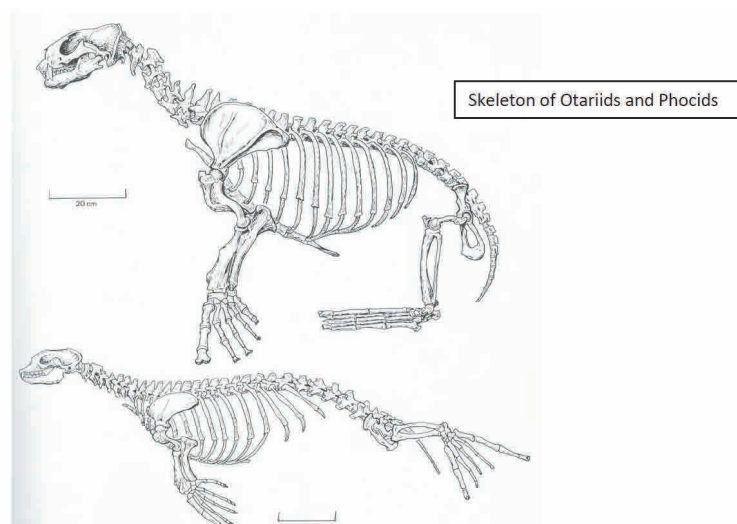
## FLIPPERS AND LOCOMOTION

The size and shape of the limbs are perhaps the most obvious ways in which seals differ from a typical land mammal. Leg and arm bones are relatively short and are within the body outline. The axial in otariids and walrus falls at about the middle of the forearm, and in phocids at the wrist. In all the three families the hind flipper is free only from the ankle.



In phocids the propelling mechanism is at the hind end of the body and, because for mechanical reasons a long neck is impracticable, the head merges into the trunk without a clearly defined the neck region. The movements are assisted by lateral swinging of the hind end of the body, and there is consequently great development of the spinal musculature. When swimming fast the foreflippers are usually held close to the body, but the used when change direction, and are sometimes used in paddling movements when the animal is going very slowly.

Otariids have considerable agility on land. When walking on land the whole of the belly is held clear of the ground and from the short-legged silhouette it's easy to see why the old sealers used to refer to them as "sea bears". The foreflippers are moved alternately when the animal is going slowly. The hind flippers are also moved alternately, raised so that only the heel rests on the ground. As the animal moves more quickly, a gallop results with both foreflippers being moved forward together, followed by both hind flippers.





## DENTITION

Depending on the species, there is a reduction of teeth in pinnipeds. There are never more than three upper and two lower incisors in each half jaw in pinnipeds, and sometimes less than this. There is a total absence of carnassials teeth in living forms, and the nearly homodont condition of the cheek teeth means that is frequently convenient to refer to them collectively as postcanines or cheek teeth rather than premolars or molars.

The milk dentition is very feebly developed in all seals. The permanent incisors and canines have milk precursors in the normal way, but of the postcanines only the second, third and fourth are preceded by milk teeth.

The permanent teeth of the various members of Otariidae are far less diverse in their shape than are those of the Phocidae.

The age of the most seals can be deduced, reasonably accurately, from the growth layers in the roots of canines.

## SENSES

### Touch

Seals vary a great deal in their sensitiveness to touch. Elephant seals, walruses and sea lions are strongly thigmotactic and will crowd together so that their bodies are touching even when there is plenty of space available. This probably has at least a certain amount of thermoregulatory function.

### Smell

The olfactory lobes of the seal brain are small, but in spite of this it is likely that this sense of smell plays quite an important part in the life of the animal.

Immediately after the birth of the pup the female will spend much time touching it with her nose.

The odor of the sweat glands is presumably appreciated in the breeding season.

### Taste

The tongues of seals are usually rather short, wide at the back and tapering to a notched tip, except in the walrus in which the tip is rounded.

### Sight

Seals are agile animals that feed on relatively small prey, so they have need to have large eyes that are housed in large orbits for good visual acuity. The nictitating membrane is present, but the supporting cartilage varies in size.

The exposed part of the eye is protected by the corneal epithelium being strongly keratinized.

### **Vision on land**

On land a seal will see clearly only in bright light. Seals seem to respond mainly to large objects appearing on the skyline or to rapid movements.

In water, seal eyes are thus particularly adapted for functioning where their visual acuity is said to be as great as that of a cat on land.

The Seals, are blind in one of both eyes, as they are usually in a well- nourished condition. But the lack of sight does not seem to handicap them in obtaining food.

### **Hearing**

Phocids have no external ear pinna. The opening of the external auditory the side of the head and is a small oval hole.

Otariids have a small external ear pinna.

Underwater, seals are better than fissipeds and have good directional hearing.

Phocids differ from otariids and odobenids in being slightly more modified for the resonant reaction.

### **Sounds**

Barking, snoting, roaring, a rattling sound like a distant motor bike, a lowing, or an explosive cough-grunt are the most usual sounds produced by seals in air, and they use these in various ways to indicate alarm, aggression, or to locate pups.

The sounds produced under water are not always the same as those made in air. Clicks, trains

## **DIVING**

Under natural conditions, seals dive to depths that are difficult to measure accurately. As we already mentioned at least some seals are capable of remaining under water for over an hour and for this length of time they are swimming about without access to further supplies of oxygen. A human pearl diver can lonely stay under water for about 2.5 minutes before the increased carbon dioxide in the blood stimulates the breathing reflex and the person must come to the surface before the brain is damaged from lack of oxygen. How then has a seal access to so much more oxygen?

Before diving, and to avoid the effects of pressure, the marine mammals exhalate the air in their lungs, diving with empty lungs. They concentrate the oxygen they need underwater in muscles and blood. On the contrary, the terrestrial mammals concentrate the oxygen mainly in their lungs. This adaptation allows them to stay long periods of time diving, without coming to the surface to breath. Other adaptation developed by these animals to dive is that they can voluntarily shut their nostrils before submerging.

## REPRODUCTION

### Male Reproductive organs

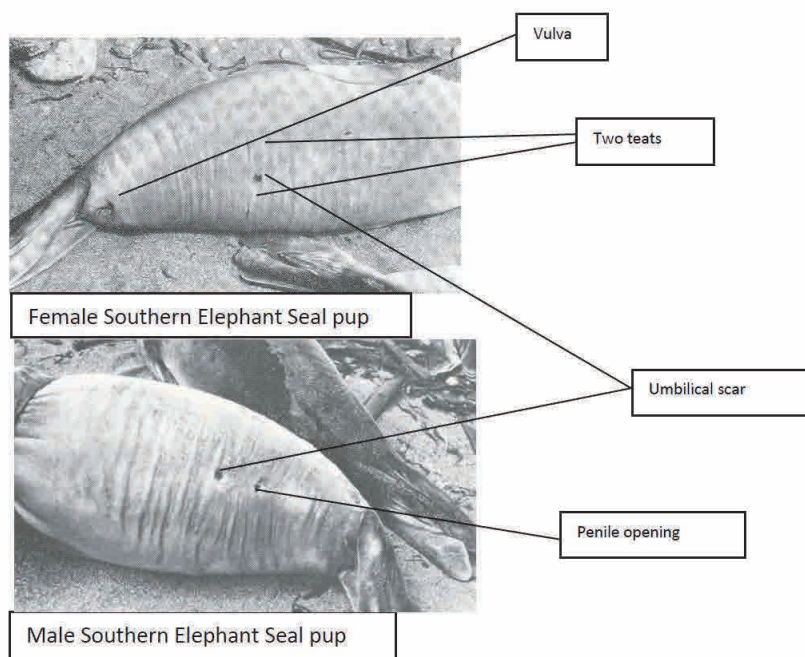
In all seals the penis is retractable within a cutaneous pouch, the external opening of which is mid-ventrally, between the anus and umbilicus.

Seals possess a baculum, or os penis, which is the ossified anterior end of the corpus cavernosum.

In Otariidae the testes are scrotal and lie in the normal position just anterior to the tail and anus, covered with skin. The adult males have only infantile testes, and the animals tend to be more slender and finely built than normal bulls, and lack their aggressiveness.

### Female Reproductive organs

The ovary is enclosed in a double fold of peritoneum, which forms an ovarian bursa, a sac that is many times the size of the ovary in a mature animal.



Gestation period.

The total gestation period, that is the entire period between fertilization and parturition varies. It may be, for instance about nine months to 12 months depending the species.

Pinnipeds normally produce a single young at birth. Twins are relatively rare.

Milk

Seal milk is particularly rich in fat, has a high level of protein and a low level of water.

The high fat and protein content can be correlated with the fast rate of growth of the pup, the frequently short lactation time, and the need to lay down an insulating layer of blubber as soon as possible. It's also correlated with the need for water conservation by mother, as concentrated milk would facilitate its storage by the mother during the periods when she is away at sea feeding and the pup is therefore not suckling.



# ACTIVIDADES

A LESSON OF LIFE

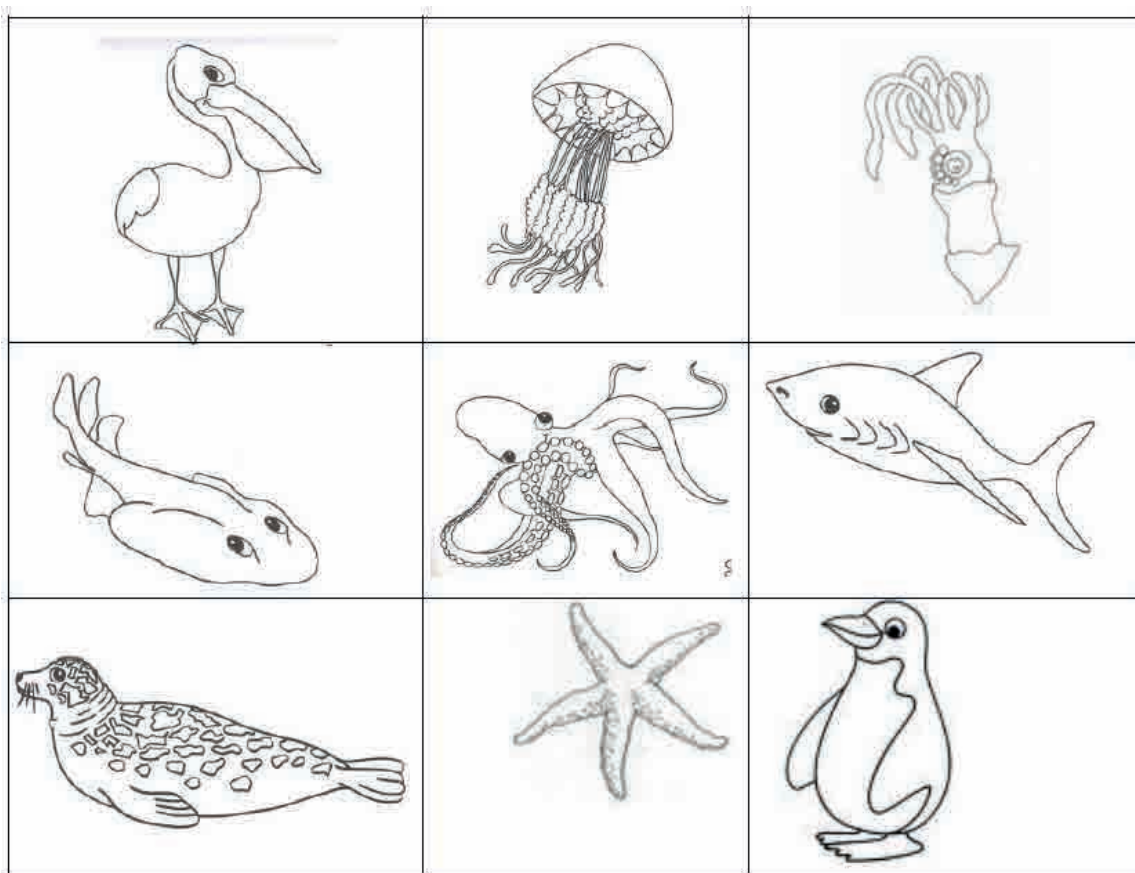
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Activities suggested for kids older than seven years.

1- Draw a picture showing the environment in which some of the above mentioned specimens live. Then paint it.

2- Find the pictures of everything related with the pinnipeds.

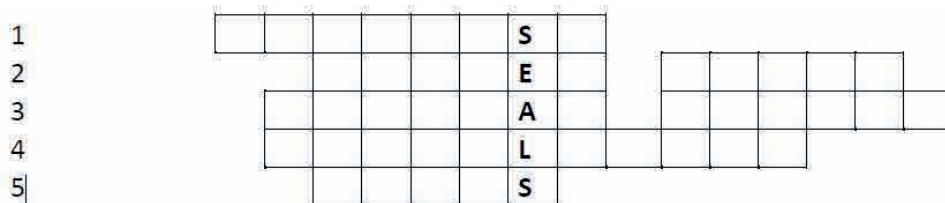


Activities suggested for kids older than eleven years.

3- Complete the following picture, considering the following characteristics:  
Front flippers, hind flippers neck, eyes, nose, mouth, ear, and moustaches.



4- Complete the following crosswords. Use the references below.



**References:**

- 1- No external ears
- 2- The most usual predator of pinnipeds
- 3- The biggest specimen of phocid in our country
- 4- Name of the front flippers in pinnipeds
- 5- Food of most pinnipeds

5- Find in the alphabet soup the following words, which characterize the dolphins:  
Mammal-Pinnipeds- Pup- Squid-Nails.

The direction of the words may be horizontal, vertical, backward or forward.

I	M	Q	H	T	P	U	P
P	A	A	A	A	C	N	I
I	R	A	M	I	A	E	M
N	I	C	E	M	N	S	E
N	L	B	L	L	A	S	R
I	A	L	F	A	R	L	P
P	C	O	I	R	E	N	A
E	H	R	W	E	S	W	S
D	P	S	L	I	A	N	T
S	A	A	R	W	O	U	I
A	T	T	E	T	N	R	G
S	Q	U	I	D	I	S	H

6- Complete this diagram to show maximum diving depths of five Pinnipeds and compare with the human:

Sea lion - 170 m – 7 minutes

South Elephant Seal - 1200 m – 2 hours

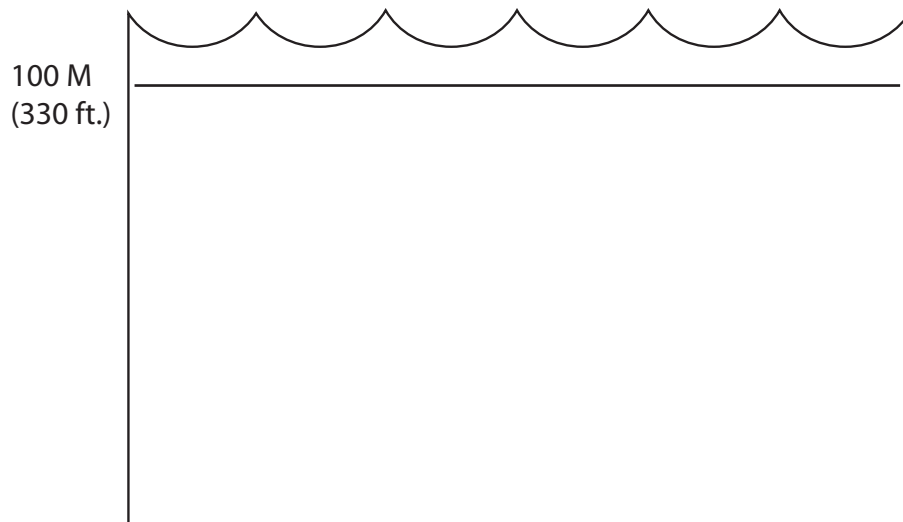
Weddel Seal - 300 m – 15 minutes

Crabeater Seal - 430 m – 11 minutes

Ross Seal - 100 m – 6 minutes

Human - 1.8 m – 1.5 minutes

How deep do they dive?



7- Before diving, a man breath and fill his lungs with air. The phocids breath air just like us. What do phocids do when they dive? Mark with a cross the correct sequence.

- a) Inhalate – dive – keep the nostrils shut.
- b) Inhalate – dive – keep the nostrils opened.
- c) Exhalate – dive – keep the nostrils shut.

8- Complete with a cross the characteristics shown in the following table.

	Ears		Nails on the fins		Movements in the land		Movements in the water		Hair	
	Present	Absent	Forelimbs	Hindlimbs	Walk	Drag	Foreflipper	Hindflipper	Present	Absent
<b>Sea Lions</b>										
<b>Seals</b>										
<b>Walrus</b>										

9- The fur seals and phocids are heterodont: they have incisive, canine and post-canine teeth. They have two dentitions, one temporary or milk teeth and a definitive one.

Compare the teeth of a fur seal or a phocid with the teeth of the following animals?

Which is most similar?

Cat –Hare – Dog – Horse – Man

According to the previous comparison, which is the terrestrial mammal group most related with fur seals and phocids?

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