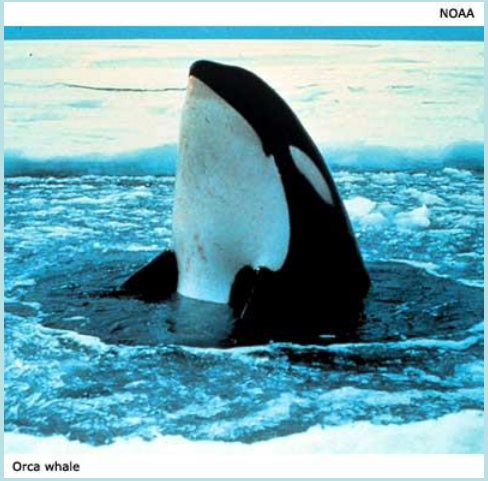
Marine Mammals

Characteristics of Marine Mammals

- All organisms in **class Mammalia** share these characteristics:
  - They have hair on some part of the body.
  - They nourish their young with milk provided by mammary glands.
  - Mammals are **homeothermic** (warm-blooded) with a constant internal temperature.
  - The majority give birth to live young (viviparous).



Orca whale

Order Carnivora

- Prominent canine teeth
- Sea otters
- Polar bears
- Pinnipeds
  - Walruses
  - Seals
  - Sea lions
  - Fur seals

Carnivora

(a)

(b)

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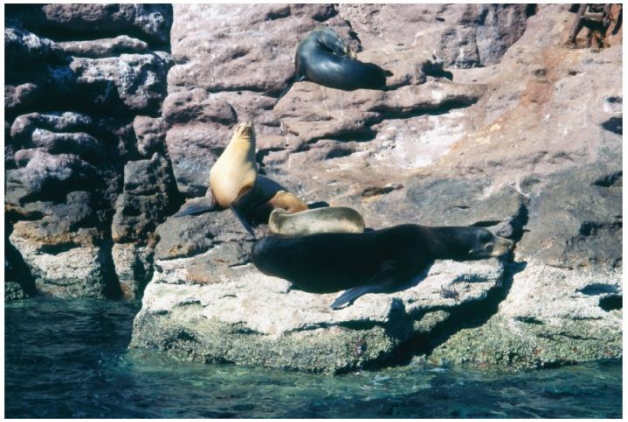

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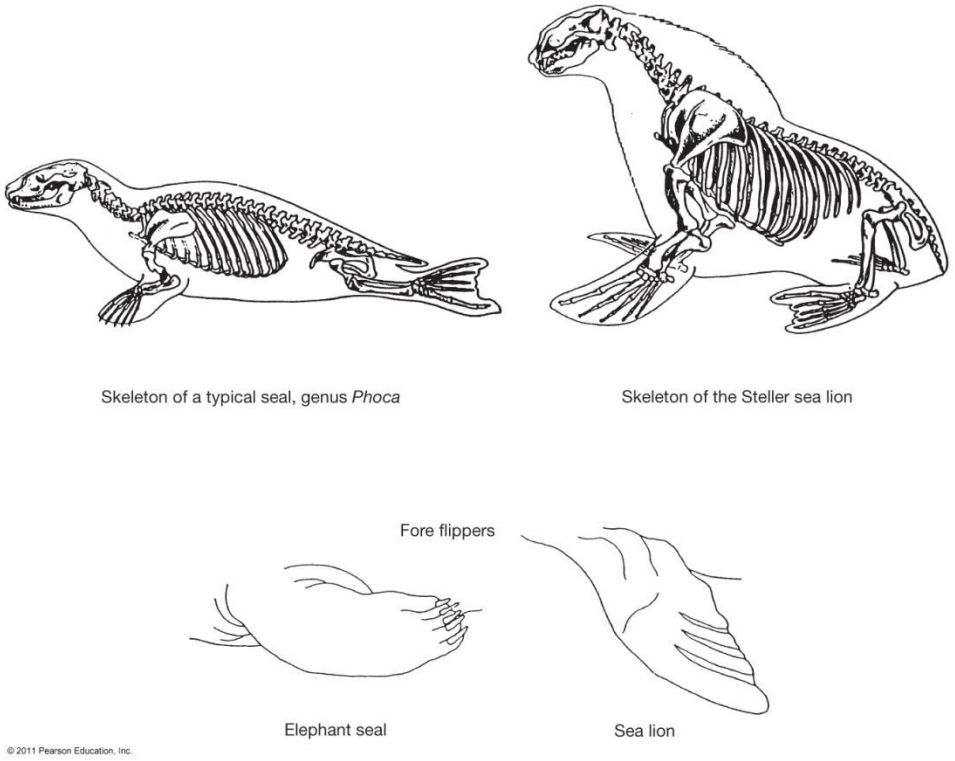
Pinnepeds

- Pinnepeds are marine mammals that have flippers and blubber, that need to breed on land.
- Seals, Walruses, and Sea Lions all belong to this Order Carnivora.
- Pinnepeds live in cold water, they have a thick layer of blubber to keep them warm.

Seals vs. Sea Lions and Fur Seals

- Seals lack prominent ear flaps
- Seals have smaller front flippers
- Seals have fore flipper claws
- Different hip structures
- Different locomotion strategies



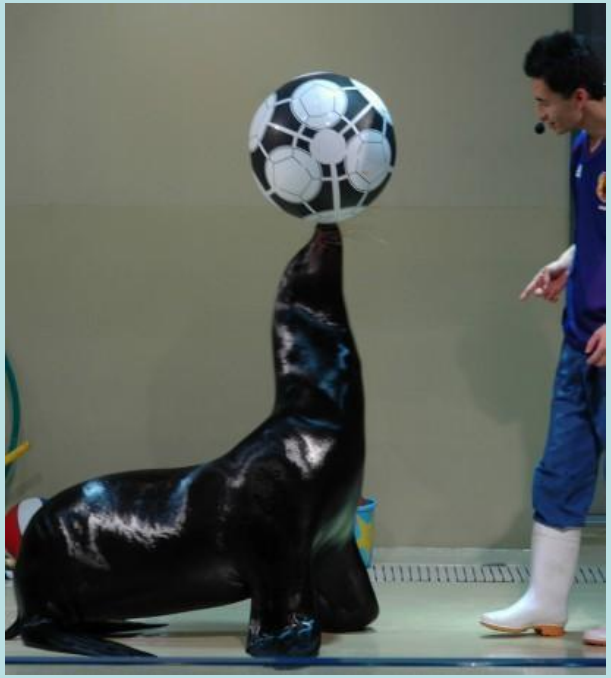
- They are mostly carnivores and feed on squid and fish.
- They have streamlined bodies and are excellent swimmers.

Seals

- Seals have rear flippers.
- They move forward by pulling themselves along the ground.
- Seals do not have ear flaps.
- They are hunted for their fur and are protected by the Marine Mammal Protection Act of 1972.
- There are approximately 19 species of Seals.
- Seals are the largest group of pinnepeds.

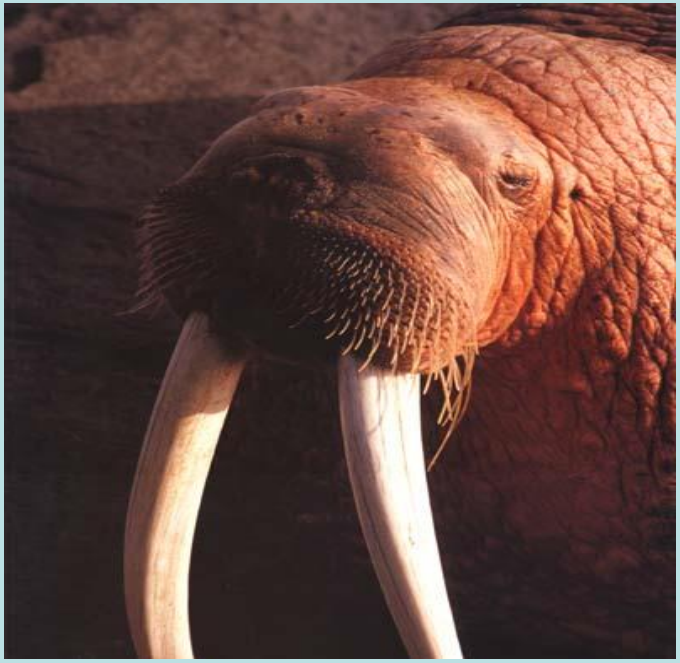
Sea Lions

- Are also called Eared Seals, because they have external ear flaps, AKA “True ears.”
- They can move their rear flippers forward to walk.
- They are graceful and agile swimmers.
- These are the “guys” that you see at an Aquarium doing neat tricks and they also work for the US Navy!
- At one time they were hunted for their fur, but are now protected by the MMPA of 1972.



Walruses

- Have large protruding tusks for digging up mollusks. They love to eat clams!
- They have stiff whiskers, vibrisae, for feeling around on the ocean floor.
- They are the largest Pinneped, weighing up to 2700 lbs!



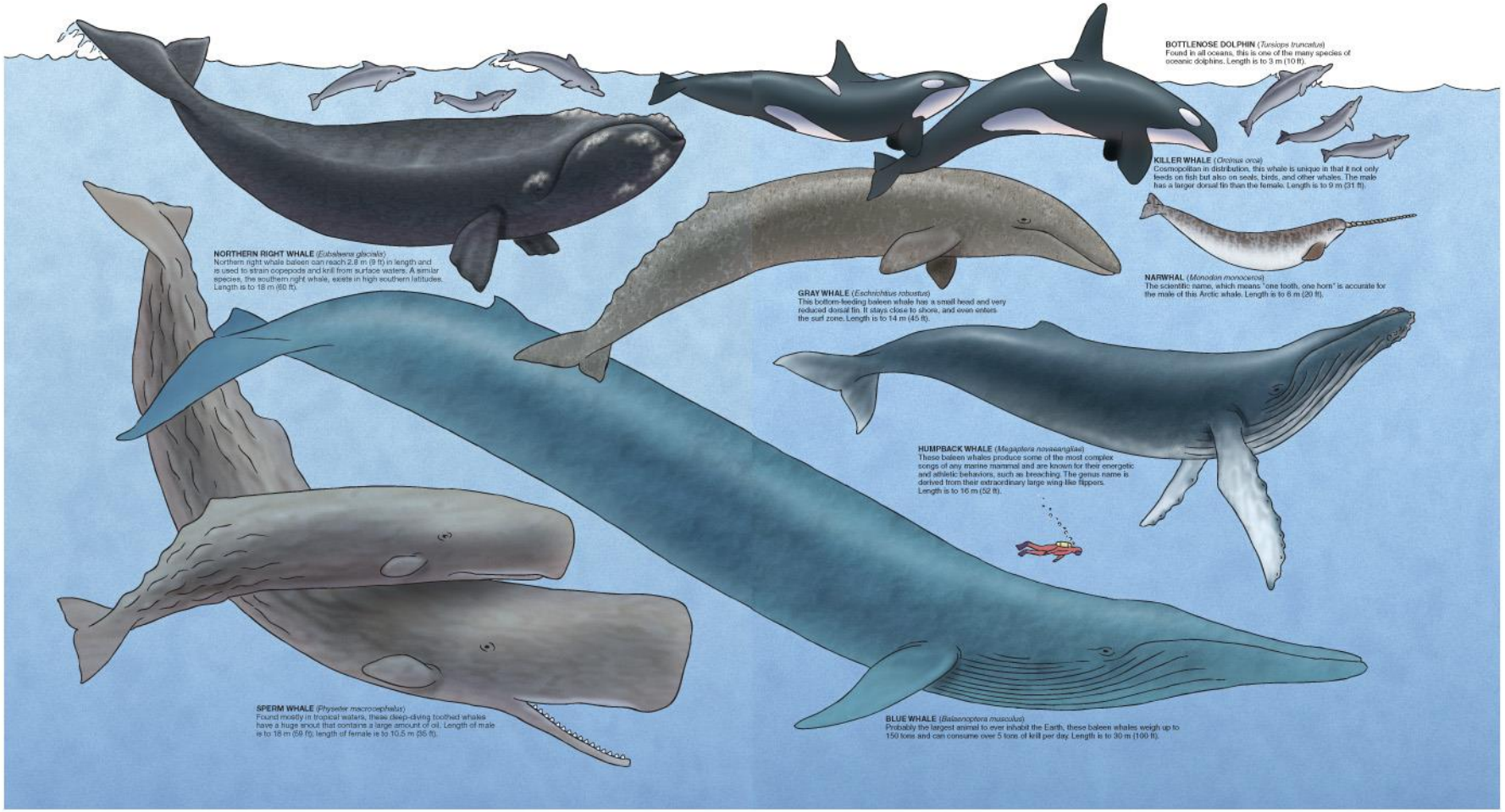
Sea Otters

- Are members of the Order Carnivora.
- They are the smallest Marine Mammal, weighing 60-80 lbs.
- They lack a layer of blubber, and make up for it by trapping air in their dense fur.
- They were slaughtered to the brink of extinction for their beautiful fur, but became protected by an international agreement in 1911.
- They are playful, and intelligent.
- They eat mostly shell fish and spend most of the day maintaining their fur.

Largest of Bears
Polar Bears *Ursus maritimus:*

- They are semi aquatic, and inhabit both the land and the sea – excellent swimmers.
- Polar bears live in countries that ring the Arctic Circle: Canada, Russia, the United States (in Alaska), Greenland and Norway.
- Appear to be white, but their hair is actually transparent; the white results from light being refracted through the clear hair strands – adaptive camouflage.
- They feed primarily on seals.
- Fat is used for heat insulation and buoyancy in H20.
- Females usually give birth to twin cubs.
- They have recently been put on the endangered species list because of loss of habitat due to global warming.

Order Cetacea



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Order Cetacea

- Whales, porpoises, dolphins: in different families organized under **order Cetacea**. Cetaceans are divided into two suborders:
  - **Suborder Mysticeti**: filter feeders made up of baleen whales (e.g., blue whale, humpback whale.
  - **Suborder Odontoceti**: toothed whales made up of sperm whales, dolphins and porpoises. They are predators.

Special Attributes of Dolphins, Whales and Porpoises

- This is the largest group of Marine Mammals, consisting of Whales , Dolphins, and Porpoises.
- These, of all the Marine Mammals, have made the most complete transition to aquatic life.
- These animals spend their entire lives in the water.
- They are streamlined, and look remarkably fish-like.
- They breathe air through lungs and have nostrils on the tops of their heads called a blowhole (some single, some double).

Order Cetacea

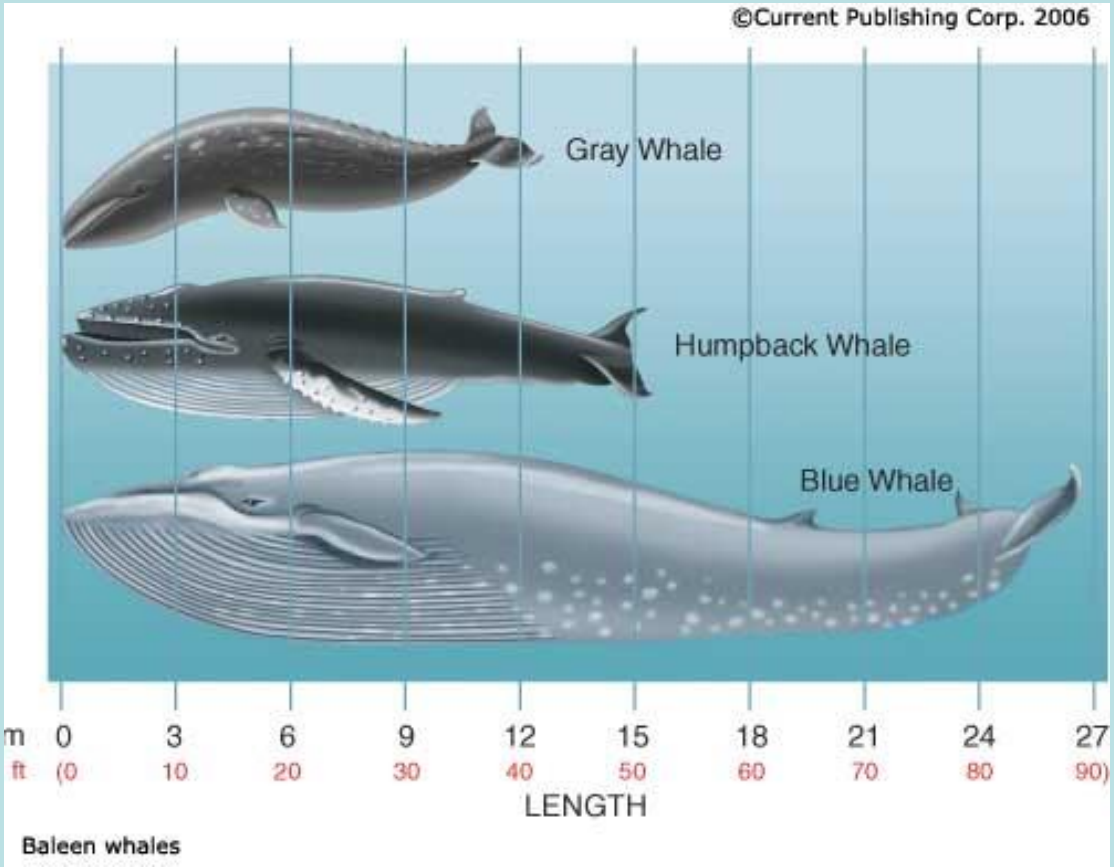
- Suborder Odontoceti (toothed)
  - Dolphins, porpoises, killer whale, sperm whale
  - Echolocation to determine distance and direction to objects
  - Determine shape, size of objects

Dolphins vs. Porpoises

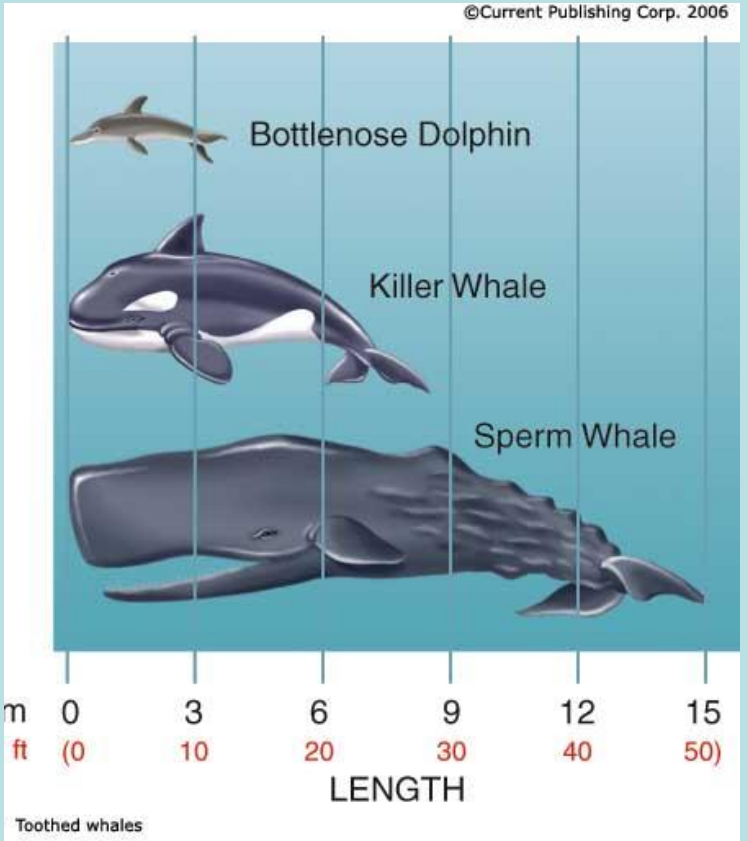
- Porpoises
  - Smaller, more stout body shape
  - Blunt snout
  - Triangular, smaller dorsal fin
  - Blunt or flat teeth
- Dolphins
  - Larger, more streamlined shape
  - Longer rostrum
  - Falcate dorsal fin (hooked)
  - Pointy teeth like killer whales (orca)

- Most cetacea use echolocation and communicate by sound.


Bottlenose dolphin



Baleen whales

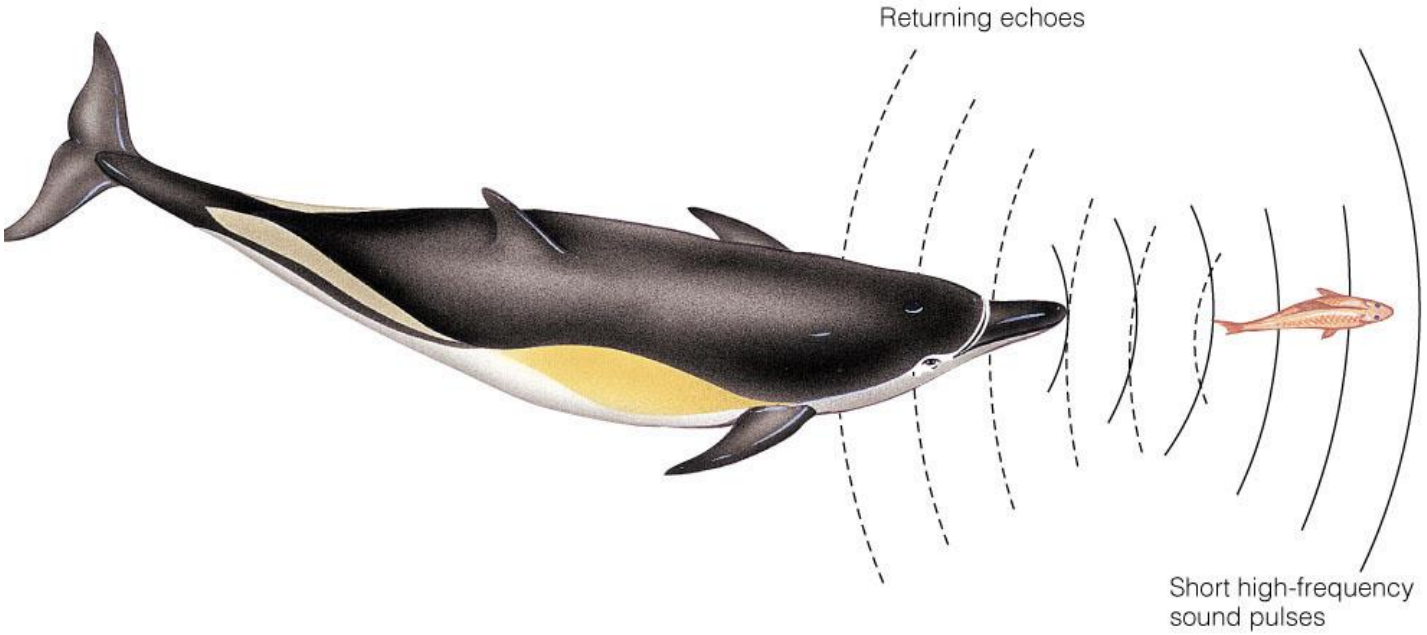


Toothed whales

Echolocation

- Toothed whales send sound through water.
- Sound is reflected, returned to the animal, and interpreted.
- An evolved inner ear structure may help toothed whales pick up sounds.
- Increased marine noise pollution may affect cetacean echolocation.

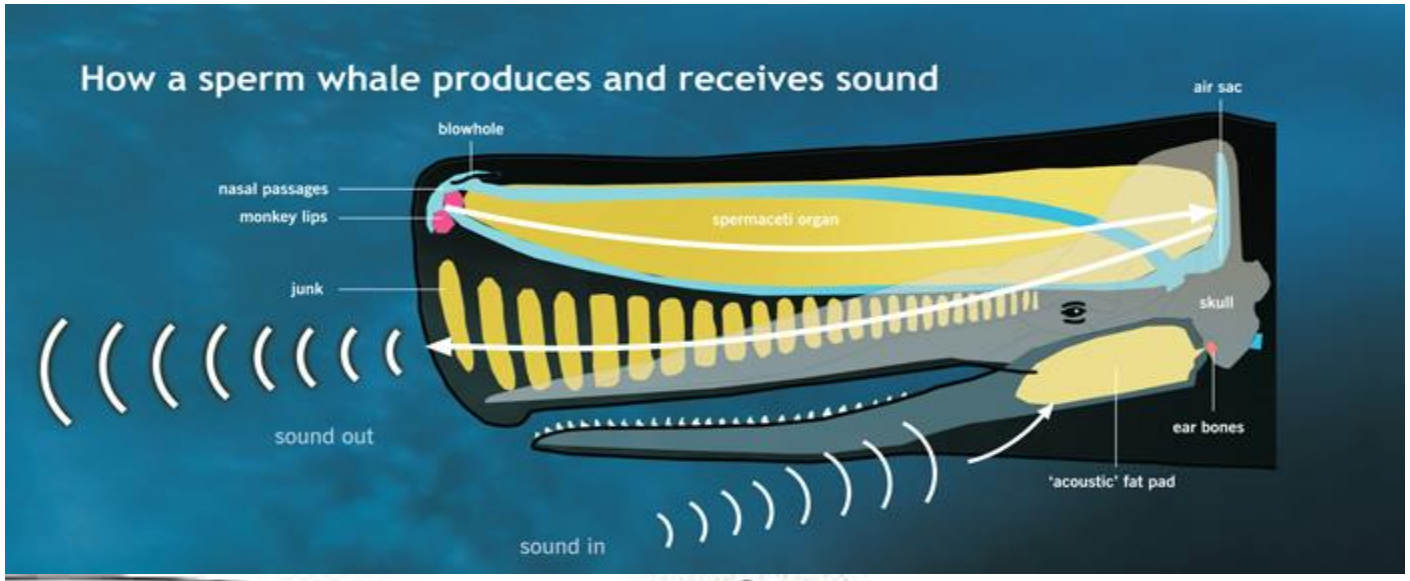
Sonar waves are used as high and low frequency pulses

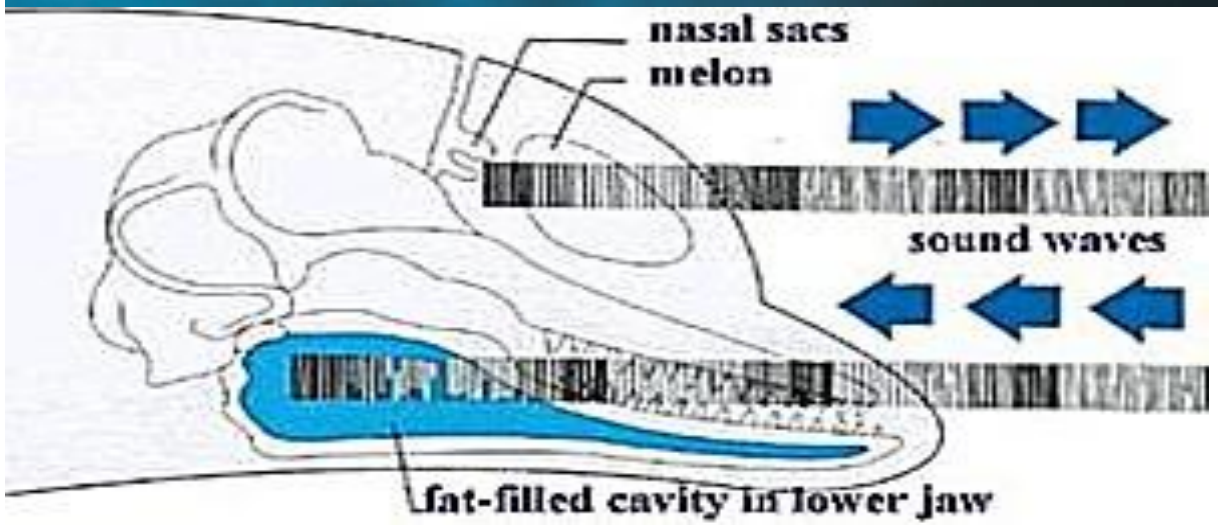


Marine animals have evolved effective adaptations for capturing prey, avoiding danger and maintaining thermal and fluid balance with their environment.

(above) Echolocation, used by toothed whales to locate and perhaps stun their prey.

Echolocation is similar in both Dolphins and Whales. They create sound waves directed from their heads to objects. When the sound waves return, they use acoustic nerves to create a picture of the object in their brain.



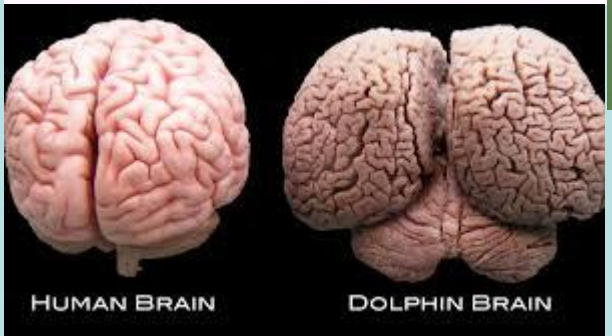


Intelligence in Toothed Whales

- Large brains relative to body size
- Communicate with each other
- Brains convoluted
- Trainable

- Dolphins live in highly social pods as intelligent animals with their own system of language, behavior and self awareness.

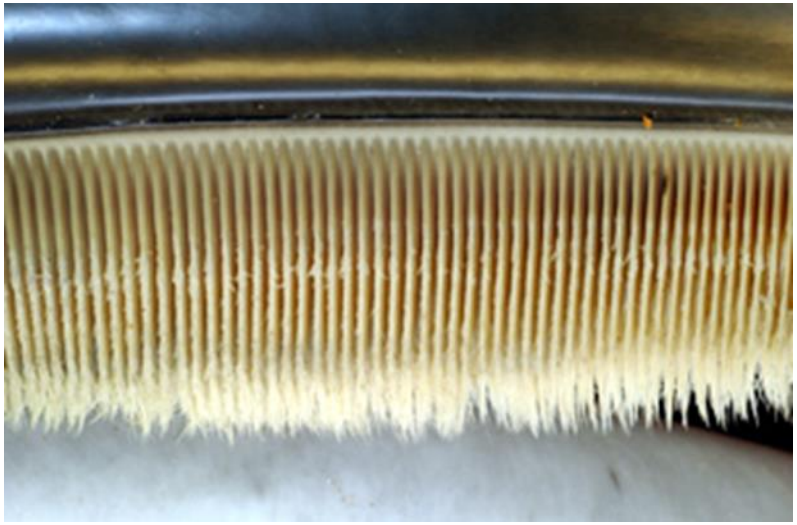
Both humans and dolphins have large complex brains



Dolphins in the FL Keys use "mud nets" to help catch mullet as they jump out of the rings and into Dolphin mouths

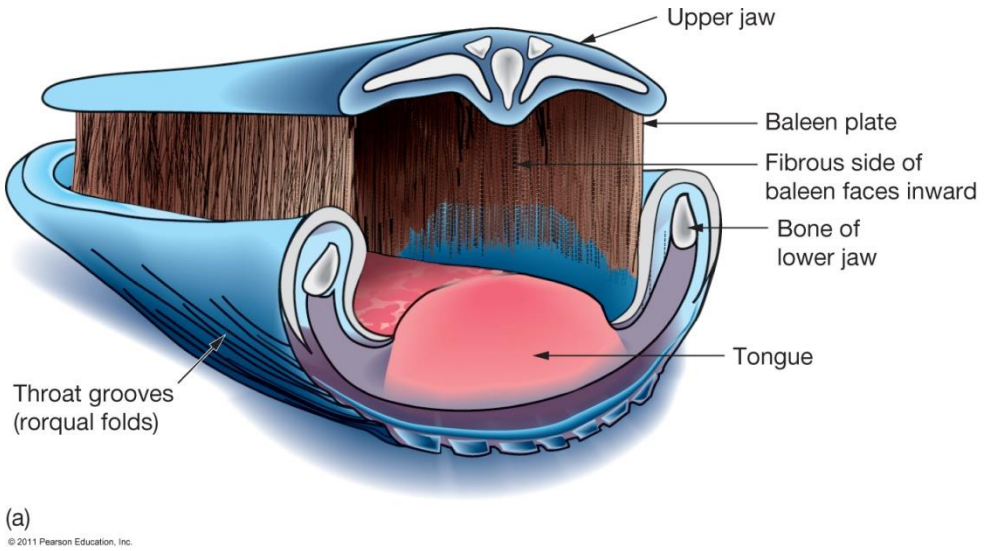
Dolphins use sponges as a tools when foraging on the benthos

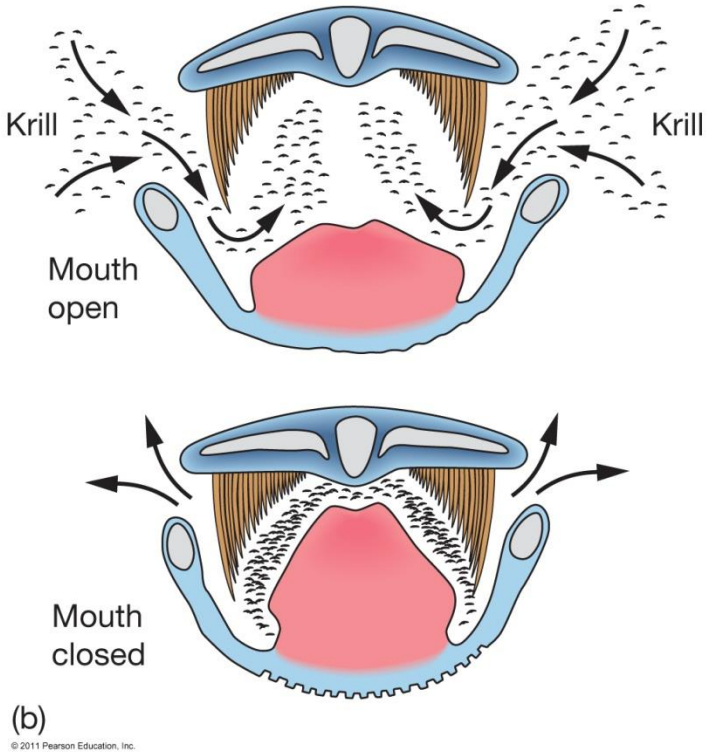
Order Cetacea



- Suborder Mysticeti
- Baleen whales
- Blue whale, finback whale, humpback whale, gray whale, right whale
- Fibrous plates of baleen hang in jaw to sieve prey items
- Vocalized sounds for various purposes

Use of Baleen





Baleen Whale Families

- Gray whales
- Rorqual whales
  - Balaenopterids
  - Megapterids – humpback whales
- Right whales

Gray Whale Migration

- 22,000 km (13,700 miles) annual migration from coastal Arctic Ocean to Baja California and Mexico
- Feeding grounds in Arctic (summer)
- Breeding and birthing grounds in tropical eastern Pacific (winter)

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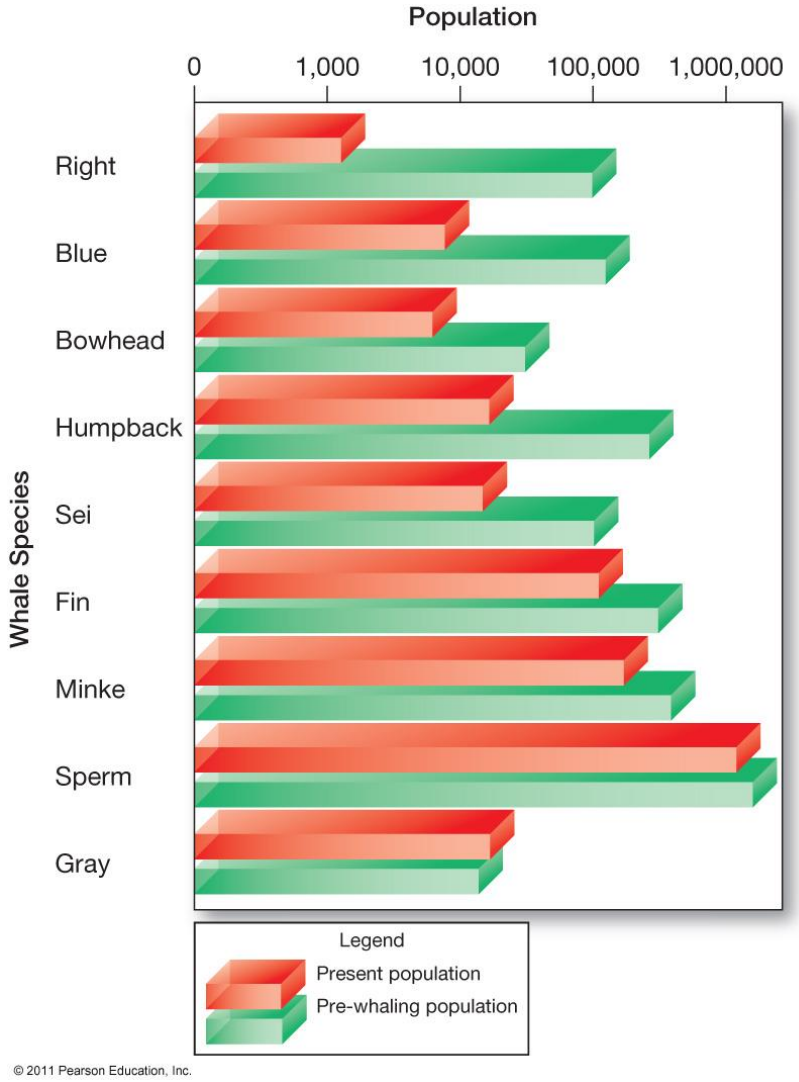
Breaching

- When Whales leap in the air and loudly crash on the surface of the water.
- This can be a warning signal, getting rid of external parasites, fun, or a way of scanning the surface.

Whales as Endangered Species

- Fewer whales now than before whaling
- International Whaling Treaty
- Hunting of gray whale banned in 1938
- Gray removed from endangered list in 1993 as population rebounded



Gray Whale Friendly Behavior

Whaling

- International Whaling Commission (IWC) 1948 – established to manage whale hunting
- In 1986, 72 IWC nations banned whaling
- Three ways to legally hunt whales:
  - Objection to IWC ban
  - Scientific whaling
  - Aboriginal subsistence whaling

How is it that these mammals are able to survive in a marine environment?

ADAPTATIONS

for life in a wet, cold and salty place.

Swimming

Streamlined body to reduce drag

Powerful, efficient appendages

Efficient use of O2 in lungs

O2 is stored in blood (myoglobin) and muscles

Voluntary and conscious breathing

Collapsible lungs, thick cartilaginous trachea to tolerate pressure changes

High tolerance to lactic acid- muscles can work anaerobically

Thermoregulation

Large body, small surface-to volume ratio reduces heat loss

Blubber and/or underfur

Complex circulatory system conserves and dissipates heat

Water Conservation

Use freshwater from food, inhaled air and blubber

Remove salts from bodies using many small kidneys

Order Sirenia

- Herbivores
- Manatees
  - Coastal areas of tropical Atlantic Ocean
- Dugongs
  - Coastal areas of Indian and western Pacific Oceans

(a)

(b)

Order Sirenia

- Herbivorous marine mammals
- Manatees
  - Coastal areas of tropical Atlantic Ocean
- Dugongs
  - Coastal areas of Indian and western Pacific Oceans
- Warm water species
- Not fat but have a huge intestinal tract
- Hunted and endangered