



SUPER SENSES

The 7 senses of sharks

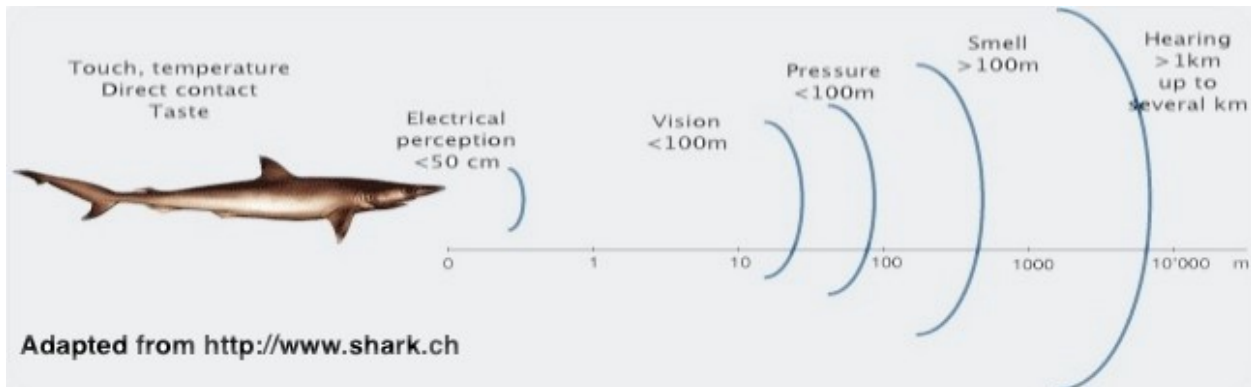
MARINE EDUCATION
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Super senses: THE 7 senses of sharks

Just like humans, sharks have the same 5 senses of **sight, touch, taste, smell and hearing**; however unlike humans, shark's 5 senses excel underwater.



Shark Sight

- Shark's eyesight allows them to see **up to 50m underwater**, in order to see their prey. Shark eyes, like cat eyes, have a reflective layer behind the **retina** which helps them see in low light.



- Because a shark's eyes are positioned on opposite sides of their head, they have a major blind spot directly in front of them and as a result, have to swim from side to side in order to see their prey in front of them.
- Most or all sharks have some way of protecting their eyes. Some sharks use their eyelids primarily as a protective measure.
- But, some sharks don't have eyelids. One of the unique features of the Great White sharks eyes, is that prior to chomping at their prey, their **eyes roll back** into their head to protect the eyes from damage during feeding.
- Some sharks, like the Great White Shark, do not have eyelids and instead roll their eyes back to prevent injury, causing a white eyed look
- Sharks that live deeper in the oceans usually have larger eyes than those that live nearer the surface.

Shark touch

- Shark's can feel touch and pain all over their bodies. The head area of the shark is the most sensitive area to touch, especially around the snout, mouth and gills.
- In addition to this, sharks have **stretch receptors** that alert the sharks to pressure waves, such as those created by swimming fish.
- Before biting something, many sharks will touch an object with its nose in order to determine if it is edible or not.
- The **act of biting** is also a touch based activity, as sharks lack hands to be able to hold prey to determine its edibility, they must latch onto it with their jaws to test. So to sum up the bite, it is also an exploration of touch as well as taste.

Shark taste

- Sharks, just like humans, have **taste buds** which are found in their mouths and on their tongues.
- Some bottom dwelling sharks also have **barbells** on their snouts which can be used to detect or 'taste' for prey that may be buried within the sand below.
- Since sharks have to **bite** in order to determine whether something is a worthwhile meal or not, accidental attacks on humans do occur.



Nurse Shark's barbells

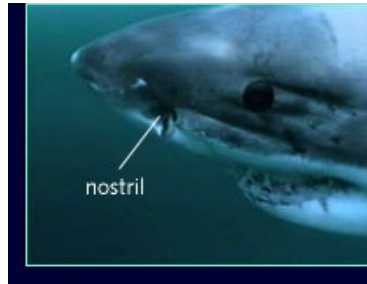


The largest shark jaw found belongs to the Megalodon shark, which can be over 2 and a half meters tall and over 3 meters across!

Fun fact: Sharks **do not** view humans as a valuable food source and will often release humans after the initial bite.

Shark Smell

- Sharks possess the largest **olfactory bulbs** (the part of the brain dedicated to smell) of any fish, and as a result of this have a fantastic sense of smell.

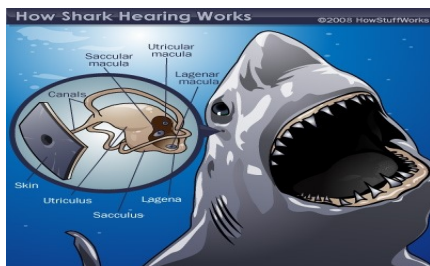


The nostril of a Great White Shark

- Sharks can smell up to a **100m away**, a drop of blood in an Olympic size swimming pool.
- Little sensory smells in the nose detect chemicals in the water when water passes through the shark's **nasal cavities**, allowing sharks to determine what the chemical is and whether or not it may be food.

Shark Hearing

- Never seen a shark with ears? Well, that is because sharks only have an **inner ear**.
- Two holes on either side of a shark's head are the only clues indicating the presence of a shark's ears.
- Yet sound is often the shark's first tip-off that prey is nearby. The **vibrations** that the shark is trying to pick up include splashing and the sounds of an injured prey, which create different sound frequencies.



Shark's Hearing

***Fun Fact:** According to a shark cage diving tour operator in Australia, they discovered that Great white sharks in the area seem to be attracted to rock band's music, especially Australian rock band ACDC!*

- Because sound travels farther and about 4 times faster underwater, sharks are easily able to detect their prey from distances of more than 243 meters. Sharks hear deep **low-pitched sounds** the best, they listen to these sounds to detect their prey; they can hear a fish's muscles as it swims.
- Sharks can hear sounds much lower than we can, while we hear sounds much higher than sharks.

Extraordinary senses: extra shark senses

in addition to the 5 standard senses, sharks also possess extra senses that help them excel underwater.

The Ampullae of Lorenzini

- Probably the most fascinating sensory performance of sharks is their ability to detect **electrical fields**.
- All living things emit electrical fields, either with the beat of the **heart**, **muscle movement** or **with the brain**. Animal prey can effectively hide or camouflage themselves, but they cannot conceal their electrical fields.



Ampullae of Lorenzini

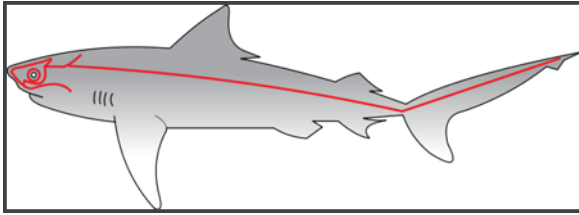
- The shark's electro sensors are its **Lorenzini ampullae**.
- Only sharks and rays have ampoules and a long canal filled with a **jelly-like substance** which ends in a pore.
- Hundreds of such pore groups are located on the shark's head, especially in the region of their snout. Since the **electrical impulses** of prey animals are very weak, the electro sensors only function within a range of several centimetres.

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A shark's lateral line runs all the way from the top of its snout down to the very tip of its tail and is used to assist the shark in hunting prey

Lateral Line

- Sharks possess another exceptional sense to help them find prey, it's called the **lateral line**. How does this lateral line system work?



A shark's lateral line runs all the way from the top of its snout down to the very tip of its tail and is used to assist the shark in hunting prey

- The lateral line system of sharks extends from the **head to the caudal fin** (as illustrated in the picture). It contains sensory cells embedded in jelly and is connected to the skin surface by small pores, very similar to the **Lorenzini ampullae**. The jelly conducts shock waves to the sensory cells.

Other senses:

Pit organs

- The pit organ consists of **two oversized denticles** which cover a small pocket in the skin. At the bottom of this pocket is a collection of sensory hair cells.
- Many sharks have these pit organs in greater numbers on their **backs, sides and lower jaw**.
- The **exact function** of the pit organ has not yet been determined, but most likely sharks use it to register mechanical stimuli such as water currents.

In the ocean, predators must have excellent senses and over 400 million years of evolution have witnessed the development of shark senses into high performance sensors. They see in the dark better than cats, they smell 10,000 times better than humans and have a highly developed sense of taste. They have excellent hearing, receive and sense even the slightest differences in pressure, feel currents and can detect the electrical fields of their prey. These are just a few reasons why sharks are such fascinating and amazing animals, and why they are considered as the, Masters of the Seven Senses.

Shark Senses Comprehension Test

1) True or False:

Sharks have more senses than humans

2) Why do sharks, like the Great White, roll his eyes back in its head when attacking and eating prey?

3) Up to how many meter can a shark see underwater?

4) Fill in the blanks:

Sharks that live deeper in the oceans usually have larger _____ than those that live nearer the surface.

The _____ area of the shark is the most sensitive area to touch.

5) True or False:

A shark tastes and touches with its mouth?

6) How far can a shark smell?

7) Name the two extra senses that sharks have?

8) Fill in the Blanks:

The small sensory pores (ampullae of lorenzini) have the ability to pick up _____ fields.

9) Explain the lateral line and what the shark uses it for?

10) Name the other sense that sharks have, of which its exact function is yet to be determined?
