

**DK findout!**

# Oceans



**What do you want to findout?**

**Fun Facts, Amazing Pictures, Quizzes**





**findout!**

# Oceans



Author: Andrea Mills



Penguin  
Random  
House

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#### » Scale



The scale boxes on pages 16–17 and 42–43 of this book show you how big an animal is compared to a person or a diver who is 6 ft (1.8 m) tall.

Spiny lobster



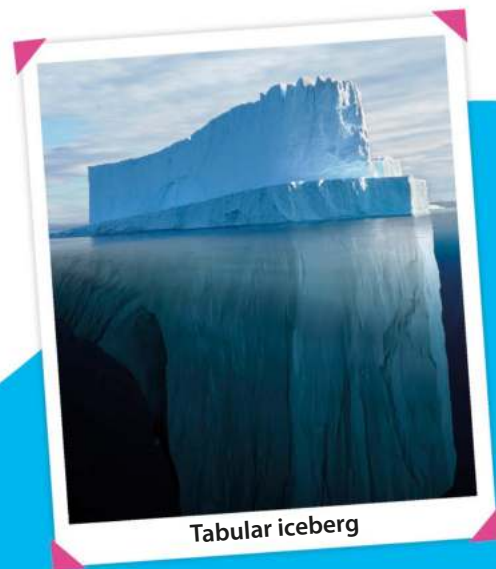
Dumbo octopus







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# What is an ocean?

Oceans are the largest bodies of water on Earth. These huge, underwater habitats are home to millions of different types of plants and animals. Oceans are salty because when water evaporates into the air it leaves behind salt.

## Deep blue sea

Bright sunshine makes clear seawater look blue. This is because water can absorb, or take in, all the colors in sunlight except blue, which is reflected instead.

## Seas and lakes

The main differences between seas and lakes are their size and saltiness. Seas are bigger and saltier than lakes. Lakes almost always have fresh water, which is not salty.



Mediterranean Sea  
by Sardinia, Italy

Seas are smaller than oceans, but are connected to them. There are many more seas than oceans. Almost all of our seas are salt water.



## Salt lakes

A few lakes are salty. Water flows into these lakes from surrounding rivers, but does not flow out. Instead, water evaporates from these lakes and leaves behind salt. The Dead Sea in the Middle East and the Great Salt Lake in the US are both lakes that contain salt water instead of fresh water.



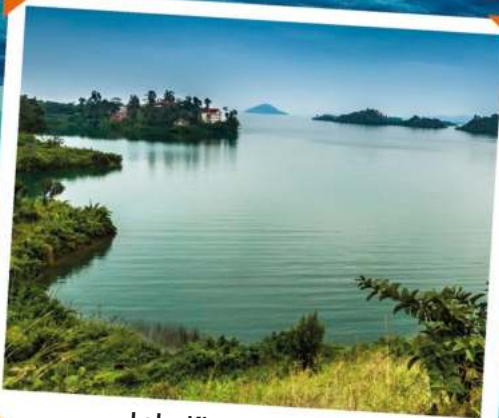
**Great Salt Lake**

The Great Salt Lake is about five times saltier than the oceans.



**Dead Sea**

The Dead Sea is almost 10 times saltier than the oceans.



Lake Kivu, Rwanda

Lakes are similar to giant ponds, and are completely surrounded by land. They contain fresh water, which comes from nearby streams or rivers.



**WOW!**

We know more about the surface of the **Moon** than the **bottom** of the **oceans**.

# How are oceans formed?

Our planet is a wonderfully watery world. Oceans cover more than 70 percent of the Earth's surface, and contain 97 percent of the total water supply on Earth. The oceans formed almost 4 billion years ago, when low-lying areas became filled with rainwater.

## Moving plates

Earth's surface is made up of a thin crust, which covers the top of the hot, rocky mantle. Together, the crust and mantle make moving pieces of land, called tectonic plates. New ocean floor develops where these plates pull apart.

### Making waves

Ocean waves are influenced by wind speed, distance, and direction. Their size and shape range from tiny ripples to giant swells.



#### Ripple

A gentle wind blowing over the ocean results in small ripples.



#### Chop

Stronger winds make rough waves known as chops.

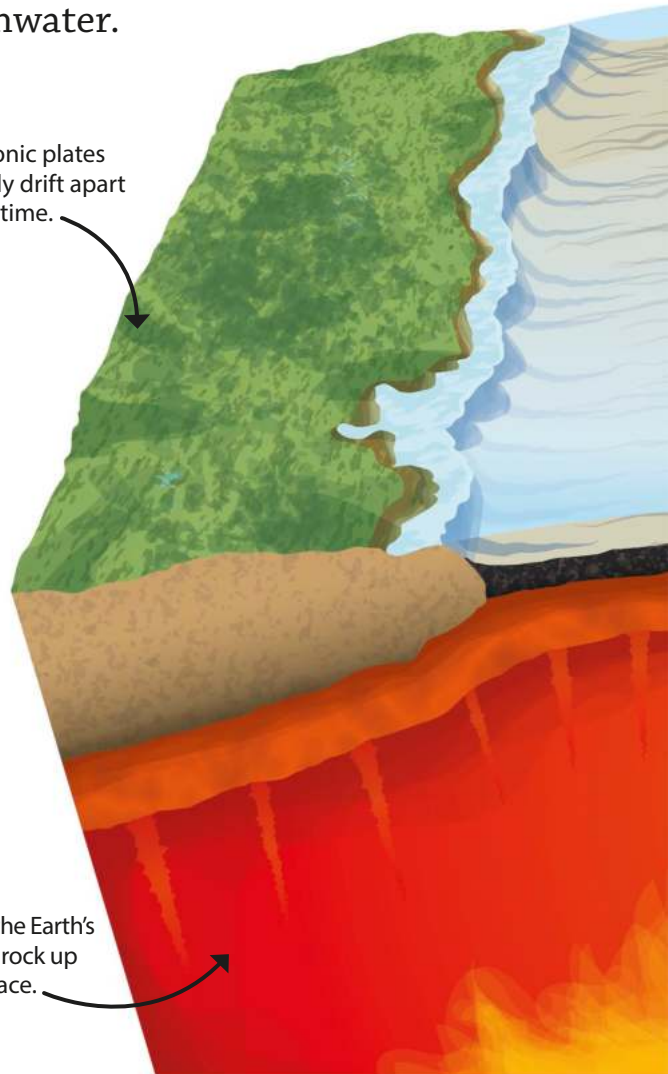


#### Swell

Large waves, known as swells, create a more regular wave pattern over time.

Tectonic plates slowly drift apart over time.

Heat from the Earth's core sends rock up to the surface.







Water covers much of planet Earth

### Global ocean

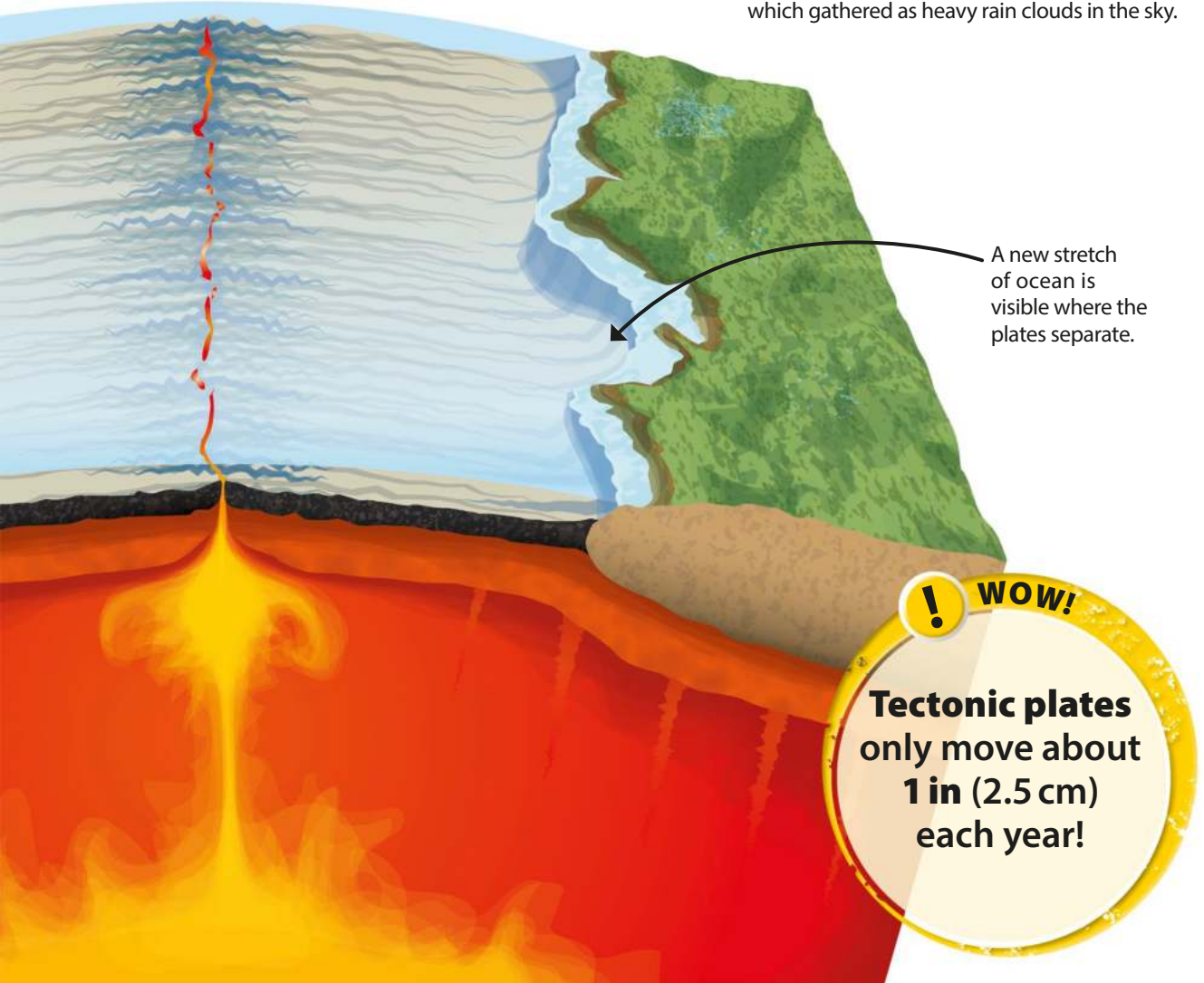
When the Earth first developed, its surface was almost entirely ocean. As the first continents formed, water in hollow areas became the five oceans we know today.



Rain clouds build up before a downpour

### Water vapor

In the past, oceans were formed when hot gases were released from under the Earth's surface. These gases cooled to become water vapor. The vapor turned into water droplets, which gathered as heavy rain clouds in the sky.



A new stretch of ocean is visible where the plates separate.

**! WOW!**

**Tectonic plates only move about 1 in (2.5 cm) each year!**

## A drop in the ocean

The world's seven continents are surrounded by water. The Pacific Ocean is the largest ocean, and it covers about a third of the planet's surface. The Arctic Ocean is the smallest and coldest ocean—it has sea ice all year round.

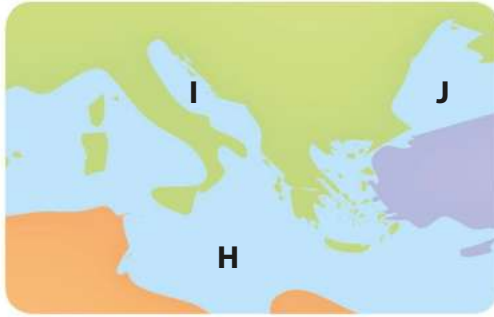
### Key to oceans and seas

- A Pacific Ocean
- B Arctic Ocean
- C Southern Ocean
- D Atlantic Ocean
- E Indian Ocean
- F Arabian Sea
- G Red Sea
- H Mediterranean Sea
- I Adriatic Sea
- J Black Sea
- K Persian Gulf
- L Baltic Sea
- M North Sea
- N Caribbean Sea

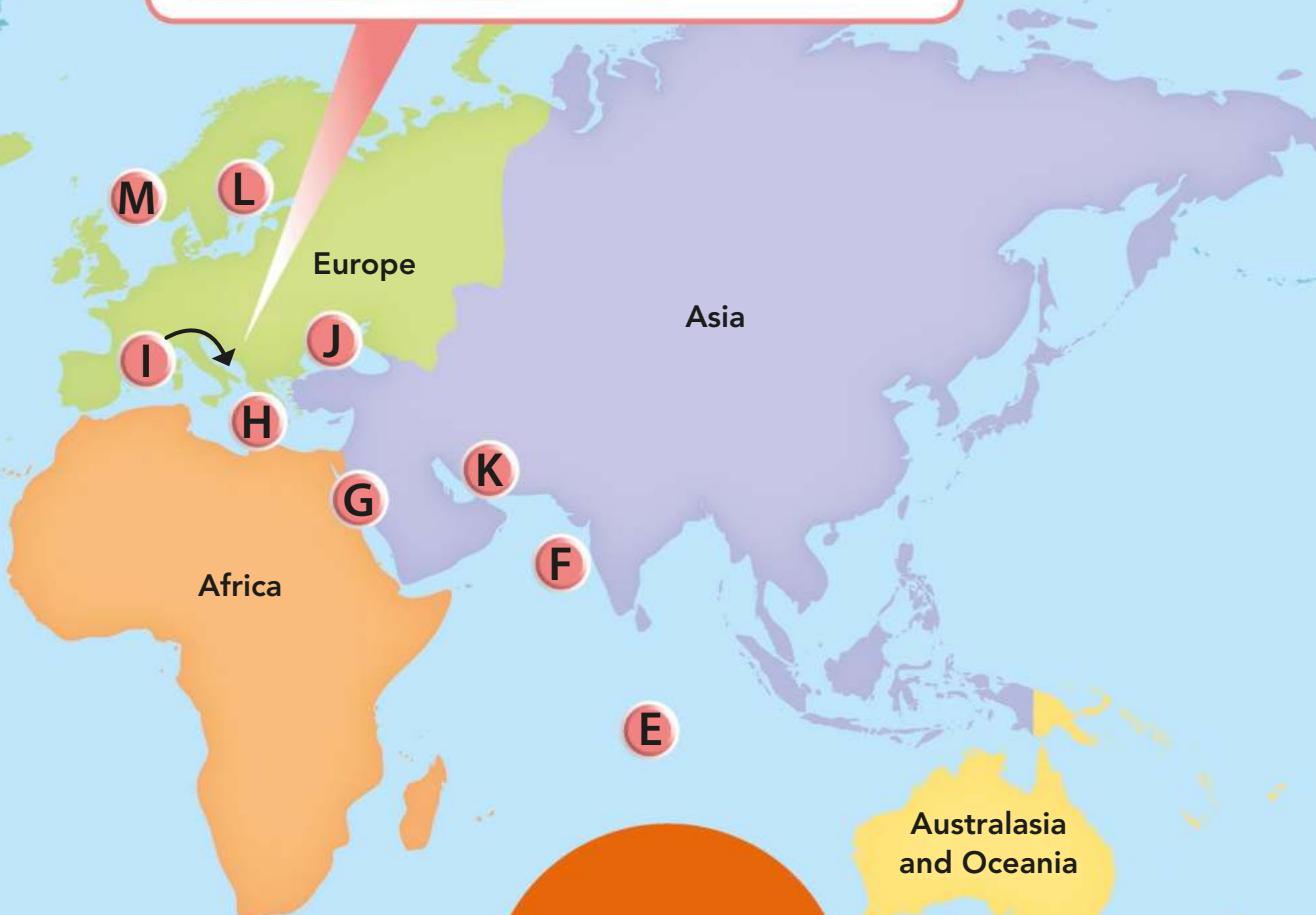


## Blue planet

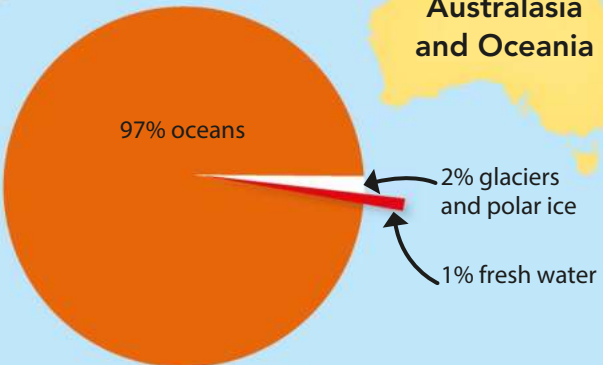
Earth is known as the blue planet because it is mostly covered in water. This is almost all salt water, which is found in the five oceans and many smaller seas. Only a small amount of the Earth's water is drinkable fresh water, which lies in lakes and rivers.



The Mediterranean Sea is almost entirely surrounded by the coastlines of 21 countries. Other, smaller seas are also found close to the Mediterranean Sea.



This pie chart shows that almost all of the water that covers the Earth is ocean water, while the rest is either ice or fresh water.





# Ocean zones

Sunlight sparkles on the surface of the oceans, lighting up marine animals swimming in shallow waters. Deep down on the ocean floor it is another story. There is constant darkness, falling temperatures, and very little marine life. Oceans can be divided into five zones, which relate to the conditions at different depths.

0–656 ft (0–200 m)



Seahorse

Seal

## Sunlit zone

Sunshine can only reach the shallowest waters. Many marine animals live here. Underwater plants have enough light to make food, in a process called photosynthesis.



Hammerhead shark



Sea turtle

656–3,280 ft (200–1,000 m)

## Twilight zone

Less sunlight means that this zone is much colder and darker than the sunlit zone. Lantern fish and squid have large eyes, which help them see more clearly in the darkness.



Chain catshark



Squid



Lantern fish



Swordfish

! WOW!

Some oceans are more than **6 miles** (10 km) deep.

3,280–13,123 ft (1,000–4,000 m)

## Midnight zone

This zone is in total darkness. Huge pressure comes from the heavy water above, but some animals, such as jellyfish, have soft bodies, which stop them from being crushed.



Footballfish



Big red jellyfish



Frisled shark



Dumbo octopus

13,123–19,685 ft (4,000–6,000 m)

## Abyss

Meaning “bottomless” in Greek, the abyss is freezing cold. The amount of water above it means that this zone has a level of pressure that is hundreds of times greater than on the surface.



Hagfish



Sea pig



Tripod fish

Below 19,685 ft (6,000 m)

## Hadal

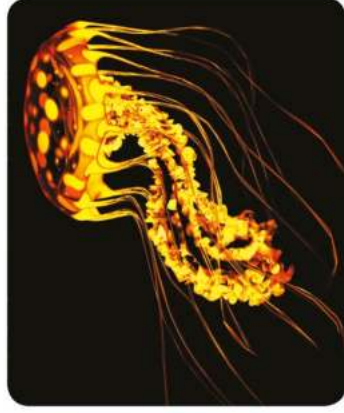
The deepest and darkest depths of the ocean in the hadal zone are almost empty. Food is in short supply, so marine life down here eats bacteria and waste material, which falls to the ocean floor.



Giant tube worm

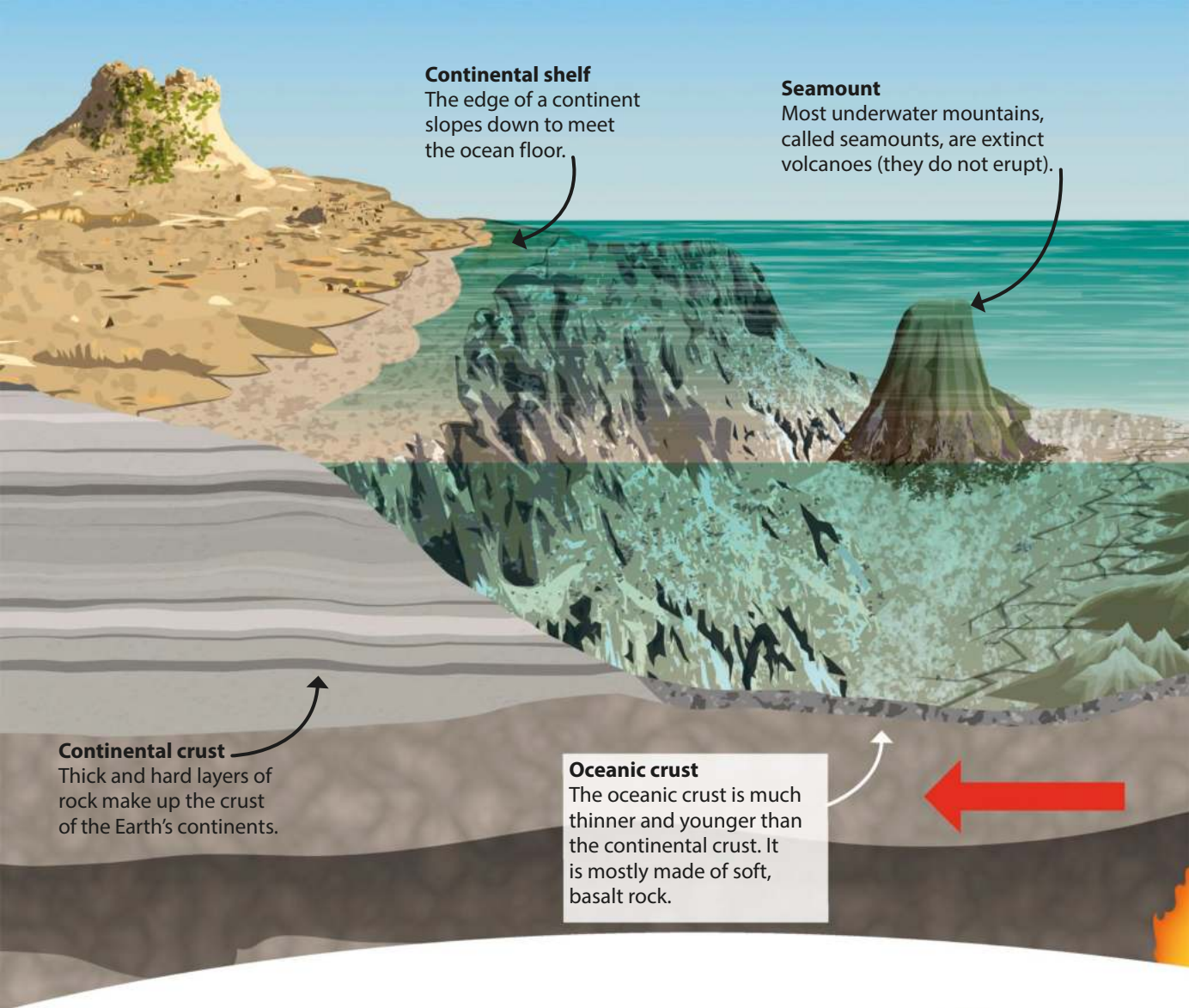
## Bioluminescent fish

Some animals in the deeper zones have adapted to the darkness by using chemicals in their bodies to create their own light—this is called bioluminescence. Glowing in the dark allows them to recognize each other, catch prey, and scare away predators.



Brilliant bioluminescent jellyfish





**Continental shelf**  
The edge of a continent slopes down to meet the ocean floor.

**Seamount**  
Most underwater mountains, called seamounts, are extinct volcanoes (they do not erupt).

**Continental crust**  
Thick and hard layers of rock make up the crust of the Earth's continents.

**Oceanic crust**  
The oceanic crust is much thinner and younger than the continental crust. It is mostly made of soft, basalt rock.

# Ocean floor

A trip down to the ocean floor reveals a fascinating underwater landscape. This bumpy ocean floor has many features similar to dry land. There are steep slopes, deep cracks, and rising mountains. But there is one big difference—there's no light down here.

**! WOW!**  
**The Ring of Fire in the Pacific Ocean has more than 450 volcanoes.**

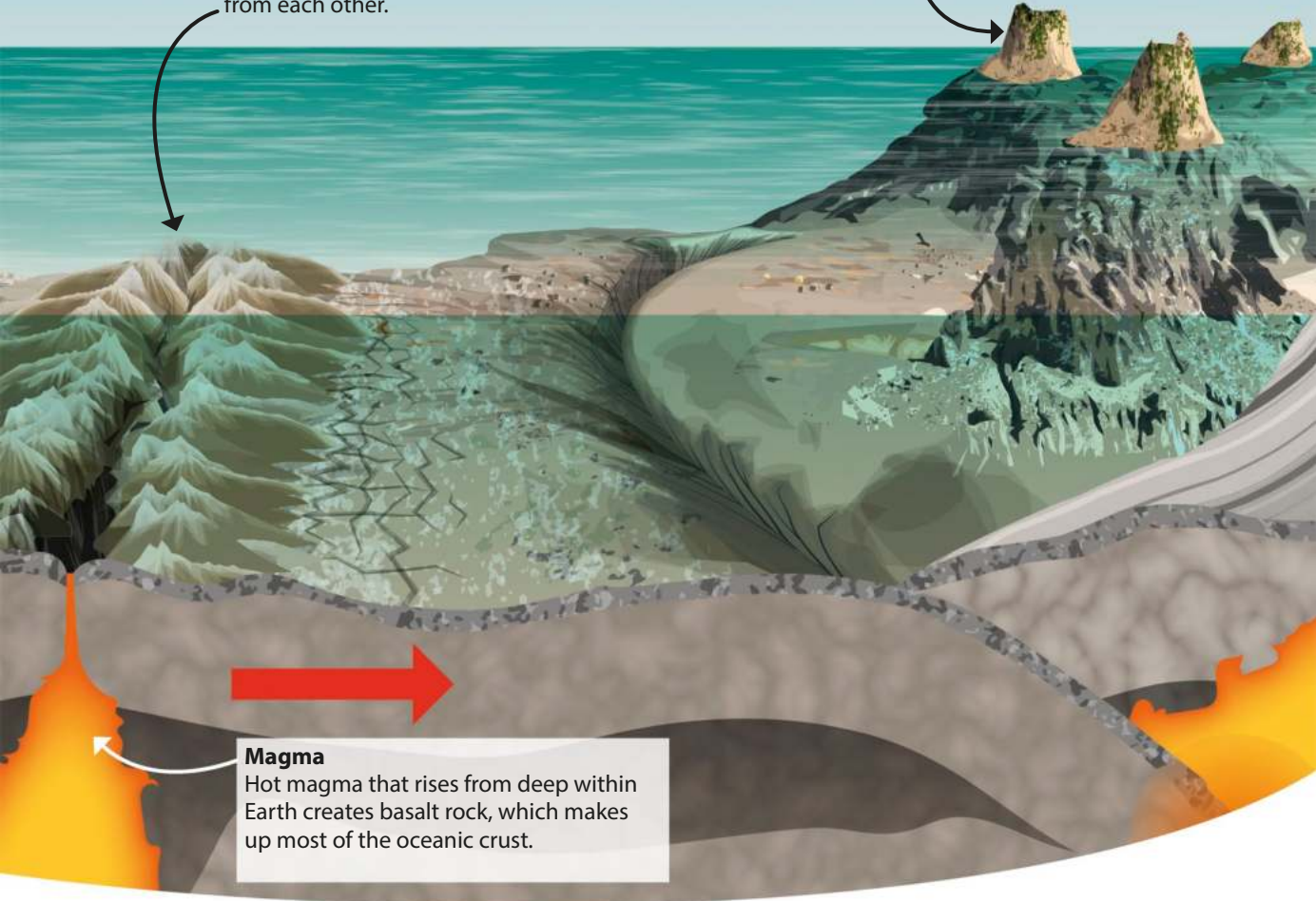


### Ridge

These underwater mountain ranges are created when tectonic plates pull away from each other.

### Volcanic island

These mountains rise from the ocean floor as cooling lava hardens into rock.



### Magma

Hot magma that rises from deep within Earth creates basalt rock, which makes up most of the oceanic crust.

## Limited life

Not many animals can survive in the darkest depths of the ocean. Those that do, rely on chemicals instead of light to make their food. Sea life develops around hot springs on the ocean floor, where the water is full of minerals.



### Hydrothermal vent

Deep-sea vents release extremely hot water from deep in Earth.



### Sea anemones

These creatures cover themselves in sand for protection.



### Tube worms

Giant tube worms eat the tiny bacteria that grow near hydrothermal vents.

# Frozen features

The Arctic and Antarctica are among the most remote, or hard to get to, places on Earth. The Arctic is a freezing-cold region that is mostly water. Antarctica is a continent almost totally covered by ice. Very low temperatures affect these places and transform their landscapes.

**! WOW!**

Antarctica is the **coldest, driest, and windiest** continent. It is **technically a desert!**

## Ice shelves

Most ice shelves are found in Antarctica. These giant platforms form where a glacier or ice sheet moves slowly down to the coastline. Antarctica's record-breaking Ross Ice Shelf is about the same size as France!

Ice shelves attached to the Antarctic coastline



An iceberg floating along a strip of water in Greenland



## Icebergs

When great chunks of ice break off from a glacier or ice sheet, they float out to sea as icebergs. Less than 20 percent of the total iceberg is visible above the surface of the water.



## Plankton bloom

Summer sunlight melts some of the sea ice, allowing tiny sea life to develop. In polar regions, small plants called phytoplankton grow rapidly, which causes a bloom. This bloom provides a much-needed source of food for marine life.



This satellite image shows an enormous phytoplankton bloom.



## Frozen food

The Southern Ocean is home to a huge amount of Antarctic krill. These small animals are at the heart of the marine food chain. Krill feed on phytoplankton, but they are eaten by whales, seals, and penguins.



# Life on the ice

Life is tough by the oceans in the North and South poles. The freezing conditions mean that many animals struggle to survive. While some travel to warmer places to escape the cold, those left behind must adapt to the temperature and lack of food.

## FACT FILE

- » **Length:** Up to 10 ft (3 m)
- » **Weight:** Up to 1,320 lb (600 kg)
- » **Swim speed:** Up to 24 mph (39 kph)
- » **Ocean:** Southern

## Leopard seal

A double layer of fat keeps seals warm. The leopard seal's smooth body shape is suited to fast swimming, while its powerful jaws are used to catch prey.

» Scale



## FACT FILE

- » **Height:** Up to 2.5 ft (0.8 m)
- » **Weight:** Up to 12 lb (5.4 kg)
- » **Swim speed:** Up to 22 mph (36 kph)
- » **Ocean:** Southern

» Scale



## Gentoo penguin

To stay warm and active, penguins have thick skin and layers of fat, called blubber. With their winglike flippers, they can swim at high speeds to catch fish.

» Scale



## Emperor penguin

This, the tallest and heaviest penguin, has many feathers and layers of fat to help keep it warm. Emperor penguins also huddle in groups to stay warm.

## FACT FILE

- » **Height:** Up to 4 ft (1.2 m)
- » **Weight:** Up to 88 lb (40 kg)
- » **Swim speed:** Up to 8 mph (12 kph)
- » **Ocean:** Southern

## Polar bear

Two coats of fur and layers of fat help the largest predator on land survive the Arctic's freezing conditions. Black skin under the polar bear's fur absorbs heat from the sun.

White fur is the perfect camouflage. It helps polar bears to blend in with the surrounding snow and ice.



### FACT FILE

- » **Height:** Up to 5 ft (1.5 m)
- » **Weight:** Up to 1,764 lb (800 kg)
- » **Swim speed:** Up to 6 mph (10 kph)
- » **Ocean:** Arctic

» Scale



### FACT FILE

- » **Length:** Up to 11.5 ft (3.5 m)
- » **Weight:** Up to 3,968 lb (1,800 kg)
- » **Swim speed:** Up to 21 mph (35 kph)
- » **Ocean:** Arctic



» Scale



## Walrus

These huge, blubbery mammals use their large tusks as weapons when defending their land. Their fat reserves keep them warm.

## Orca

Often called a killer whale, this speedy, blubbery swimmer uses its flippers and the fin on top of its body, called the dorsal fin, to glide through the water.

Orcas travel in groups, called pods, to keep each other warm.

» Scale



### FACT FILE

- » **Length:** Up to 32 ft (10 m)
- » **Weight:** Up to 14,550 lb (6,600 kg)
- » **Swim speed:** Up to 35 mph (56 kph)
- » **Ocean:** Arctic and Southern



# Icebergs

Giant blocks of frozen ice float through the coldest waters on Earth. They were once attached to glaciers or ice sheets, but these icebergs have broken off and drifted away, in a process called calving. Most icebergs are found in Antarctica and the North Atlantic Ocean.

Tabular icebergs always have a flat top and steep sides.

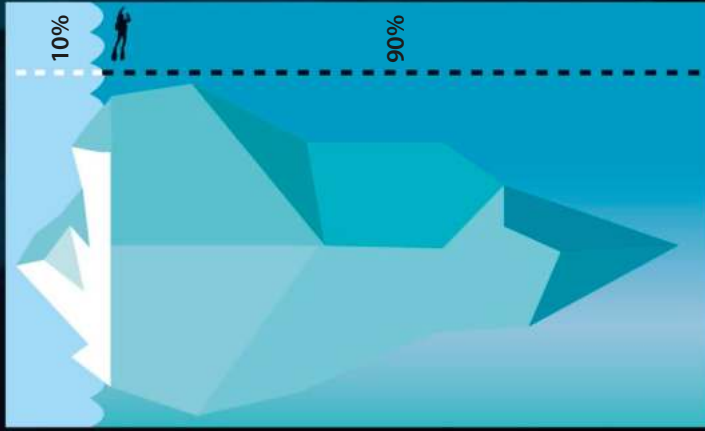
## Islands of ice

A piece of ice must measure more than 100ft (30m) wide and 16ft (5m) above sea level to be called an iceberg.

The biggest icebergs can be as large as a small country!







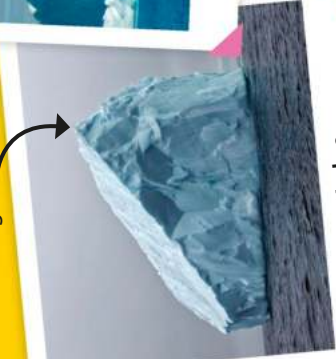
Icebergs are shaped by crashing waves and collisions with land or other icebergs.

The largest part of an iceberg is hidden underwater.

## Iceberg types

Icebergs are grouped together by shape. Tabular icebergs are the most common, but nontabular types can be many different shapes.

An iceberg with a slope on one side and a steep cliff on the other is called a wedge.



Wedge



U-shaped

An iceberg may be eroded (gradually worn away) over time to form an arch.



Pinnacle

This type of iceberg has at least one tall column.



# Shipwrecks

Ships destroyed at sea can be lost forever, or left untouched as watery graves. Whether caused by natural disasters or warfare, shipwrecks help us find out about the history of sinking ships and sailors who died at sea. Their discoveries reveal stories just waiting to be told...

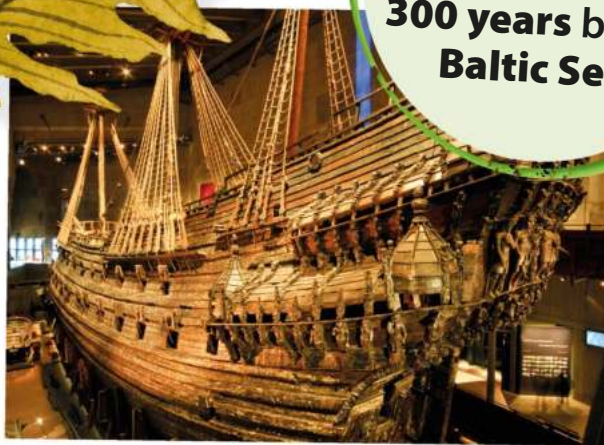


**! WOW!**

***Vasa*, a wooden ship, was kept in good condition for 300 years by the Baltic Sea.**

## ***Mary Rose*, UK**

One of English King Henry VIII's largest warships, the *Mary Rose* sank during a sea battle in 1545 and hundreds of people died. Raised from the ocean floor in 1982, what is left of the ship can be seen in Portsmouth, UK.



## ***Vasa*, Sweden**

Doomed from the start, the 17th-century warship *Vasa* had a leak and sank on its first trip, in 1628, just 0.8 miles (1.3 km) after leaving Stockholm, Sweden. Finally recovered in 1961, the ship is now on display in Sweden.





## RMS *Titanic*, UK

Even though it was launched as an “unsinkable ship,” RMS *Titanic* sank in 1912 on its first trip after hitting an iceberg in the Atlantic Ocean.

Hundreds of people died, because there were not enough lifeboats on the ship.



## SS *Central America*, US

This steam-powered ship sailed between Central America and the US until a hurricane destroyed it in 1857. Nicknamed the “Ship of Gold,” it sank with a stash of gold worth roughly \$2 million (£1.5 million) at the time.



## Sweepstakes, Canada

*Sweepstakes* lies in shallow waters off the coast of Ontario, Canada. This ship hit a rock near Cove Island, Canada, in 1885 and sank before the damage could be fixed. Today, divers can explore the underwater wreck.

## MS *World Discoverer*, Germany

German cruise ship MS *World Discoverer* traveled the world until it hit a reef and got stuck in shallow waters in the South Pacific in 2000. Luckily, everyone on board escaped, but the ship remains on its side to this day.



# Ocean homes

The world's waters offer a variety of homes and hideaways for different sea animals. With many types of natural resources in ocean habitats all over the world, ocean dwellers use plants, rocks, and coral to make safe shelters or create camouflage.



A sea lion swims in the kelp forests of California, US.

## Kelp forests

These underwater forests of giant seaweed are home to marine life big and small, from sea lions and whales to sea urchins and tiny fish. The kelp doubles as a source of food and a protective shelter.

## Mangroves

These swamplands provide coastal homes for marine life. The mixture of mineral-rich waters, plenty of food, twisting tree roots, and shallow waters suits fish, crabs, shrimp, oysters, snails, and sponges. Many fish raise their young in mangroves.



A saltwater crocodile is hard to spot in a mangrove forest in Sri Lanka.

## Shells

Some marine animals use seashells as body armor. Hermit crabs can make new homes in the empty shells of sea snails. These crabs even carry the shells around the ocean floor with them!



Red hermit crab making a snail shell into a new home



Sea turtle swimming through a coral reef

## Coral

Colorful coral is an underwater playground for clown fish, seahorses, and sea turtles. Some sea snails attach coral to their shells for camouflage.

## Rocky crevices

Hidden among shadowy rocks are crevices, or narrow cracks. Sea urchins, starfish, sea cucumbers, barnacles, spider crabs, and anemones use the darkness in these cracks to lie low and avoid predators.



Spiky sea urchins gather in groups next to the rocks.



Seagrasses are a comfortable habitat for starfish.

## Seagrasses

These flowering plants provide hundreds of types of sea animals with a place to live. While starfish and sea urchins live among the long grasses, manatees and sea turtles eat these plants.

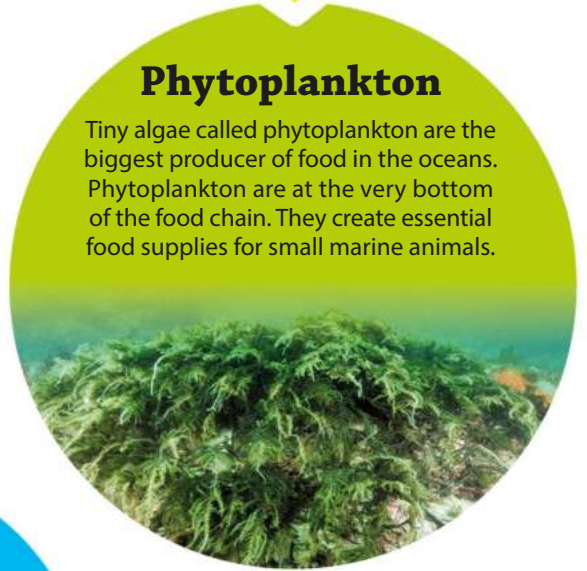


# Fish food

The ocean food chain shows us who eats what in the underwater world. The tiniest of marine life are producers—they make plant and animal food. Larger fish and mammals are consumers—they hunt prey to eat.

## Phytoplankton

Tiny algae called phytoplankton are the biggest producer of food in the oceans. Phytoplankton are at the very bottom of the food chain. They create essential food supplies for small marine animals.



## Seabirds

Along with seals, seabirds are the main consumers of salmonidae. They swoop down to the surface of the ocean and pluck fish out of the water.



Arctic tern

## Sharks

The top predators in the ocean food chain are sharks. These skilled hunters target a range of prey, including seals, dolphins, turtles, seabirds, and fish.



Tiger shark

Harbor seal

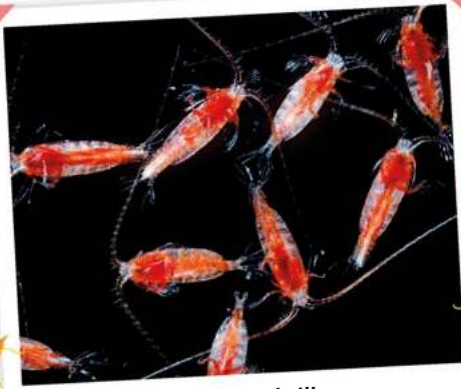


## Seals

Seals have big appetites. Their seafood diet includes fish, octopus, and squid. Seals, however, must always stay alert to the threat of a shark or polar bear attack.







Antarctic krill

## Zooplankton

The main consumers of phytoplankton are zooplankton. These tiny animals include the Antarctic krill, which are small, shrimplike creatures that grow up to only 2.5 in (6.5 cm) long.

## Salmonidae

Animals get bigger the higher up on the food chain they are. This group of large fish, which includes salmon and trout, are hunters. They feed on forage fish and marine insects.

Brook trout



## Forage fish

Small forage fish, such as the colorful goldband fusilier, feast on zooplankton. These fish are an important part of the food chain since they are the main source of food for many larger animals.

Goldband fusilier



## Polar bears

At home on the Arctic sea ice, polar bears are hunters who are always on the lookout for a tasty seal. When seals are in short supply, they will feed on the carcasses (dead bodies) of whales.



# Defense mechanisms

Ocean predators better watch out! Their prey are finding more and more inventive ways to avoid attack and protect themselves. Whether blending into the background to hide from hunters or fighting back with weapons, these marine animals are not going down without a fight.



## Sting in the tail

The blue-spotted stingray would rather swim away than fight, so its bright, blue spots warn predators to back off. If it is attacked, the spiky stinger on its tail releases a deadly poison.

## Poisonous spines

Deadly lionfish have poisonous spines that can kill other marine life and also paralyze humans. Their colorful spines can clearly be seen, and are a warning to predators to stay back.



## Camouflage

The marine master of disguise is the cuttlefish. It can change its appearance very quickly. The cuttlefish can make its skin color and texture blend so well with its surroundings that predators can't see it.



## Safety in numbers

Fish swim in groups called schools, because it reduces the likelihood of being attacked. Predators can be overwhelmed by large schools and struggle to pick a single target.



## Puffing up

The porcupine fish scares off predators by sucking in water to look bigger. An inflated porcupine fish is almost impossible for predators to eat.



## Cloud of ink

Like a marine magician, the common octopus can do a disappearing act. If predators come close, it releases a cloud of dark ink to hide itself and create a diversion before making its escape.



# Ocean hunters

Predators in water develop special skills, which help them catch prey. Some have sharpened senses that pick out a target in the darkness. Others rely on a sleek, streamlined shape to move quickly through the water when on the hunt. In the final attack, those who have strong jaws and sharp teeth ensure a deadly outcome.

## Wolffish

Beware the Atlantic wolffish! This fearsome predator has wolflike fangs and an eel-like body, which reaches up to 5 ft (1.5 m) long. They like to eat sea urchins and crabs, but wolffish will also attack people!



## Sea urchins

These spiky sea creatures can't swim, so instead they have stinging spines, which they use for self-defense. Their beaklike mouths help them scrape dead fish, mussels, and algae from underwater rocks to eat.

## Swordfish

Built for speed, the streamlined swordfish is one of the ocean's largest predators. They have special organs that heat up their eyes for better underwater vision, while their "sword" is used to knock out prey.

The swordfish's "sword" also pushes water aside for high-speed hunting.



## Dahlia anemones

This marine animal looks like a pretty flower growing on ocean rocks, but it is really a deadly predator. Its many tentacles trap prey, and they have stinging tips, which are used to kill marine life.





# JELLYFISH

These deadly hunters are found all over the world. Anything that comes into contact with their long tentacles receives a poisonous sting. This paralyzes prey (stops it from moving), which is then ready for the jellyfish to eat.

## Ribbon eels

This predator looks like a colorful ribbon when swimming through the water. Its nostrils detect the vibrations of nearby fish, then the eel moves in to catch its prey with strong jaws and sharp teeth.



## Blacktip sharks

Swimming along tropical coastlines and coral reefs, these sharks find strength in numbers. They hunt in small groups to increase their threat, before they sink their jagged teeth into their prey with ease.





# Dangerous waters

The ocean can be a dangerous and even deadly place. Extreme weather and underwater activity can make powerful winds, huge waves, and raging storms. Oceans and coastlines can suddenly turn into disaster zones, with widespread destruction and loss of life.

**! WOW!**

**Tsunamis can travel at speeds of up to 500 mph (805 kph).**



## Hurricanes

Strong, twisting winds reaching up to 185 mph (300 kph) can develop quickly in tropical waters. They form in extreme heat, when water temperature rises above 78° F (26° C). Hurricanes are also called cyclones and typhoons in some parts of the world.

## Floods

If rivers burst their banks, the flood water can wash away buildings, people, and animals. When huge storms cause sea levels to rise near coastlines, coastal flooding can occur.





## Whirlpools

At the point where different currents meet, a spiral of swirling water sometimes develops. This is called a whirlpool. Most are weak, but some are powerful and are known as maelstroms. Their strong spin can pull swimmers and boats underwater.

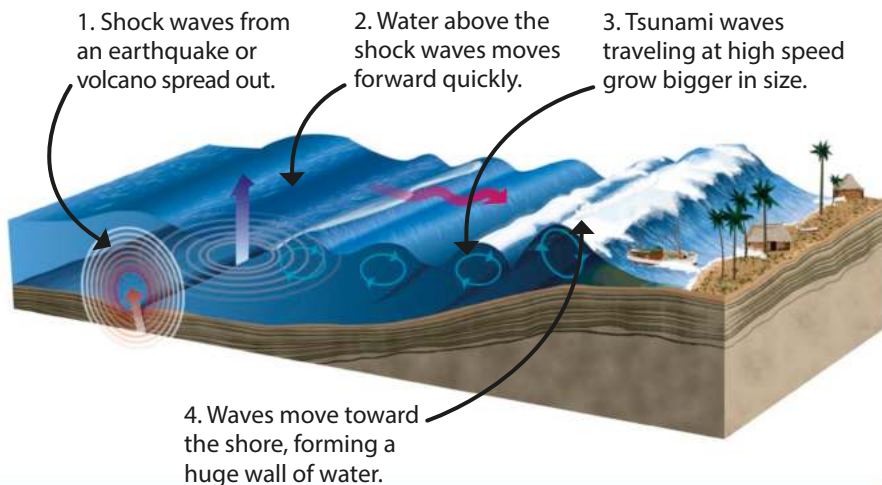


## Volcanoes

Most active underwater volcanoes are found at the edge of tectonic plates. These hot spots cause the Earth's crust to split, which releases lava and volcanic ash. Water cools the lava and ash, creating hard rocks known as pillow lava.

## Tsunamis

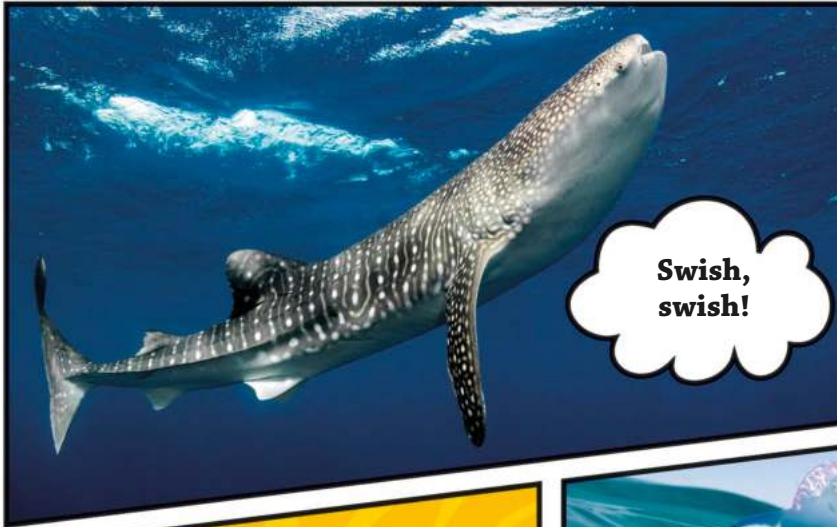
The sudden motion of an earthquake or volcano can lead to giant waves of water, known as tsunamis. Shock waves caused when part of the ocean floor moves can create a series of fast waves traveling toward the coastline.





# Ocean motion

Swimming is the main type of underwater travel, but not all marine animals are built for swimming. Instead, their body shapes are better for other forms of transportation, such as going with the flow of the water or catching a ride with another animal!



**Swish,  
swish!**

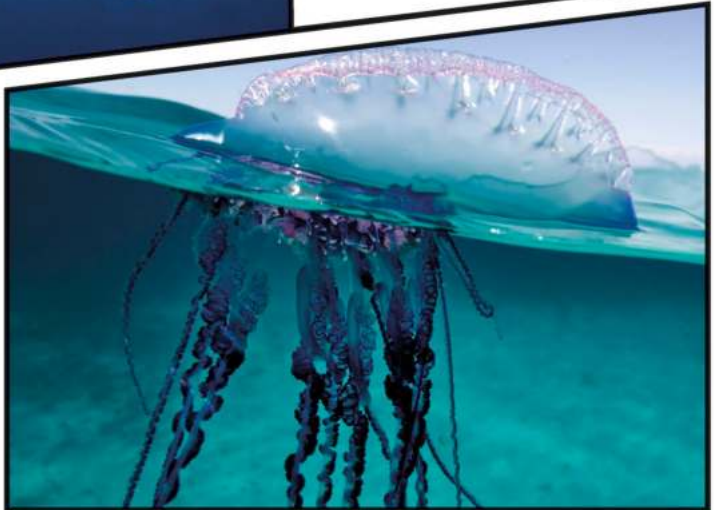
## Swim

Sharks have long fins that keep them afloat, huge, streamlined bodies, and swishing tails to swim quickly through the water. Their dorsal fins keep them upright.



## Afloat

The nautilus lives inside one chamber of its outer shell. The other chambers fill with gas and water to stop the nautilus from sinking.



## Drift

With no way of moving by itself, the Portuguese man-of-war drifts along on the ocean current, trailing poisonous tentacles behind it.

## Dive and steer

Seals dive deep underwater. Their two front flippers are used for steering, while two back flippers propel the seal forward.



Squirt!



## Jet propulsion

Jellyfish move using jet propulsion. They open and squeeze their bodies to blast out jets of water and move in the right direction.



Woo-hoo!

## Leap

Dolphins are graceful swimmers. Sometimes, they use their torpedo-shaped bodies to build up enough speed to leap out of the water.



Barnacles underneath a sea turtle

## Hitch a ride

Baby barnacles pick a spot and attach themselves to it forever. This could be a rock, a boat, or even a passing sea turtle!



# Seabirds

Soaring over the open ocean, seabirds are fantastic fliers who can stay away from land for years at a time. Many live together along coastlines, in groups called colonies, and hunt for fish. They have webbed feet, waterproof feathers, and organs that control their salt levels—three key features that help them thrive by the sea.

## Albatross

Measuring up to 12 ft (3.5 m) wide, the albatross has the largest wingspan of any bird. These giant wings help the bird glide over water for a long time in search of food. Its hooked beak helps the albatross keep hold of slippery fish.



## Pelican

By diving underwater or dipping its big beak under the water's surface, the pelican can catch a lot of fish. Then, it stores the fish in its stretchy mouth pouch, which can hold three times more fish than its stomach.



## Feeding flocks

A good food supply can mean that huge numbers of birds gather together. Flamingos live in flocks, or groups, of up to a million birds. Their beaks work like strainers, filtering out shrimp from the water. These shrimp give flamingos their famous pink color.



Flamingos flocking together to find food

## Guillemot

Cliffside colonies are home to large numbers of guillemots. Their feathers act as camouflage, since they have dark backs and white fronts to match the cliffs. Guillemots are skilled divers and can plunge up to 590 ft (180 m) into the water to catch fish.



## Puffin

Rocky islands are perfect homes for puffins. Their large, webbed feet and short, finlike wings mean they can swim fast to find food. The puffin's colorful beak has spikes, so it can hold many fish at once.





# Island hot spots

Hot magma from inside the Earth can melt the thin oceanic crust and break through to the surface. These areas are known as hot spots. As the magma rises higher, it forms an underwater volcano. Repeated eruptions of magma can spread to form groups of volcanic islands.



The coastline on Kilauea volcano

## FACT FILE

- » **Location:** Central Pacific Ocean
- » **Nationality:** American
- » **Language:** Hawaiian, English



## Hawaii

The Hawaiian Islands are dotted across 1,700 miles (2,700 km) of the Pacific Ocean. They formed as the ocean floor moved slowly over a hot spot. The Hawaiian volcano Kilauea is the world's most active volcano. It has been continuously erupting since 1983.

## Iceland

This beautiful island developed from eruptions on the underwater mid-ocean ridge mountain chain millions of years ago. Iceland is one of the only places where the ocean ridge is dry land.

## FACT FILE

- » **Location:** North Atlantic Ocean
- » **Nationality:** Icelandic
- » **Language:** Icelandic



Iceland has about 30 active volcanoes.

### FACT FILE

- » **Location:** East Pacific Ocean
- » **Nationality:** Ecuadorian
- » **Language:** Spanish



The volcanic islands of Galápagos

## Galápagos

Known for their unique wildlife, the 21 volcanic islands of Galápagos formed from a hot spot in the East Pacific Ocean. The youngest volcanoes on the Fernandina and Isabela islands are still erupting.

## Réunion

This island formed over a hot spot in the Indian Ocean about 5 million years ago. One of the volcanoes on Réunion Island, Piton de la Fournaise, erupts regularly.



Cirque de Salazie volcano in Réunion

### FACT FILE

- » **Location:** Western Indian Ocean
- » **Nationality:** French
- » **Language:** Creole, French



### FACT FILE

- » **Location:** Southeast Pacific Ocean
- » **Nationality:** Chilean
- » **Language:** Spanish, Rapa Nui



The moai statues of Easter Island

## Easter Island

Easter Island was formed from a hot spot in the Pacific Ocean about 750,000 years ago. This island is 1,100 miles (1,700 km) away from its closest neighbor. Ancient Polynesians used the volcanic rock on the island to create human-figure statues, called moai.



# Coral reefs



Even though coral reefs cover less than 1 percent of our oceans, they are home to 25 percent of all ocean life! These huge rocky structures grow gradually from the skeletons of tiny sea creatures. Animals and plants find shelter and safety here, turning reefs into underwater worlds of spectacular color.

## Great Barrier Reef

Australia's Great Barrier Reef started growing about 8,000 years ago. Today, it is the world's largest reef, covering 132,900 sq miles (344,400 sq km) and it is even visible from space.

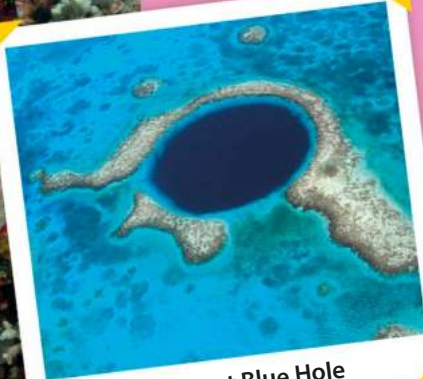




Fire coral growing off the coast of Egypt

### Red Sea reefs

The crystal clear waters of the Red Sea reefs, in the Middle East, are an oasis for snorkelers and divers, who go to see the colorful corals and amazing variety of fish.



The Great Blue Hole

### Lighthouse Reef

This reef in the Caribbean Sea is best known for its Great Blue Hole. This is a chasm, or a very deep hole, which resulted from the collapse of an underwater cave.



Turtles are often seen at Apo

### Apo Reef

The largest reef in the Philippines is located in the Apo Reef Natural Park. Many people come here to swim with giant sea turtles.



Schools of fish caught on camera

### Pickles Reef

Many underwater photographers travel to this small reef in the Florida Keys, US, because of its eye-catching coral and warm waters.



# Giants of the ocean

Among the ocean's best-known animals are sharks, whales, and dolphins. In these groups are some of the largest animals on Earth. They share many of the same features, which help them breathe, feed, and swim underwater. Whales and dolphins are sea mammals, but sharks are fish.

## Dorsal fin

Fish and sea mammals have a dorsal fin on their backs to stay upright in the water. This keeps them stable when swimming, and helps them change direction smoothly.

Spinner dolphin



Cat shark



Bottlenose dolphin



## Tail

Powerful tails can push large marine animals through the water. The tails of whales and dolphins go up and down, while the tails of sharks go from side to side.

## Body

Sharks and dolphins have streamlined shapes and smooth bodies, which are suited to swimming. Torpedo-shaped dolphins can leap out of the water!



Great white shark



Narwhal



## Head

Most sharks, whales, and dolphins have rounded, streamlined heads. The great white shark is easily recognized by its huge jaws and sharp teeth, which are ready to tear into prey.

## Horn

At home in Arctic waters, the narwhal stands out among other sea mammals because it has a large, swordlike horn. This horn is really a long tooth, which detects changes in the surroundings.



Bryde's whale



## Underbelly

Whales are covered in a layer of blubber (fat) up to 6 in (15 cm) thick. Their underbellies hold huge amounts of food, and have more than one stomach to digest it.

## Whopper whale

The biggest animal on Earth is the blue whale. Measuring up to 100 ft (30 m) long and weighing 165 tons (150 tonnes), this mighty mammal has a heart the same size as a small car.





# Marine migrators

Some marine animals travel far and wide just to survive. They journey huge distances across the oceans searching for food, or a safe place to rest and breed. These regular group movements are called migrations.

## FACT FILE

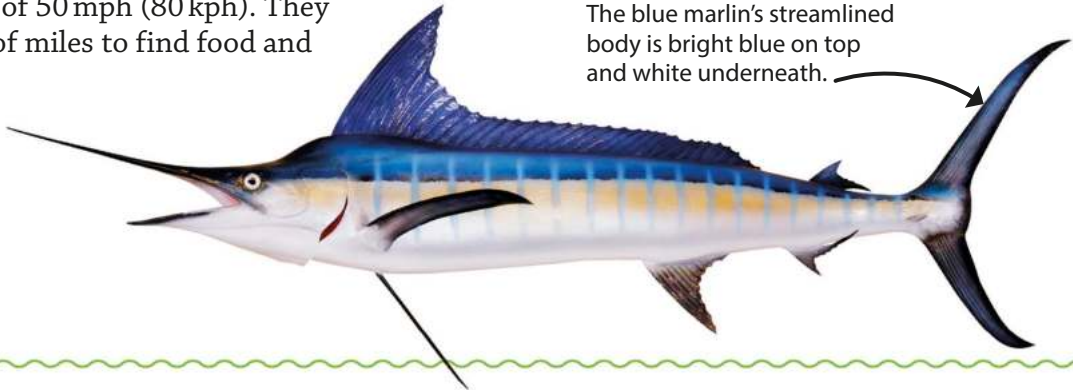
- » **Migration route:** Hundreds and thousands of miles to reach warm waters
- » **Frequency:** Once a year
- » **Fun fact:** Female blue marlin can be up to four times bigger than males.

## Blue marlin

Among the world's fastest fish, blue marlin reach top speeds of 50 mph (80 kph). They travel hundreds of miles to find food and warm waters.

The blue marlin's streamlined body is bright blue on top and white underneath.

» Scale



## Northern elephant seal

This seal travels 13,000 miles (21,000 km) to find prey to eat. It returns to the same places every year.

» Scale



Its huge, blubbery body can survive without food for months at a time.

## FACT FILE

- » **Migration route:** US to the North Pacific
- » **Frequency:** Twice a year
- » **Fun fact:** The northern elephant seal can dive to depths of up to 1 mile (1.6 km) underwater.



## Leatherback sea turtle

The largest type of sea turtle travels between its breeding and feeding grounds. It covers distances of more than 10,000 miles (16,000 km) a year.

» Scale



This turtle has soft, leatherlike skin on its back instead of a hard shell.



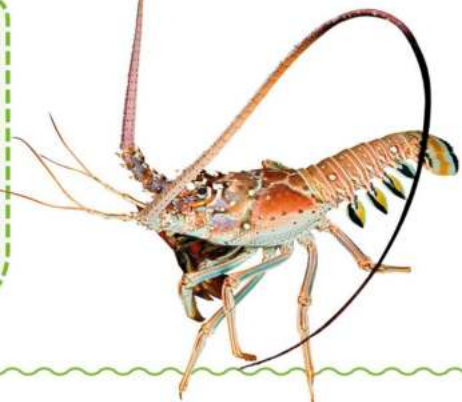
### FACT FILE

- » **Migration routes:** Indonesia, Malaysia, Papua New Guinea, and the Philippines to the US
- » **Frequency:** Once a year
- » **Fun fact:** A leatherback sea turtle's favorite food is jellyfish.

### FACT FILE

- » **Migration route:** Up to 30 miles (50 km) to reach coral reefs
- » **Frequency:** Up to three times a year
- » **Fun fact:** These lobsters shed their outside skeletons so new ones can grow.

Two long antennae help the spiny lobster fight off predators.



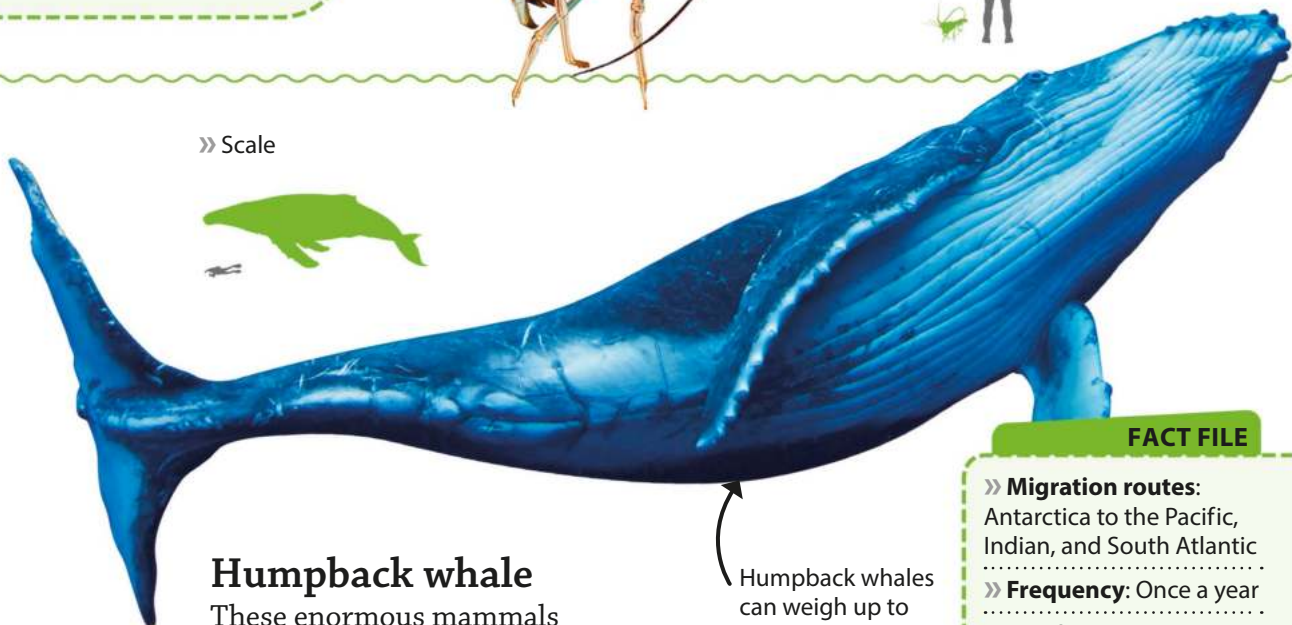
## Spiny lobster

These lobsters migrate in large groups in search of coral reefs. During their migration, they travel in long, neat lines along the seabed.

» Scale



» Scale



## Humpback whale

These enormous mammals can be 60 ft (18 m) long. The distance between their breeding and feeding grounds reaches 3,100 miles (5,000 km).

Humpback whales can weigh up to 44 tons (40 tonnes), which is about 60 times heavier than a cow!

### FACT FILE

- » **Migration routes:** Antarctica to the Pacific, Indian, and South Atlantic
- » **Frequency:** Once a year
- » **Fun fact:** These whales sing songs underwater to communicate with each other.



## JACQUES COUSTEAU

French explorer Jacques Cousteau (1910–1997) designed and built scuba devices, diving saucers, and underwater work stations for scientists. His own deep-sea dives were caught on camera in movies and television series.



Cousteau on board one of his diving saucers

## SYLVIA EARLE

American oceanographer Sylvia Earle (1935–present) built special diving equipment to discover new marine life and ocean features. She is committed to protecting the oceans and launched Mission Blue—an organization that creates marine protected areas around the world.



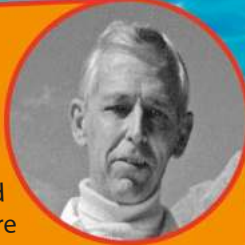
Earle showing her deep-sea exploration vehicle

# Underwater explorers

The oceans remained a mystery until the 19th century, when underwater exploration began. The invention of submersibles (underwater vehicles) allowed scientists to visit the deepest oceans. Their research opened up the oceans as never before, but even today, only five percent of the world's waters have been explored.

## JACQUES PICCARD

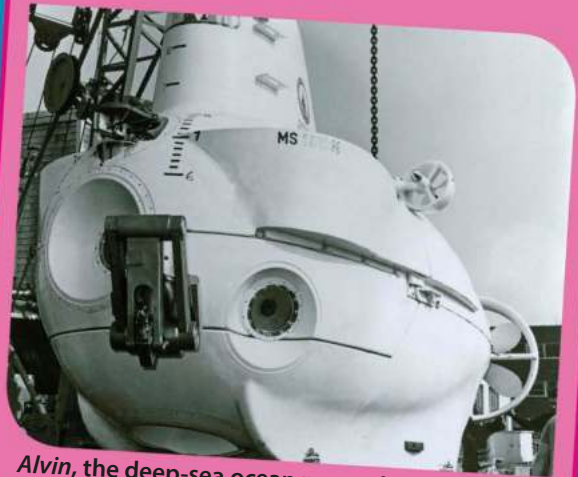
Swiss submarine fan Jacques Piccard (1922–2008) designed underwater vehicles to explore the oceans. In 1960, he climbed aboard his father's bathyscaphe (a type of submersible) *Trieste*, and went down to the deepest point on Earth—the Mariana Trench in the Pacific Ocean.



One of Piccard's submarines in 1980

## CINDY LEE VAN DOVER

American ocean explorer Cindy Lee Van Dover (1954–present) is the only female pilot of the deep-sea diving submersible *Alvin*. She found many giant tube worms and hydrothermal vents during about 50 trips underwater.



*Alvin*, the deep-sea ocean research submersible

## Underwater work

There are many different career options for people who enjoy the oceans. Some of these jobs involve studying marine life, researching ocean features, and protecting the waters.



**Marine biologist**  
Researchers of ocean habitats and marine life



**Underwater photographer**  
Scuba divers who record underwater action



**Marine archaeology**  
The study of ocean history, such as shipwrecks



**Aquatic veterinarian**  
Vets who specialize in treating marine animals



# Ocean exploration

Thanks to improvements in marine technology and equipment, people can explore more of the oceans than ever before. Basic breathing equipment allows for snorkeling near the surface, while more complicated underwater vehicles can visit the deepest ocean floor.

## Scuba diving

Scuba divers are equipped with an oxygen tank, so that they can breathe underwater. Increased interest in scuba diving has led to discoveries of ancient cities and shipwrecks, as well as encounters with mysterious marine life.



*Alvin, a US Navy submersible*

## Deep-diving submersibles

The deepest depths can only be explored by sturdy submersibles (underwater vehicles) that can handle the high water pressure. Scientists use submersibles to investigate deep-sea life.

### Diving regulator

This controls pressure inside the oxygen tank, making it possible to breathe.

### Weight belt

This belt has lead weights, which keep scuba divers underwater.



*Scuba diving over a coral reef*





AUV Artemis is designed to examine polar ice.

## Autonomous underwater vehicles

Robots that travel underwater without a human driver are called autonomous underwater vehicles (AUVs). They are programmed on land before being sent on special missions to collect scientific data from the oceans.

## Research ships

New research vessels are being designed to conduct studies at sea. These large ships are stocked with essential tools for specific investigations, such as studying underwater rocks, offshore oil rigs, polar ice, or animals of the deep.



Research ship *Neil Armstrong* is named after the first man on the moon.



Snorkelers can discover marine life close to the water's surface.

## Snorkeling

Simple snorkeling equipment has made it possible for anyone to see marine life wherever they choose to swim. The mask gives a clear view underwater, while the tube stretches above the surface so that the snorkeler can breathe.




# Ocean supplies

The image shows three large, white offshore wind turbines standing in a row in the ocean. The turbines have three blades each, and their towers are supported by concrete foundations. The sky is bright blue with scattered white clouds. The water is a deep blue with some whitecaps. The turbines are positioned diagonally across the frame, from the bottom left towards the top right.

Oceans support the lives of people all around the world, and provide opportunities for transportation and trade. Their waters are full of natural resources, and food and ingredients for medicines can be found beneath the waves. Fossil fuels, such as oil and gas, lie under the ocean floor.

Propellerlike blades  
are turned by the  
power of the wind.

A black arrow starts from the text and points towards the blades of the middle wind turbine.

## Offshore wind turbines

Wind turbines in the oceans catch strong winds. The power from the spinning blades is changed into electricity using a generator. This makes renewable energy (energy that does not run out when used) without using up other resources or polluting the oceans.

## Minerals

Over time, the natural processes taking place in underwater rocks produce different minerals, such as salt, magnesium, and titanium. Marine mining is usually done along the coast, to reduce the cost and the damage to the environment.



## Seaweed

The largest supplies of seaweed are grown off the coast of Asia—China is the world's leading producer. Seaweed farmers collect this marine plant to sell as food or as an ingredient for medicines.

## Fish

Fish can be caught using many different methods. Traditional fishing involves using small boats and nets. Bigger trawlers (fishing boats), however, can drag large nets along the ocean floor to scoop up fish and shellfish in huge amounts.



## Fossil fuels

Oil and natural gas are located deep inside layers of rocks under the ocean floor. They can be reached by drilling. The largest offshore oil fields and gas reserves are found in the Persian Gulf, in the Middle East. Fossil fuels are not renewable.

## Ocean cargo

Cargo ships can carry more weight than aircraft, while using less fuel. They can transport all kinds of supplies across the oceans in hundreds of box-shaped containers.



Cargo ship packed high with containers



# Threatened

Today, the world's oceans are in danger. Scientific research shows that human activity is polluting the waters, damaging ecosystems, and destroying wildlife. New laws are being introduced to preserve the oceans and protect the animals that live there before it is too late.



Fishermen drag in a huge catch of fish from a trawler.

## Overfishing

Large trawlers (fishing boats) are emptying the oceans of fish. This means that some groups of fish, such as the Atlantic bluefin tuna, are at risk of extinction.



Antarctic minke whales caught by a Japanese whaling ship



## Oil spills

This bird, called a cormorant, is stuck in a layer of oil. Oil spills from ships pollute the waters and poison wildlife.

## The Great Pacific Garbage Patch

Ocean currents have trapped huge amounts of litter and waste in the North Pacific Ocean. Known as the Great Pacific Garbage Patch, this area is bigger than the US, and mostly contains plastics since they do not wear down naturally.



Triggerfish swimming in an ocean of plastic

## Whaling

The whaling trade has dramatically reduced global whale populations. There are strict rules to limit whaling, but whales are still hunted for their meat, oil, and bones.



Chemical waste in Morocco is dumped into the Atlantic Ocean.

## Pollution

Every day, human activity creates sewage, chemicals, and other waste, which end up dumped in the oceans. This is extremely harmful to marine animals and their habitats.



# Climate change

The planet is getting hotter. Oceans, coastal cities, and underwater ecosystems are suffering from the harmful effects of climate change. Global warming is mostly caused by people burning fossil fuels and chopping down forests, which damages the Earth's atmosphere.

## Drowning islands

The Funafuti atoll is a ring of islands in the Pacific Ocean. Rising sea levels are causing these islands to sink. Scientists think that Funafuti may completely vanish within the next 50 years.



Waves crashing against Funafuti atoll

## Melting glaciers

Since the 1900s, the higher temperatures caused by global warming have made glaciers melt faster than ever before. The extra water has resulted in rising sea levels, more floods, and less ice for animals who depend on it to survive.



## Coral bleaching

Warmer water temperatures can cause coral to release crucial algae from their bodies. The coral then turns white in a process called coral bleaching. Over time, coral dies and entire ecosystems can be lost.



## Rising sea levels

As huge ice sheets melt, sea levels rise around the world. Coastal cities, such as Miami, in the US, Amsterdam, in the Netherlands, and Shanghai, in China, are at risk of flooding. In the future, the effect of flooding on these areas could be devastating.



## Ocean acidification

Oceans are becoming more acidic and less salty because of rising levels of carbon dioxide gas in the Earth's atmosphere. This result of climate change can damage marine ecosystems and be deadly to some sea life.





### On thin ice

The ice sheets in Antarctica and Greenland are melting, which is one of the reasons for rising sea levels. In the Arctic, walrus and polar bears live on the ice, but it is disappearing quickly.



### Ruined reefs

The world's largest coral reef is the Great Barrier Reef in Australia. Two-thirds of this reef, however, is now damaged by coral bleaching. This is devastating for all marine animals who depend on coral reefs for survival.



### Flood risk

Bangladesh already has regular flooding. By 2050, the sea level is expected to rise by 20 in (50 cm). This means Bangladesh could lose about 11 percent of its land and pose a threat to nearly 15 million people who live in low-lying coastal regions.



### Catastrophic coral

These coral reefs in the South China Sea are dying. Acidic waters are harmful to most shellfish, so there are fewer crabs and lobsters. This disrupts the ocean food chain since many marine animals eat shellfish.



# Meet the expert

We asked Chloe Harvey, an ocean conservationist who is a Director of The Reef-World Foundation, some questions. She travels to coral reefs around the world and teaches people how to protect them.



**Q: Why is ocean conservation so important?**

**A:** We can thank the oceans and the creatures who live there for every breath we take. Our oceans are the support system for everything we need to survive. The health of life in our oceans is threatened from increasing temperatures as a result of a changing climate, overfishing to feed a growing global population, and because habitats are being destroyed by human activity.

In order to keep enjoying the lives we live and the beauty of our blue planet, we must take action to look after marine life.

**Q: What do you love most about the oceans?**

**A:** Its magical powers! I am lucky enough to have been a scuba diver since I was 12 years old. Every time I plunge beneath the waves, I enter into a silent and calm world filled with adventure, color, and magnificence.

**Q: What is a typical work day for you?**

**A:** Every day is completely different. I am one of only five full-time staff members at The Reef-World Foundation, which means that we all need to do a bit of everything to keep the organization running. In addition to traveling to exotic destinations and developing our global programs, I also spend a lot of time in rainy Britain, sitting behind a computer writing reports and working on our accounts.



Scuba diving near a coral reef

**Q: What tools do you use in your job?**

**A:** Since I started my work with Reef-World in 2009, I have always believed that education is the most valuable tool to inspire the change we need to preserve our oceans. I enjoy listening to all the wonderful and passionate people I have the honor of working with—from the leader of a Philippine village and a trash collector in Malaysia, to national political leaders. They have taught me all I know, and I see it as my responsibility to pass on their messages and lessons to others.



Education is necessary to help protect the oceans.

**Q: What are your hopes for the future of ocean conservation?**

**A:** That the children of today are given the chance to do things better than previous generations. I'm driven by the words and actions of kids today who are demanding change to turn the tide on global warming and the destruction of our natural world. We know what we have to do and it's time to start doing it.

Write a letter to your local politician, educate your parents, or make your own ocean-friendly choices. You can make a difference.

**Q: Do you have any tips for how we can clean up our oceans?**

**A:** Each of us can make small changes to the way we live our lives. We can replace our clothes less often, use fewer chemical cleaning products in our homes, buy fewer plastic products, and eat less meat. Over time, technology and products that are more ocean friendly will be more easily available.

**Q: What is the best thing about your job?**

**A:** To work with the most incredible team and to know that every step, every success, and every minute I spend working will help to protect precious marine life in the sea.

**Q: What is your favorite sea creature?**

**A:** The wunderpus octopus—the master of disguise. This octopus can change its appearance in the blink of an eye, from a regular octopus to a slithering black-and-white striped sea snake, to a dancing sea feather, or to a flat fish lying on the seabed. To confuse a predator, trick its prey, or maybe just for fun, this incredible octopus is the ultimate costume champion!

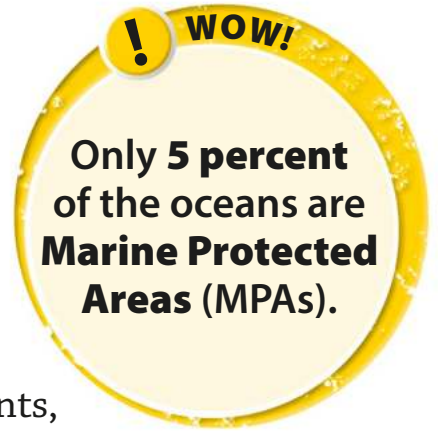


Chloe has pledged to stop using plastic straws.



# Protecting our oceans

There has never been a more important time to protect the oceans. The combined threats of fishing, plastics, and pollution are harming the oceans like never before. International governments, conservation groups, and local communities are working together to keep the oceans safe.



## Sustainable fishing

Overfishing happens when too many fish are caught too quickly. Sustainable fishing is the opposite of overfishing. It protects fish populations and lets them breed to produce more fish. Using special equipment, such as cast nets and spears, means that fish can be caught without harming the environment.



## Marine reserves

Some areas of the ocean are Marine Protected Areas (MPAs). In these zones, it is illegal to fish or to build. MPAs provide protection to fragile underwater ecosystems and encourage new types of marine animals to grow.





## Cleaner oceans

In 1972, the United Nations Environment Programme started. Their “Clean Seas” campaign is an agreement by 57 countries to reduce the amount of plastic polluting the oceans and to encourage recycling.



These volunteers are cleaning up a beach in Bangladesh.



These shelters keep people away from newly hatched turtles.

## Taking care of coastlines

Coastlines are protected so that people and wildlife can live in harmony. Marine animals and coral reefs must not be disturbed if they are to survive. At the same time, local communities need protection against the risks of erosion (land wearing away) and floods.



## Helping out

Each and every one of us can play a part in protecting the oceans. Removing litter from beaches, using fewer plastic products, and choosing to eat sustainable seafood are all good ways to help protect the environment.

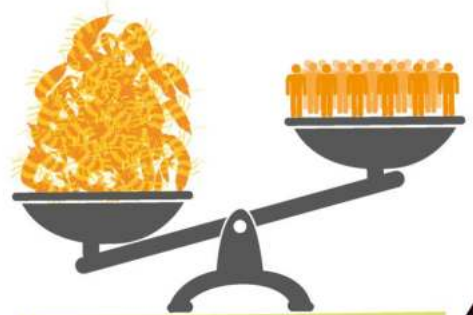


People come together to clean up coastlines.



# Oceans facts and figures

The world's oceans are full of fascinating features and marvelous marine animals. Here are some weird and wonderful facts and figures you might not know.



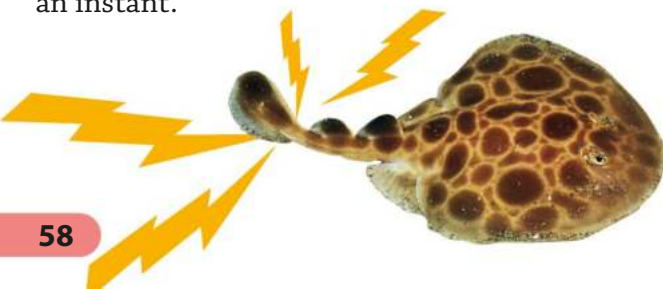
The **total weight** of **Antarctic krill** in the oceans is **greater** than the total weight of the **human population** of the world.



The **ice sheets** in the **Arctic Ocean** are **shrinking** by **8 percent** every **10 years**.

## 200 volts

The torpedo ray can produce a 200-volt electric shock, which is enough to kill a small fish in an instant.



## 19,794

The Pacific Ocean is about 12,300 miles (19,794 km) wide, which is more than five times the diameter of the moon.



The **giant squid** has the **biggest eyes**. They are up to 11 in (27 cm) wide, which are even **bigger** than **soccer balls**.



**50**  
MPH

THE **PEACOCK MANTIS SHRIMP** HAS THE **FASTEST PUNCH**—IT CAN HIT ITS PREY AT A **SPEED** OF **50 MPH** (80 KPH).

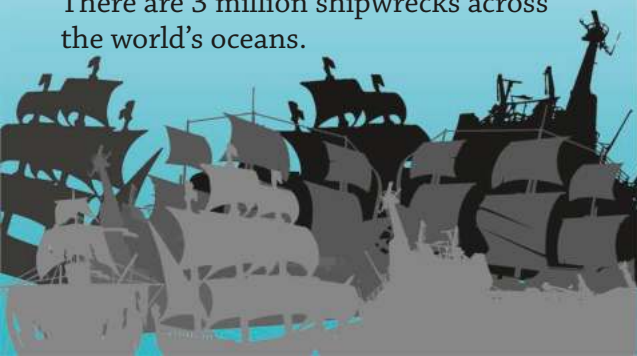


A **great white shark** has 300 teeth. Since they are being **replaced all the time**, it may grow about **30,000 teeth** during its **lifetime**.



**3 million**

There are 3 million shipwrecks across the world's oceans.



**450** MILLION  
YEARS

Starfish have lived in the oceans for almost 450 million years—long before the first dinosaurs lived on Earth.



450 million years ago



181–169 million years ago



Five great oceans surround the Earth's continents, including the huge Pacific and the icy Arctic. Their different climates and depths influence the marine animals who live in their waters.



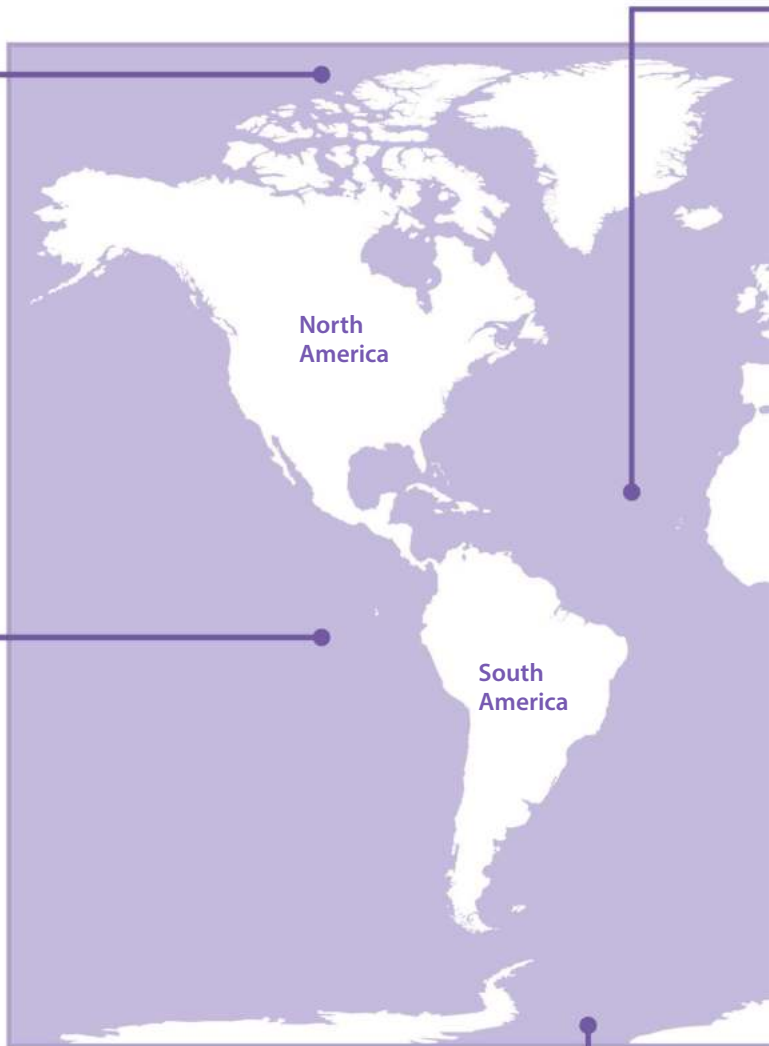
### Arctic Ocean

This is the world's smallest and shallowest ocean. Its freezing waters are home to large marine mammals, such as polar bears, whales, seals, and walrus.

**Area:** 5.4 million sq miles (14.1 million sq km)

**Average depth:** 3,405 ft (1,038 m)

**Climate:** cold and windy



### Pacific Ocean

The Pacific is the largest and deepest ocean on Earth. Killer whales, orcas, are just one of more than 200,000 different types of animals who live in this ocean.

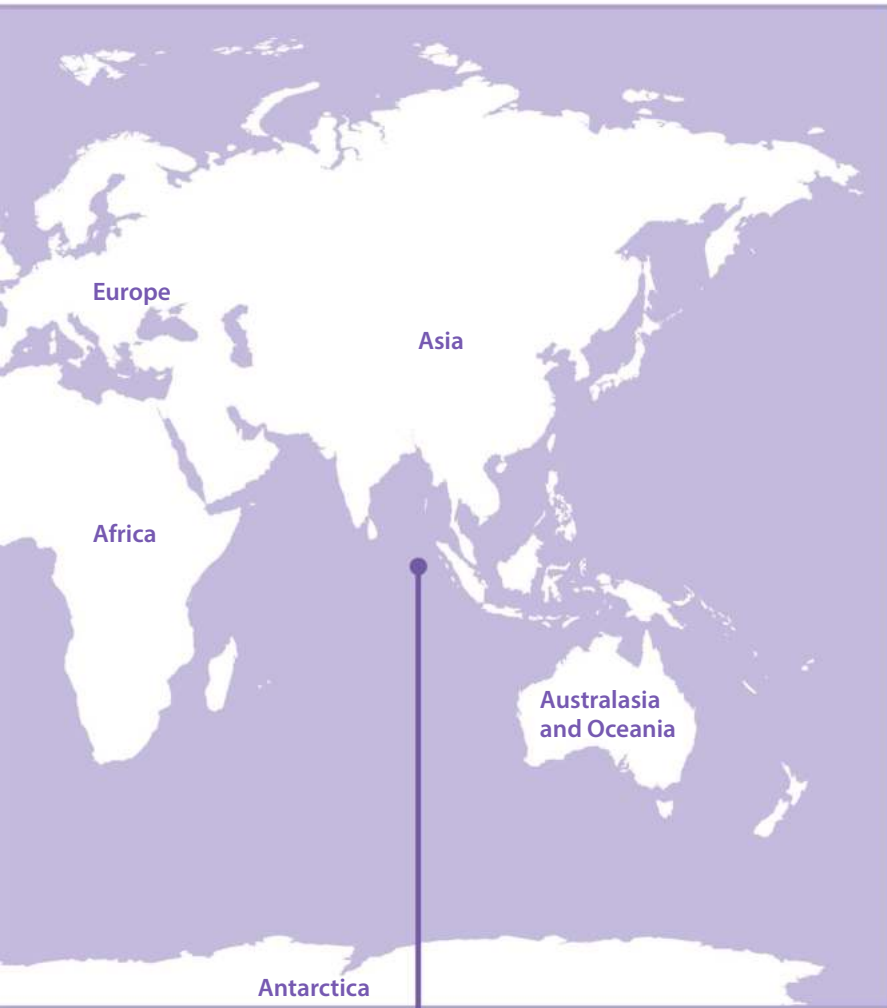
**Area:** 62.5 million sq miles (161.8 million sq km)

**Average depth:** 14,000 ft (4,280 m)

**Climate:** warm and wet



# Earth's oceans



## Atlantic Ocean

The second-largest ocean is also the saltiest. The Atlantic Ocean forms an S-shape as it divides North and South America from Europe and Africa.

**Area:** 41.1 million sq miles (106.5 million sq km)

**Average depth:** 11,960 ft (3,646 m)

**Climate:** mild and stormy



## Southern Ocean

Bordering Antarctica, the Southern Ocean has cold and windy waters. Icebergs break off from the continent's huge ice sheets and float away into the ocean.

**Area:** 7.9 million sq miles (20.3 million sq km)

**Average depth:** 14,800 ft (4,500 m)

**Climate:** cold and stormy



## Indian Ocean

The world's warmest ocean is the Indian Ocean. It has many trade routes connecting the Middle East and Africa with Oceania and the Americas.

**Area:** 27.2 million sq miles (70.6 million sq km)

**Average depth:** 12,990 ft (3,960 m)

**Climate:** hot and humid

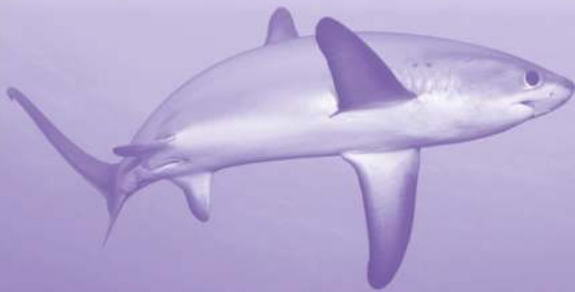


# Ocean records

## Highest-jumping fish

### Key features

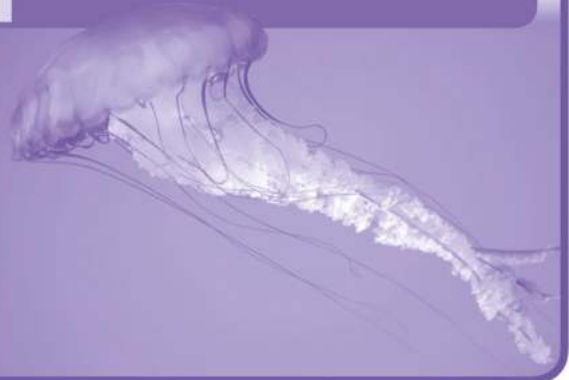
The thresher shark can jump 20ft (6m) out of the water. This shark has a very long tail to swipe and stun small prey.



## Most dangerous animal

### Key features

More than 5,000 people have died from box jellyfish stings. The venom contains about 200 different chemicals.



## Deepest depth

### Key features

The deepest point discovered on Earth is the Mariana Trench. It is 7 miles (11km) below the surface of the Pacific Ocean.



## Fastest fish

### Key features

The sailfin mackerel can swim at speeds of up to 68mph (110kph). This ocean predator uses its long bill to tear into schools of fish.



Beneath the surface, oceans are packed with fascinating features, wonderful wildlife, and ancient treasures. From the largest and the longest to the deepest and the oldest, the oceans' record-breaking secrets are revealed here.

## Largest living structure

### Key features

The Great Barrier Reef, off the coast of Australia, is the largest living structure on Earth.

It is about 132,900 sq miles (344,400 sq km) in area.



## Longest mountain chain

### Key features

The mid-ocean ridge mountain chain stretches for 40,389 miles (65,000 km).

It is almost completely underwater and has thousands of volcanoes.



## Loudest animal

### Key features

The sperm whale makes a clicking sound that reaches 230 decibels—almost twice as loud as the loudest human scream!

Sperm whales can hear each other from 10 miles (16km) away.



## Most ancient fish

### Key features

The oldest type of fish on Earth is the coelacanth.

This giant animal has existed for more than 360 million years.







# Glossary

Here are the meanings of some words that are useful for you to know when learning all about oceans.

**absorb** To take in something

**adapt** When an animal or plant becomes better-suited to its habitat. For example, a penguin's thick feathers keep it warm in icy places

**algae** Simple, plantlike organism that is found in or near water. Seaweed is a type of algae

**bacteria** Tiny living things

**basalt rock** Type of rock found on the ocean floor

**bathyscape** Type of submersible

**bioluminescence** Chemical reaction in which an animal produces light

**blubber** Thick layer of fat in some animals, such as whales; it protects them from the cold

**breed** To produce offspring

**camouflage** Patterns or colors on an animal's skin that help it blend in with the environment

**cargo** Goods carried on board a ship

**chasm** Deep crack in the ground

**climate** Weather patterns for a specific area

**climate change** Process of the Earth's climate changing over time

**colony** Group of animals who live together, such as seabirds

**conservation** Protecting an area of the Earth, such as the oceans

**coral reef** Huge rocky structure, which has grown gradually from the skeletons of tiny marine animals

**decibel** Unit that measures the loudness of sound, where silence is 0 decibels (dB)

**dorsal fin** Fin located on the back of a marine animal, such as a shark

**ecosystem** Living community of plants and animals found together, and their environment

**environment** Surroundings in which an animal lives

**erosion** Breaking down of rock by wind and water

**evaporation** When water heats up and turns into water vapor

**flooding** When a river or the ocean overflows and fills land with water

**fossil fuel** Type of energy that is not renewable, such as oil

**fresh water** Water that is not salty, such as in rivers, ponds, and most lakes

**glacier** Large mass of ice that moves slowly down a slope

**global warming** When worldwide temperatures rise

**habitat** Natural home of an animal or plant

**lava** Red-hot, melted rock that flows out of a volcano when it erupts

**low-lying land** Land that is close to the sea level

**mammal** Warm-blooded animal with a backbone that has skin covered in hair and feeds its young milk

**marine** Describes animals that live in the ocean, their habitat, and environment

**migration** Regular group movement of animals, often to feed or breed, or for safety

**minerals** Substances that all living things need in order to grow

**oceanographer** Person who studies oceans and seas

**photosynthesis** Process that green plants use to make food

**poison** Harmful substance released by an animal or plant that may be deadly if touched or eaten

**predator** Animal that hunts other living animals for food

**prey** Animal that is hunted for food

**remote** Far away from another place, or difficult to get to

**renewable** Energy or fuel that will not run out when used, such as wind power

**school** Large group of fish who swim together

**scuba** Device that allows the wearer to breathe underwater

**sea ice** Ice that forms when ocean water freezes

**streamlined** Smoothly shaped to move easily through water. Sharks are streamlined, which helps them swim fast

**submersible** Boat or vehicle that can travel underwater, such as a bathyscape

**sustainable** Able to continue or be supported for a long time

**tectonic plates** Giant slabs of rock that make up the Earth's crust

**vessel** Boat or ship

**voyage** Trip to a place, usually by boat or ship

**water vapor** Gas that is made when water is heated

Penguins have blubber to keep warm and are streamlined to swim fast.







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# findout! Quiz

Test your knowledge on oceans  
and find out even more fun facts!



**1** What percentage of water on Earth is fresh water?

**2** What is the deepest zone of the ocean called?



**3** What is blubber?

**4** How big can Antarctic krill grow to be?



**5** When did the oceans form?



**6** What is a group of fish called?



**7** What is the biggest creature on Earth?



**8** Which job involves studying ocean history?

**10** What seabird has the largest wingspan of any bird?

**9** How much of the Great Barrier Reef has been damaged by coral bleaching?



Turn over to discover the answers



# Quiz answers



1

**One percent.** Find out more about our blue planet on page 8.

2

**Hadal.** Find out more about ocean zones on page 10.

3

**The fat of sea mammals.** Find out about the animals that have blubber to keep warm on page 16.

4

**2.5 in (6.5 cm).** Find out more about their part within the ocean food chain on page 25.

5

**Almost 4 billion years ago.** Find out more about how the oceans formed on page 6.

6

**School.** Find out why some fish swim in schools on page 27.

7

**Blue whale.** Find out more about the huge creatures in our oceans on page 41.

8

**Marine archaeology.** Find out more about ocean jobs on page 45.

9

**About two-thirds of it.** Find out more about the effects of climate change on our oceans on page 53.

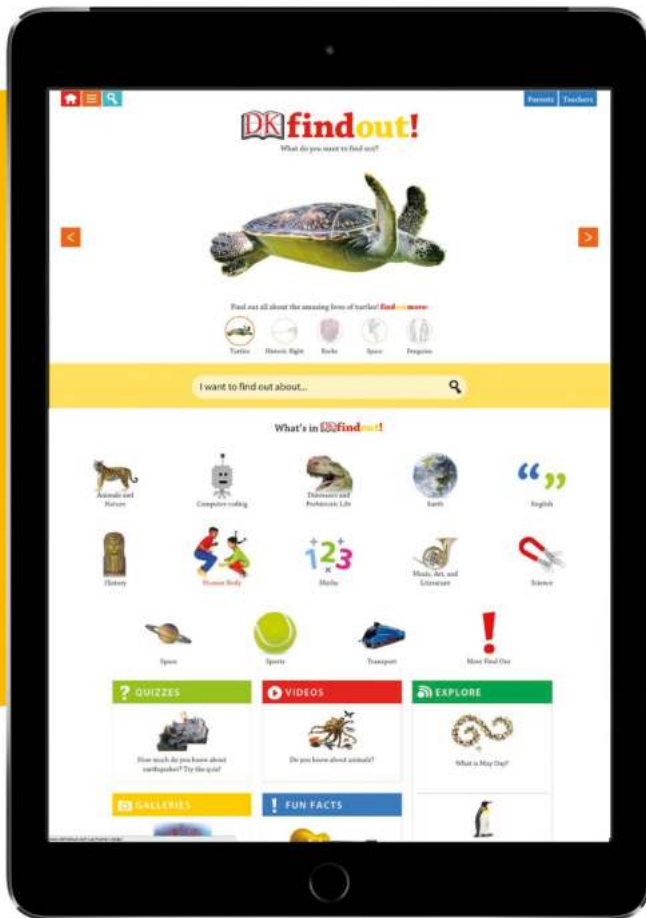
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**Albatross.** Find out more about seabirds on page 34.



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