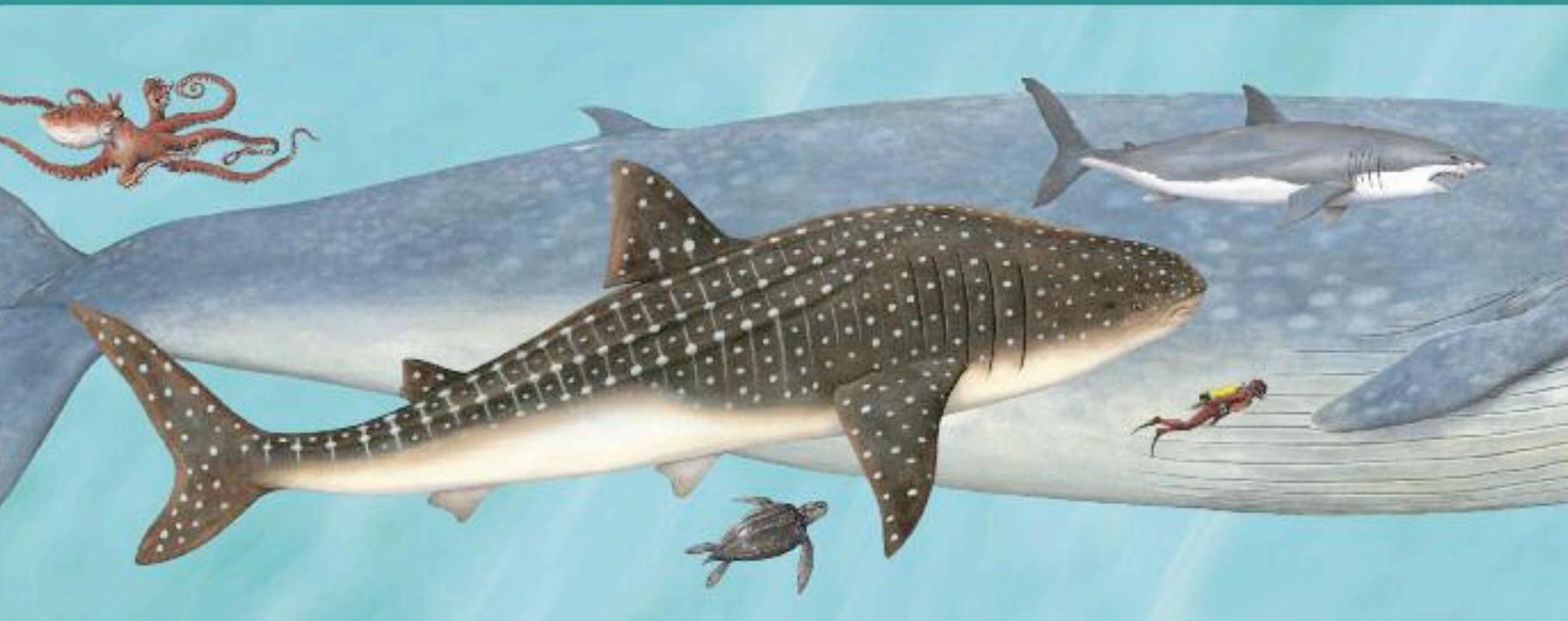


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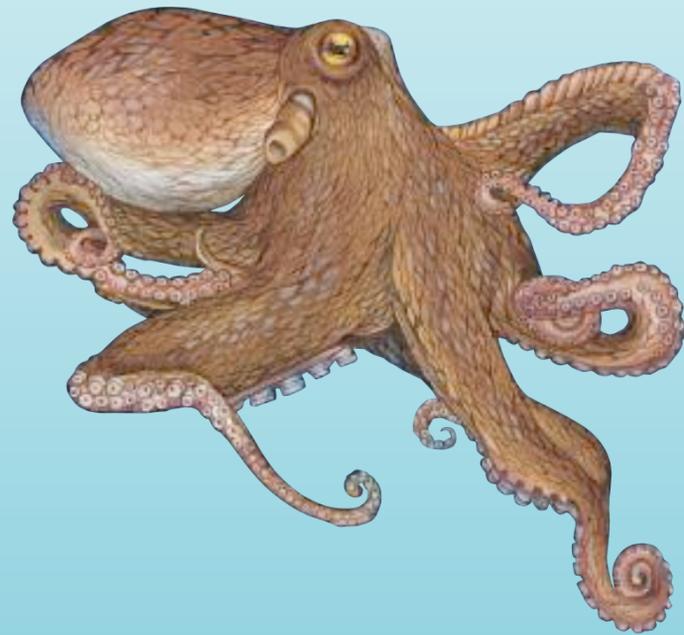
OCEANS



More than 200 keywords

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OCEANS

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OCEAN ZONES

The ocean is the body of salt water that covers about 71% of the Earth's surface. There are two main ocean habitats: the water itself, or pelagic habitat, and the ocean floor, called the benthic habitat. Both are subdivided into several zones, according to the amount of sunlight that reaches down through the water. Most life is concentrated in the upper 200 m where tiny plants and animals congregate, providing a rich source of food. But some animals manage to survive in the dark, near-freezing waters in the depths of the ocean.

Abyssal plain A flat region of ocean floor lying between 4000 and 6000 m deep. It is covered by a thick layer of mud called ooze. The animals that live here must lift themselves out of the ooze, burrow inside it, or find a way of slithering across it.

Abyssal zone The layer of water that extends from 4000 m down to the ocean floor. Only a few animals live in this zone.

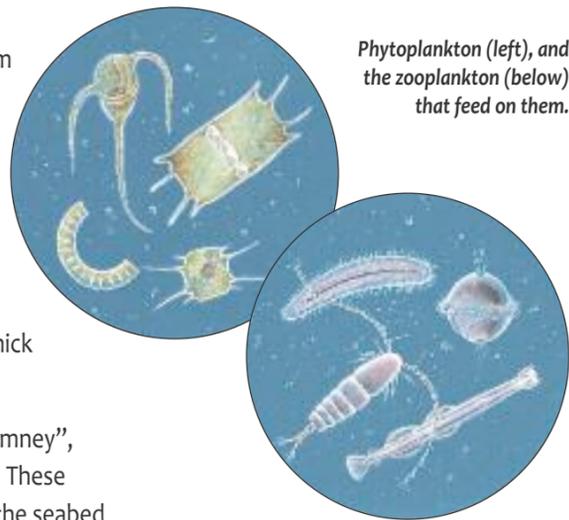
Bathypelagic zone The layer of water between 1000 and 4000 m deep. To blend in with their environment and so avoid predators, most creatures in this zone are dark brown, purple or grey in colour.

Benthic zone The ocean floor. It may be bare rock, coral or a thick layer of mud.

Black smoker A dark, rocky "chimney", found along mid-oceanic ridges. These chimneys form above cracks in the seabed through which hot, sulphur-rich water spurts out. A number of creatures flourish in the waters near the vent. They eat bacteria that feeds on the sulphur-rich waters, or other bacteria-eating animals. The most amazing of these creatures are three-metre-long tube worms.

Continental shelf The part of a continental landmass that lies under ocean waters, no deeper than 200 m below the surface.

Continental slope The steep part of the continental shelf that plunges down towards the abyssal plain. A constant "rain" of decomposed material from the surface settles on the slope to form a soft, muddy ooze.



Phytoplankton (left), and the zooplankton (below) that feed on them.

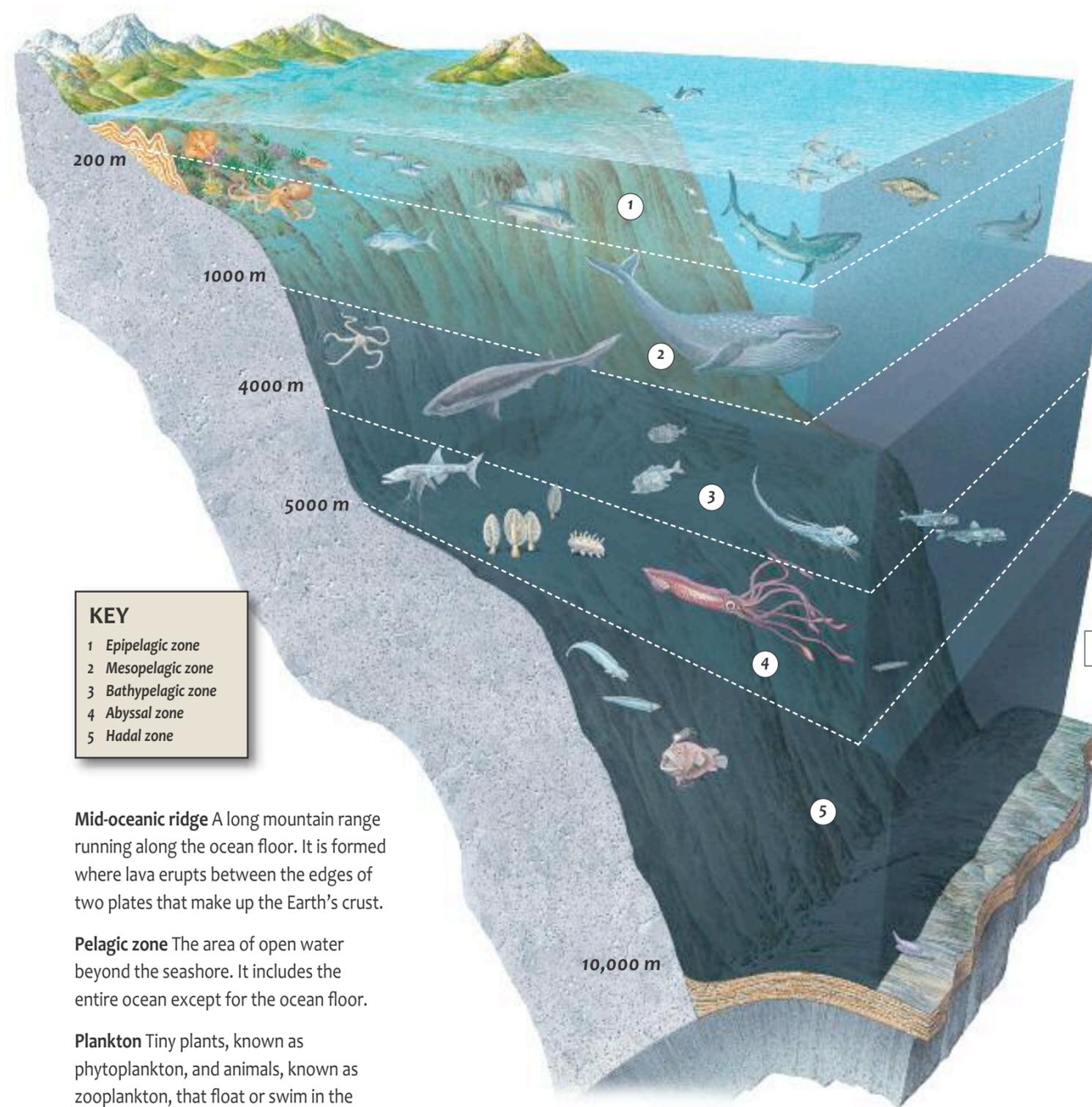
Deep sea trench A very deep valley in the seabed, plunging to depths of 6000 to 11,000 m. Trenches are formed when the huge plates that make up the Earth's crust push together, forcing one to slide beneath the other.

Epipelagic zone The sunlit top 200 m of ocean water. In these waters, there is enough light for plants to make food via photosynthesis. The richest variety of life in the oceans occurs in this zone.

Hadal zone The water found in deep sea trenches. The zone is named after Hades, the Greek god of the underworld. Incredibly, some animals have been found to live at these depths. They can survive the great pressure because their bodies have no air spaces inside them.

Littoral zone The seashore, the part of the sea closest to the land.

Mesopelagic zone The layer of ocean water that lies between 200 and 1000 m deep. It is sometimes known as the "twilight zone".



KEY	
1	Epipelagic zone
2	Mesopelagic zone
3	Bathypelagic zone
4	Abyssal zone
5	Hadal zone

Mid-oceanic ridge A long mountain range running along the ocean floor. It is formed where lava erupts between the edges of two plates that make up the Earth's crust.

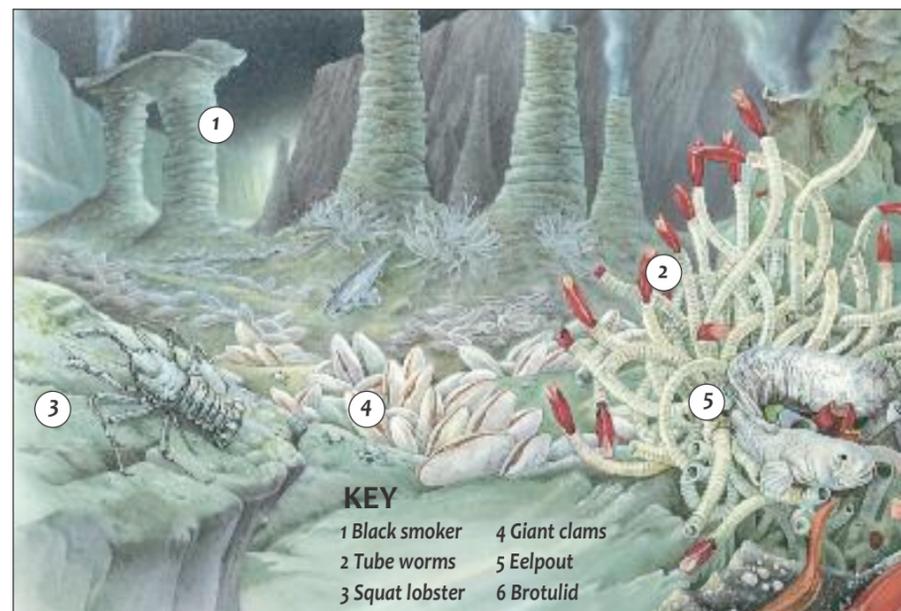
Pelagic zone The area of open water beyond the seashore. It includes the entire ocean except for the ocean floor.

Plankton Tiny plants, known as phytoplankton, and animals, known as zooplankton, that float or swim in the surface waters of the ocean.

Photosynthesis The process by which green plants use sunlight as an energy source to turn carbon dioxide and water into the sugars they need for food. Photosynthesis in the ocean can occur only in clear, shallow waters.

Phytoplankton Microscopic plants that float in the ocean currents. Phytoplankton use sunlight and nutrients dissolved in ocean water to make food by photosynthesis. They comprise most of the plant material found in the oceans.

Zooplankton The tiny animals that feed on phytoplankton. These include the larvae (young) of fish, as well as tiny relatives of crabs and shrimps called copepods. They provide food for a range of ocean animals.



Black smokers and the community of animals that live near them.

KEY	
1	Black smoker
2	Tube worms
3	Squat lobster
4	Giant clams
5	Eelpout
6	Brotulid

INVERTEBRATES

Invertebrates are animals that do not have backbones. They come in many different shapes and sizes.

Many are only found in the sea. Marine invertebrates are a large and diverse group that includes corals (▶18), sea anemones (▶26), sea urchins, starfish (▶26) and many crustaceans, molluscs and worms. Crustaceans and molluscs are sometimes grouped together and called “shellfish”.

Arthropods Animals, such as insects and crustaceans, that have jointed legs and an external skeleton. This **exoskeleton** is made of a light, strong material called **chitin**, which supports and protects the animal’s body. As an arthropod grows, it moults its exoskeleton and grows a new one.

8

Bivalves Soft-bodied molluscs with two shells joined by an elastic hinge. Bivalves include scallops, oysters and mussels.

Cephalopods Molluscs with a large head and a beaked mouth surrounded by tentacles. Cephalopods include squid, octopuses, cuttlefish and nautilus. They are very intelligent and can change colour to scare off predators or blend in with their surroundings.

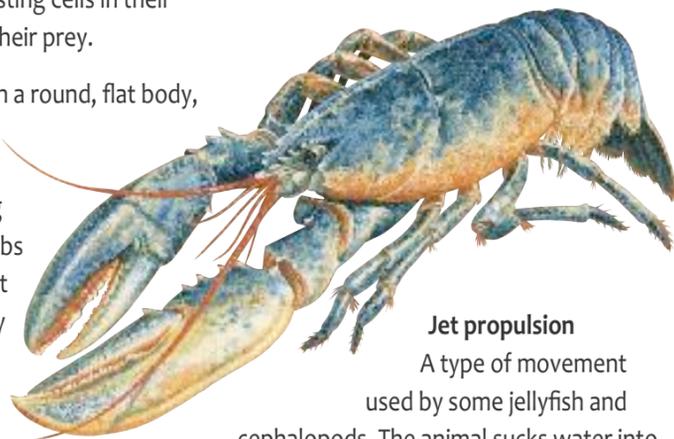
A sea urchin



Jellyfish

Cnidarians Jelly-like invertebrates with stinging cells. Some, such as coral polyps (▶17) and sea anemones (▶26), are anchored with their tentacles pointing upwards. Others, such as jellyfish, float with their tentacles hanging down in the water. Cnidarians use sting cells in their tentacles to paralyse their prey.

Crab A crustacean with a round, flat body, four pairs of legs and a pair of pinching claws used for feeding and defence. Most crabs live on the seafloor but some may live in sandy burrows or even on land. Crabs eat the rotting bodies of dead animals and plants.



Lobster

Jet propulsion

A type of movement used by some jellyfish and cephalopods. The animal sucks water into the body sac, then squirts it out. As the water shoots out backward, the force of it pushes the animal forward.

Lobster A crustacean with a long body, four pairs of legs and a large pair of claws. Lobsters crawl on the seabed in shallow water, feeding on starfish, sea urchins, molluscs and crabs. One claw is used for crushing prey and the other is used for cutting it up.

Molluscs A group of invertebrates with soft bodies, often protected by hard shells. The main groups of molluscs are gastropods, bivalves and cephalopods.

Crustaceans Arthropods such as crabs, lobsters, krill (▶24) and barnacles (▶26) that have two pairs of sense receptors called antennae on their heads.

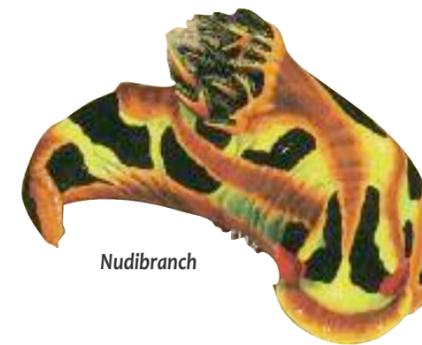
Echinoderms Marine invertebrates with spiny skin and skeletons made of chalky calcium plates. They include starfish (▶27), sea urchins and sea cucumbers.

Gastropods Soft-bodied molluscs, such as snails, slugs and whelks, that move about on one large foot. Some gastropods have hard, protective shells.

Jellyfish A cnidarian with a bell-shaped body and tentacles. Jellyfish are more than 90% water and have no heart, bones or brain. Some swim by jet propulsion, but most are carried by the ocean tides and currents. Their tentacles have stinging cells with which they paralyse their prey.



Scallops move through the water by forcing water from their shells to push themselves forward.



Nudibranch

Nudibranch A brightly coloured type of sea slug. Some nudibranches feed on sea anemones (▶26) and store their stingers as growths on their backs as a weapon.

Octopus A cephalopod with a bag-shaped body, an internal shell and eight arms, used to fight, grab things and move about. The largest octopuses have an arm span of up to 9 m. Octopuses live on the ocean floor, feeding on crabs and lobsters. They are thought to be the most intelligent of all invertebrates.

Scallop A soft-bodied mollusc with two shells joined together at a hinge. Scallops move through the water by quickly closing their shells to force out water and push themselves forward.

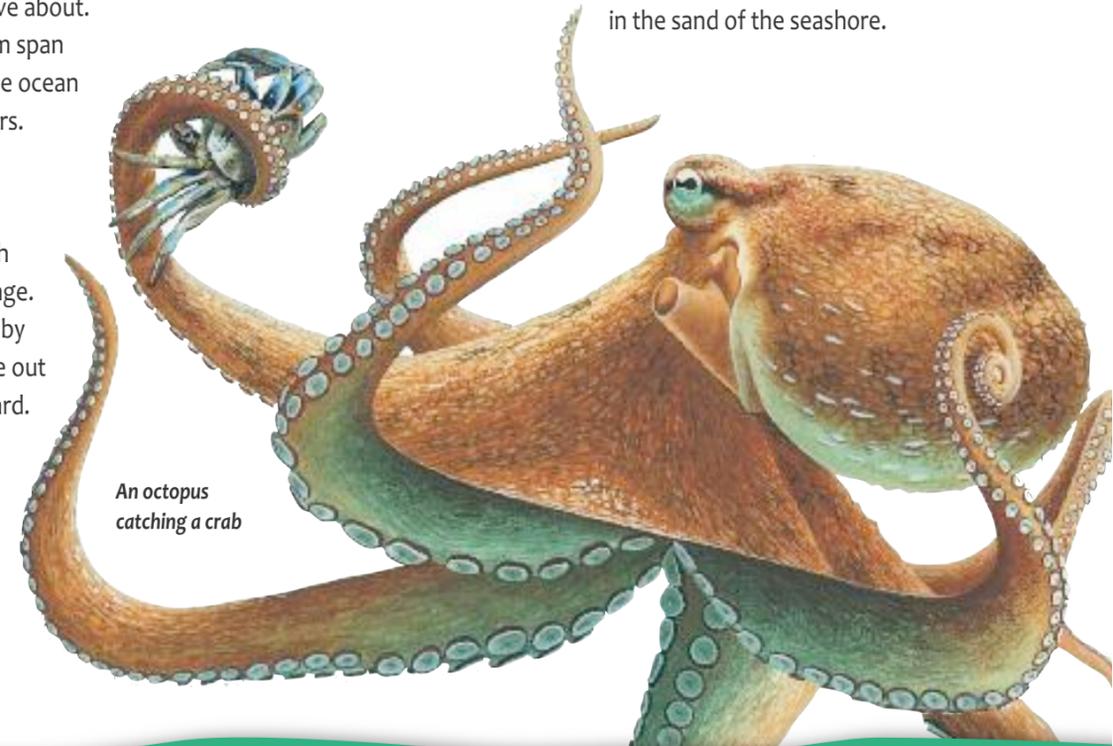
Sea cucumber A soft-bodied echinoderm that lives on the ocean floor. It filters the sandy bottom for dead plant and animal material. It has five rows of feet and a mouth surrounded by tentacles.

Sea slug A soft-bodied sea creature that moves on one foot. Because sea slugs are not protected by a shell, some species are camouflaged and some are poisonous.

Sea snail A gastropod with a hard shell. Conches, whelks and winkles are all types of sea snail.

Sea urchin A small, round, spiny echinoderm that feeds on seaweeds and other plants. Its mouth is in its underside, so it crawls on top of things to eat them.

Sponge A type of invertebrate with no mouth, heart, brain or distinct body parts. Sponges live attached to solid surfaces. They feed by passing water through tiny pores in their bodies and filtering food from the water.



An octopus catching a crab

FACTFILE

★ The octopus has the largest brain of any invertebrate.

★ Most invertebrates have symmetrical bodies, meaning that each half looks exactly the same. The only exception are sponges. Echinoderms are symmetrical five ways, meaning that their bodies can be divided into five identical pieces.

★ The largest jellyfish, the lion’s mane, has tentacles that are more than 50 m long.

★ Some jellyfish, such as the box jellyfish, have a sting powerful enough to kill a human within minutes of contact.

Squid A cephalopod with a long, pointed body, eight arms and two longer tentacles. Squids have an internal shell called a “pen” that protects their inner organs. They have large eyes and good eyesight.

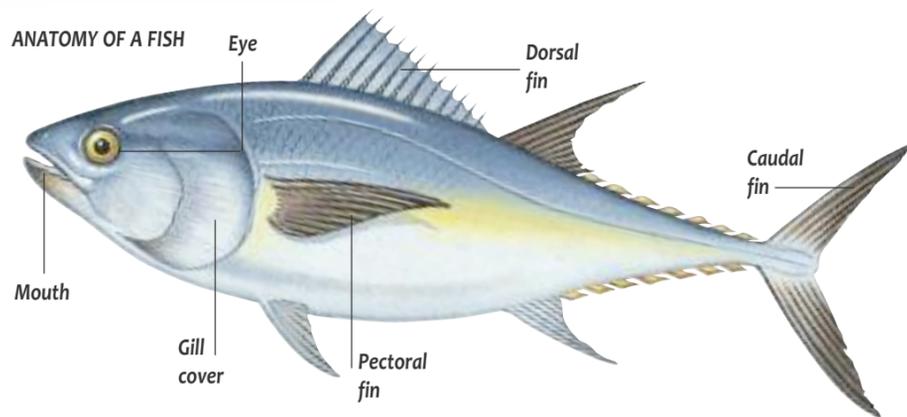
Tentacle A flexible limb with no bones or joints, belonging to some animals, especially invertebrates, such as squid and jellyfish. Tentacles may be used for gripping or feeling objects, or for movement.

Worms A group of long, thin, soft-bodied creatures. Some species live in the sea or in the sand of the seashore.

9

FISH

Fish are vertebrates (animals with backbones) that live in water all of the time. They breathe using gills. Fish move by flexing muscles along their bodies in a wave-like motion. Many fish have a streamlined body shape, with fins, a tail and a coat of overlapping scales. There are two main types of fish: the **cartilaginous fish**, including sharks and their relatives (➤12); and **bony fish**.



Cartilaginous fish A group of fish including sharks and rays whose skeletons contain no bone—only a flexible, fibrous material called cartilage. Cartilaginous fish also have no swim bladder organs to help them to stay afloat. They must therefore swim continuously to stop themselves from sinking to the bottom of the ocean.

Caudal fin The tail fin of a fish used to move it through the water.

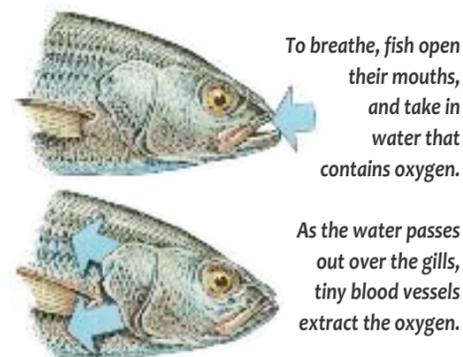
Dorsal fin A fin on the back side of fish, sharks, whales and dolphins. It helps keep the animal upright while swimming.

Eel A long, ribbon or snake-like fish without scales. Eels have long bodies with narrow dorsal fins that do not stick out from their bodies like other fish. They live in the world's oceans and rivers. Their young are called **elvers**.

Fins The broad, flat surfaces projecting from the body of marine animals such as fish. They are used for steering and balance.

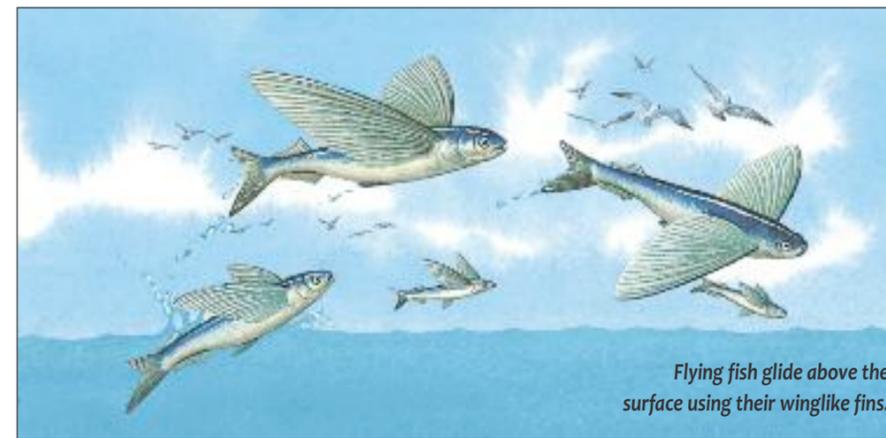
Flatfish A group of bottom-living fish, including flounder and sole. They have both eyes on one side of their flat bodies, so that they can spot predators or prey above them in the water. They are camouflaged to blend in with the sandy ocean floor.

Flying fish A fish with large pectoral fins like wings. These allow it to swim fast and leap from the water to escape from predators.



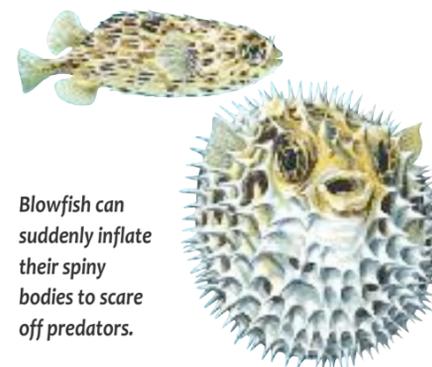
Gills The breathing organs of fish, that extract oxygen from the water. Fish draw water, which contains oxygen, into their mouths. When they pump it out through slits in the side of their head, it passes over the gills and tiny blood vessels extract the oxygen. Bony fish usually have a protective flap over their gills.

Jawless fish Long, tube-like fish that have no jaws. They have existed for around 400 million years, but the lamprey and hagfish are the only species still alive today.



Flying fish glide above the surface using their winglike fins.

Lionfish A striped, tropical fish, armed with venomous spines on its back. Its bright markings warn other animals that it is poisonous.



Blowfish can suddenly inflate their spiny bodies to scare off predators.

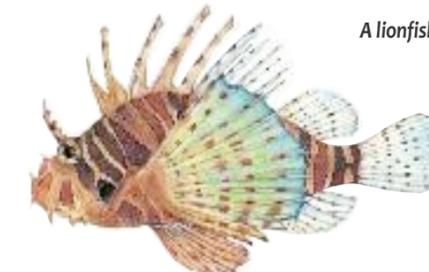
Pectoral fin The fin located on each side of a fish's body, used to help the fish steer.

Scales Tiny, layered plates that cover the bodies of many bony fish. Most fish have scales that overlap each other to keep water out and to protect the fish's body.

School A group of fish or marine mammals, such as dolphins, swimming as a group in the same direction.

Shoal A number of fish that stay together as a social group. Shoaling means that fish have a better chance of survival if they are attacked by predators, and a better chance of finding a mate.

Stonefish A mottled red fish with venomous spines down its back. It lives on the seabed in tropical waters, where it is perfectly camouflaged. Its spines stick up when it is threatened and can inject a venom that is fatal even to humans.



A lionfish

Swim bladder An internal organ filled with air that helps fish stay at a certain depth. Swim bladders enable fish to stay buoyant without needing to swim. They also help fish sense sound vibrations in the surrounding water.

FACTFILE

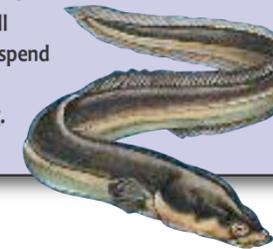
★ Most bony fish have good eyesight and can see in colour. Their eyes are on the sides of their heads, giving them a wide field of vision.

★ Bright colours in fish are often a warning to predators that they are poisonous.

★ Most fish lay vast numbers of eggs at once, which they leave to hatch out on their own. A few kinds of fish, such as sharks (➤12), carry their eggs inside their bodies and give birth to live young.

★ Fish were the first vertebrates to evolve, millions of years ago. One of the oldest types alive today is the coelacanth, fossils of which date back 90 million years. Coelacanths are the closest link between fish and the first amphibians, which moved from the water to the land about 375 million years ago.

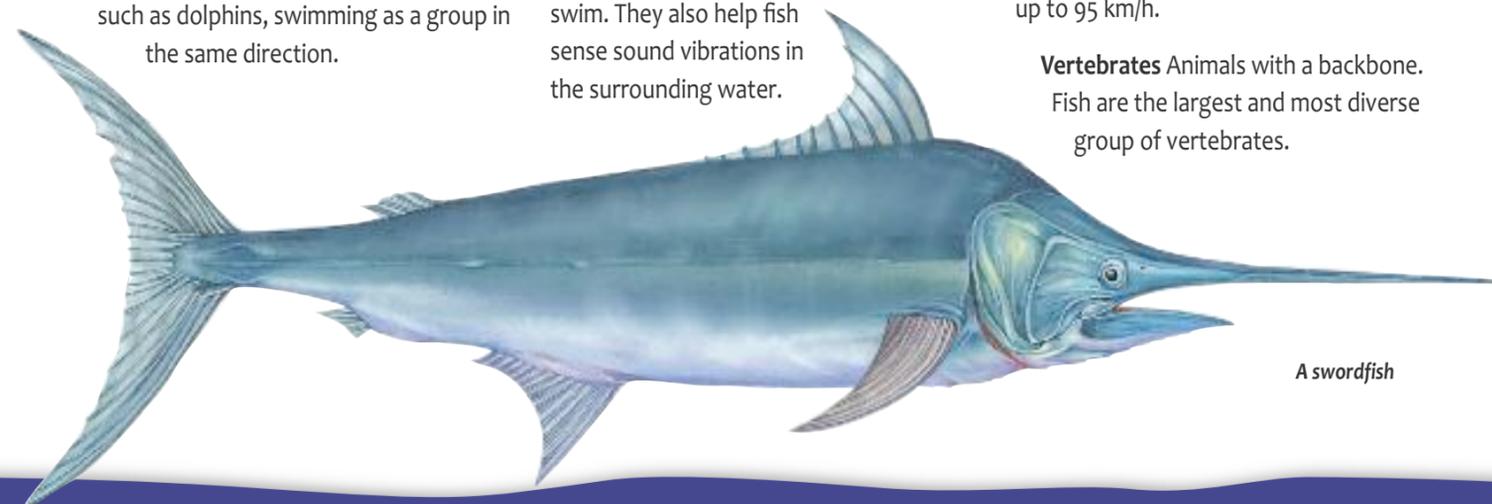
★ Around one quarter of all fish species spend their whole life shoaling.



European eel

Swordfish A large predatory fish with a distinctive long, flat, sword-like snout. Swordfish have long, streamlined bodies up to 4.5 m long. They hunt at night near the ocean surface, using their snouts to stun prey before eating it. They swim at great speed, sometimes leaping out of the water and briefly travelling through the air at speeds of up to 95 km/h.

Vertebrates Animals with a backbone. Fish are the largest and most diverse group of vertebrates.



A swordfish



Schooling fish all swim in the same direction as a group.

Barbels Whisker-like feelers near the mouths of fish, rays and some sharks. They contain taste sensors that help fish to find food in dark or murky water.

Blowfish A medium-sized fish that can inflate its body to more than twice its size by swallowing water. This causes sharp, poisonous spines to stick out all over its body, scaring off any predators. It is also sometimes called a **porcupine fish**.

Bony fish A group of fish with skeletons made of bone. Their bodies are mostly covered with overlapping scales and they have swim bladders to keep them afloat.



The colourful reed stonefish is one of the deadliest fish known.

SHARKS & RAYS

Sharks and rays are both kinds of cartilaginous fish (10). Sharks typically have rows of large, sharp teeth and feed on fish and squid, but some species also eat larger prey.

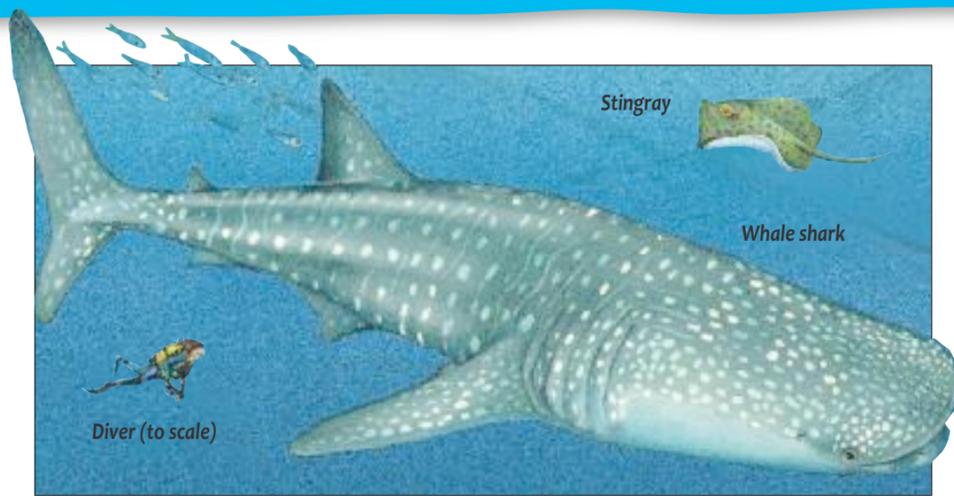
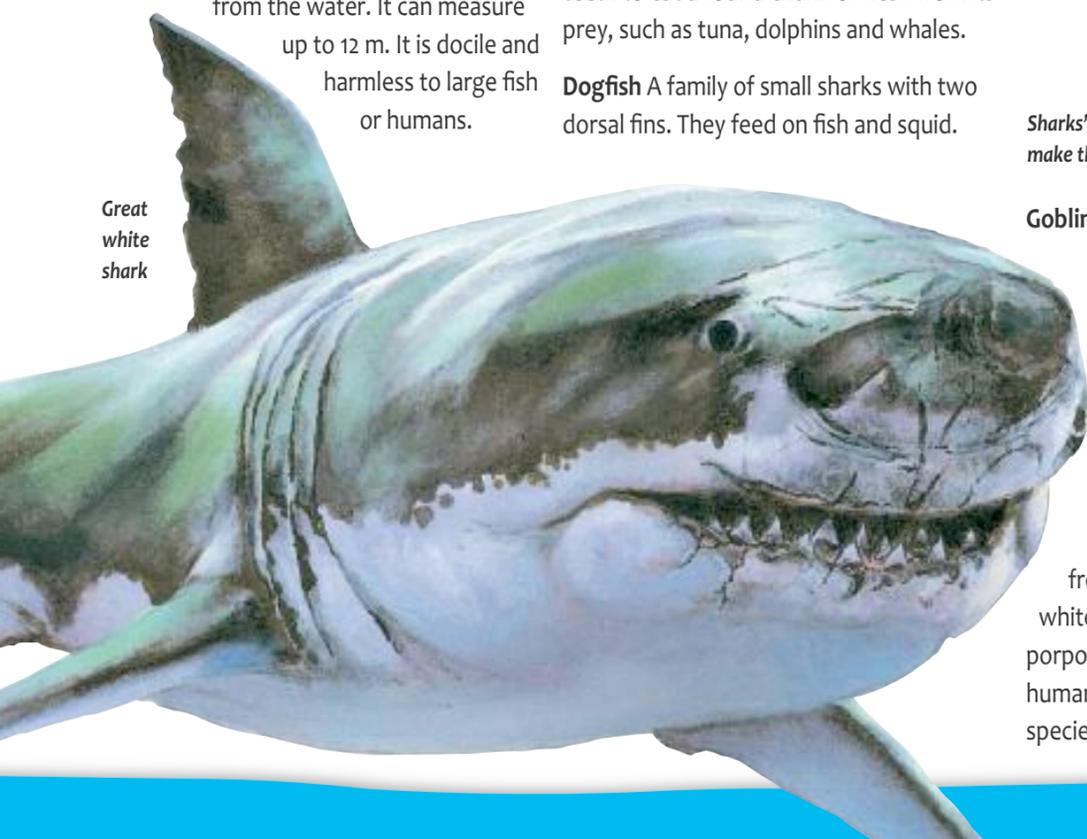
Sharks rely on their sense of smell and their ability to detect movement in the water to hunt their prey. Despite their reputation, only the largest predatory sharks are dangerous to humans.

Rays are fish with flat bodies and often long, narrow tails. They have large, wing-like fins that they flap as they swim.

Angel shark A 1.5 m long shark with a wide, flat kite-shaped head. It burrows into the sand on the ocean floor and wait takes its prey by surprise.

Basking shark A large shark that swims in temperate surface waters. It swims with its mouth wide open to filter plankton (7) from the water. It can measure up to 12 m. It is docile and harmless to large fish or humans.

Great white shark



Blue shark A four-metre-long shark with a deep blue back and a white belly. It lives in the open ocean where it hunts fish.

Bull shark A large, aggressive shark that grows up to 3.5 m long. It is usually found along warm coasts but is also known to swim up rivers. It is one of the most dangerous species to humans.

Chimaeras A group of cartilaginous fish related to sharks and rays. They have long bodies and tails and large eyes.

Cookiecutter shark A 50 cm-long shark with a slender brown body and a short snout. It feeds by using its razor-sharp teeth to cut a round chunk of flesh from its prey, such as tuna, dolphins and whales.

Dogfish A family of small sharks with two dorsal fins. They feed on fish and squid.

Electric ray A type of ray that gives out electric shocks. It does this to paralyse prey or to ward off predators. It lives in warm waters, and grows up to 2.5 m long.

Frilled shark A rare, deepwater shark with frilled gills. With its two-metre-long, slender, brown body it looks like an eel.



Sharks' skin is covered with tooth-like scales that make their skin rough to touch.

Goblin shark A rare bottom-dwelling shark best known for its long, dagger-like snout and protruding, beak-like jaws. It can grow to 3.5 m long.

Great white shark A six-metre-long shark with a grey back and white belly. It prefers cool coastal waters, but has been known to frequent tropical waters. The great white shark mainly feeds on seals and porpoises but has been known to attack humans. It is one of the most dangerous species to bathers.

Hammerhead shark A family of sharks that are distinguished by their hammer-shaped heads, with eyes at each end. This unusual design allows them to observe prey as quickly as possible. Most species feed on fish, squid or crustaceans, but larger species can be dangerous to humans.

Mako shark The fastest shark in the world, swimming in bursts of up to 50 km/h. It has a powerful, streamlined body, with indigo-blue colouring and grows up to 4 m long.

Basking shark



Manta ray The largest of the rays, growing up to 7.6 m across. Its name means "mantle" in Spanish and refers to its cloak-like appearance. It is also called the "devil fish" after its two fins, which look like horns. It feeds on tiny creatures, which it filters from the water with its sieve-like gills.

Mermaid's purse A case surrounding the eggs of some sharks and skates, usually deposited on the ocean floor. Other sharks give birth to live young.

Milk shark A one-metre-long shark that swims in tropical waters, feeding on small fish and crustaceans. It has also been found in rivers and tidal streams.

Nurse shark A shark that lives just above the seabed in tropical waters and grows up to 2.5 m long. It feeds at night by sucking food from the sea floor with its soft mouth.

Reef shark One of a group of sharks commonly found near coral reefs. They are all fast and generally no more than 3 m long. They include: white-tip reef sharks; black-tip reef sharks; Caribbean reef sharks; silvertip reef sharks.

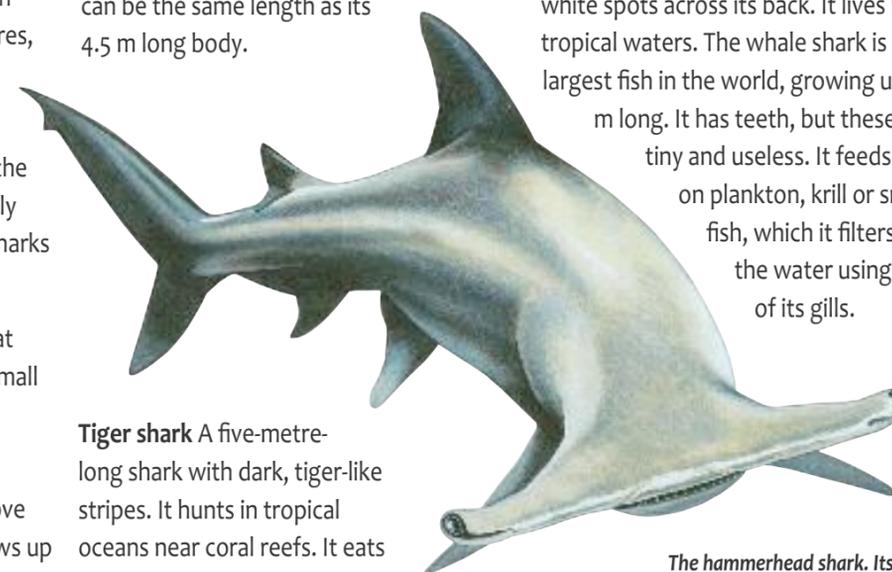
Saw shark A shark distinguished by its long snout, lined with sharp teeth. It lives just above the seabed, using its snout to slash at its prey of fish and squid. It grows up to 1.5 m long.

Skates A group of flat, cartilaginous fish that are relatives of rays. Like rays they have wide wings and a long tail, but unlike rays they also have long snouts.

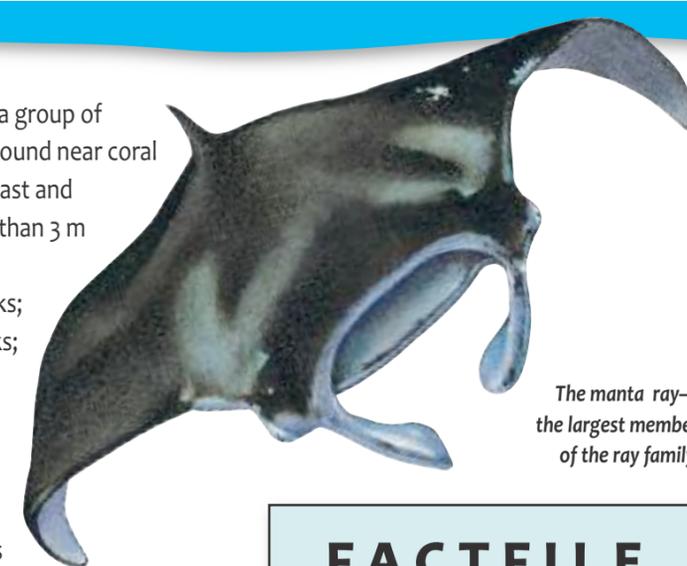
Stingray A family of rays with spines in their tails that can inject a painful poison. This sting is painful to humans, but it is deadly to other fish. The stingray lives mostly in shallow, tropical waters.

Thresher shark A shark that rounds up fish by slapping its long upper tail fin against the ocean surface. Its tail can also be used to stun its prey. The thresher shark's tail can be the same length as its 4.5 m long body.

Tiger shark A five-metre-long shark with dark, tiger-like stripes. It hunts in tropical oceans near coral reefs. It eats almost anything at the water's surface and can be dangerous to humans.



The hammerhead shark. Its eyes and nostrils are found on either side of its oddly-shaped head.



The manta ray—the largest member of the ray family.

FACTFILE

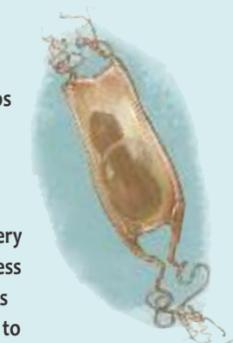
★ There are more than 350 different kinds of sharks in the world's oceans.

★ If a shark loses a tooth during feeding, a new one comes forward to take its place.

★ Sharks have a keen sense of smell. They are able to detect a single drop of blood in one million drops of water.

★ About 50 to 70 shark attacks are reported every year. Of these, less than four attacks each year prove to be fatal.

Mermaid's purse



Whale shark A huge, brown shark with white spots across its back. It lives in tropical waters. The whale shark is the largest fish in the world, growing up to 15 m long. It has teeth, but these are tiny and useless. It feeds only on plankton, krill or small fish, which it filters from the water using a part of its gills.

WHALES & DOLPHINS

Whales and dolphins are mammals that live permanently in the water. Like other mammals, they must breathe air. Whales have long, streamlined bodies. Some feed on tiny zooplankton (7), filtering their food from the seawater. Others have teeth and feed on fish or squid. Dolphins are smaller than whales and all have teeth. They are intelligent and playful animals. Some will swim beside ships, riding the waves ploughed by the front of the boat, an activity called bow riding.

Baleen whales A group of animals that feed by taking in mouthfuls of water and filtering tiny sea creatures such as zooplankton (7) through plates in their mouths. They are also known as **mysticeti**.

Baleen Horny plates fringed with fibres, found in the mouths of some whales. These plates strain food from seawater.

Blowhole A whale or dolphin's nostril on top of its head, through which it breathes.

Blue whale The largest animal on Earth, growing up to 30 m or more in length. It lives in cold waters and feeds on vast amounts of krill.



A dusky dolphin herds fish together by slapping its fins on the water to scare them.

Bottlenose whale A long, slim whale with its dorsal fin set far back and a pointed mouth like a beak. Males have two tusk-like teeth, probably used to fight over mates.

Bowhead whale A large, dark, whale found in cold oceans. It feeds on zooplankton (7).

Breaching When a whale or dolphin leaps out of the water. This may be in order to take in air while swimming fast, to communicate with other whales, to knock parasites from its skin, or just to have fun.

Cetaceans Carnivorous mammals that live permanently in the water. Whales, dolphins and porpoises are all cetaceans.

Echolocation A way of locating solid objects by emitting high-pitched sounds and picking up their echoes. Dolphins and whales use echolocation to hunt in low-visibility conditions.

Humpback whale A large baleen whale that can grow to 15 m long. Humpback whales often leap backwards out of the water. They feed on krill and small fish which they filter from the water. They are known for their distinctive "songs".



Harbour porpoise

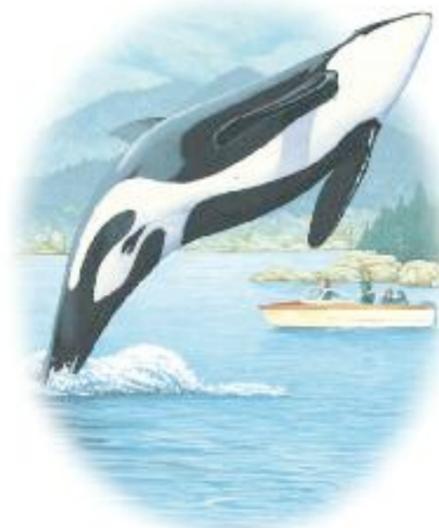
Killer whale The largest member of the dolphin family, found in all oceans of the world. The killer whale, or **orca**, has distinctive black and white colouring and grows up to 8 m long. It feeds on fish, penguins, seals, sea lions, dolphins and even whales, depending on where it lives.

Lobtailing When a whale or dolphin slaps the water's surface with its tail. This can be heard underwater for hundreds of metres. It could be a means of communicating with other whales or of frightening prey.

Logging The resting behaviour of some whales, during which they float at the surface of the water with their backs and dorsal fins exposed to the air.

Pilot whale A large, sleek, black dolphin with a bulging forehead. Pilot whales live in cool, deep oceans, feeding on squid and fish. They are known for their distinctive upward-curving mouths or "smiles".

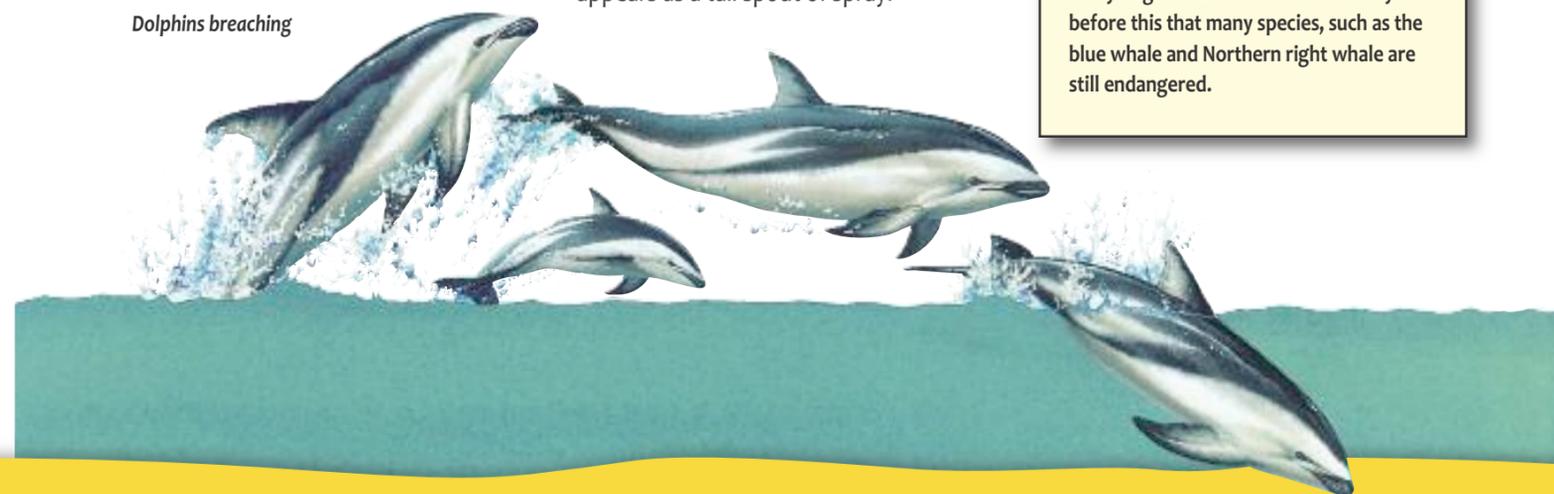
Pod A group of dolphins swimming together. Males in this group are called "bulls", females "cows" and their young "calves". Pods may stay together for life.



A killer whale breaching

Porpoises A group of small, toothed, cetaceans, related to whales and dolphins. Porpoises are stockier than dolphins and have more rounded snouts. Most are shy animals that stay beneath the surface of the water as much as possible. This means that they are rarely seen by humans.

Dolphins breaching



To feed, a baleen whale takes in a vast mouthful of water, full of tiny sea creatures.

Right whales A type of slow-moving baleen whale, often found near the shore. It contains more fat than other whales, which once made it an ideal target for hunters. Its name refers to the fact that it was the "right" type of whale to hunt.

River dolphins A type of small dolphin found in rivers in South America and Asia. They have distinctive, long snouts.

Rorquals A type of baleen whale that includes the blue whale. Rorquals are slender and fast, with distinctive grooves on their lower jaws and undersides.

Sperm whale A large, toothed whale that can grow up to 20 m long. It can dive to depths of up to 3 km, in search of giant squid (22). It can hold its breath for more than an hour while diving.

Spouting When a whale comes to the surface to breathe, pushing air from its lungs out through its blowhole. The warm breath condenses in the cool air and appears as a tall spout of spray.



As it forces water out again the creatures are caught in the baleen and swallowed.

Spy-hopping When a whale pokes its head above the water to look around it. This may be to search for prey or simply out of curiosity.

Toothed whales A group of cetaceans, including sperm whales and dolphins, that all have teeth. Toothed whales are also known as **odontoceti**.

FACTFILE

★ Whales can make different sounds to express anger, sadness and surprise. There is evidence that they sing to communicate with one another.

★ Groups of whales often share duties, such as looking after their young. When a mother sperm whale dives in search of food, she leaves her baby with another female to look after it until she returns.

★ Since the 17th century, whales have been hunted on a large scale for meat and oil. Whale hunting, or whaling, was banned in most countries in the 20th century, but so many large whales were killed in the years before this that many species, such as the blue whale and Northern right whale are still endangered.



This human diver shows the size of a 16 m-long humpback whale.

SEABIRDS

Seabirds live near the ocean, feeding on fish, squid, worms or crustaceans. Some kinds dive into the water from the air, or from high rocks. Others skim over the surface, scooping up food. Some, such as penguins (▶24), can pursue their prey by swimming through the water. Most seabirds have waterproof feathers and rough, webbed feet to help them paddle or snatch up slippery fish. Many seabirds gather in large colonies to lay their eggs, often laying just one egg.

Albatross A large, white seabird that can go for months without touching land. Albatrosses scoop up squid, octopuses and fish from the ocean's surface. The wandering albatross and royal albatross have a wingspan of 3.5 m—the largest of any living bird.

Auk A black and white diving bird that lives in the northern oceans. Auks are very similar to penguins in their body shape and their ability to swim well underwater but, unlike penguins, they can fly. There are several species of auk, including guillemots, puffins, auklets and murrelets.



Pelican

An albatross scoops a squid from the ocean



Booby A large black and white seabird that dives for its prey from the air. Boobies live in tropical areas, feeding on fish and squid. Some species are distinguished by their coloured feet and bills.

Colony A large group of birds nesting or roosting (resting) together. About 95% of seabirds are colonial, often returning to the same place every year to nest. Some species nest on the ground, while others nest on cliffsides or in burrows.

Cormorant A black, long-necked seabird, sometimes called a **shag**. Cormorants live along coastlines. They dive for fish from the ocean surface, using their feet to swim after their prey.

Frigatebird A large, black and white seabird. In mating season, the male's throat pouch becomes red and inflates in order to attract a mate. Frigatebirds sometimes steal food from other birds by biting their tails and forcing them to release their catch, which they then eat.

Gannet A black and white seabird. Gannets plunge dive from 30 m high, powering through the water after their prey.

Gull A large, white or grey bird that lives in coastal areas. Gulls feed on crabs and fish from shallow waters but also scavenge and steal food from other birds. There are more than 50 types of gull, including the herring gull and the black-headed gull.

Oystercatcher A black and white wader with a red beak and legs. It lives on the shore, using its long beak to probe through sand and tidal pools in search of worms, crustaceans and shellfish such as oysters.

Pelican A large seabird with a prominent throat pouch. This is used to scoop up fish from the water like a fishing net. Once the pelican has drained the water from its pouch, it swallows its prey.



A brown booby dives into the ocean after its prey.

Petrel A small brown or grey seabird. Diving petrels use their wings to power them through the water after fish, while storm petrels snatch fish and plankton from the surface waters with their beaks.

Plunge diving The type of hunting, used by birds such as gannets and boobies, where the birds use airborne momentum to power through the water after their prey.

Puffin A small black and white seabird with orange feet and an orange and blue striped beak. Puffins use their wings to push them through the water in pursuit of fish. They can hold up to 12 small fish in their beaks, which they carry back to feed their chicks. Puffins nest underground, sometimes in abandoned rabbit burrows.

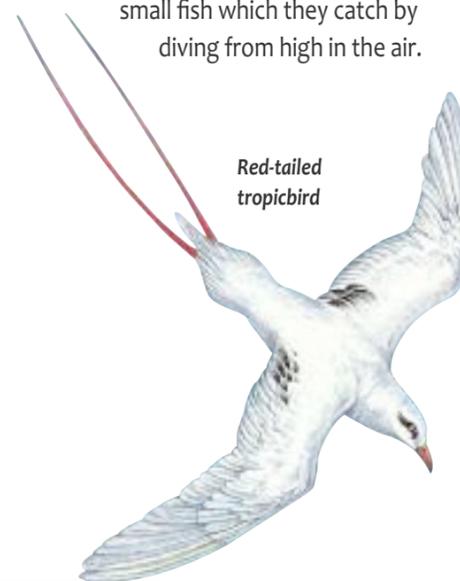
Pursuit diving The style of hunting in which seabirds swim after their prey underwater. Some pursuit divers, such as auks, use their wings to push themselves through the water, while others, such as grebes and loons, use their feet as paddles.



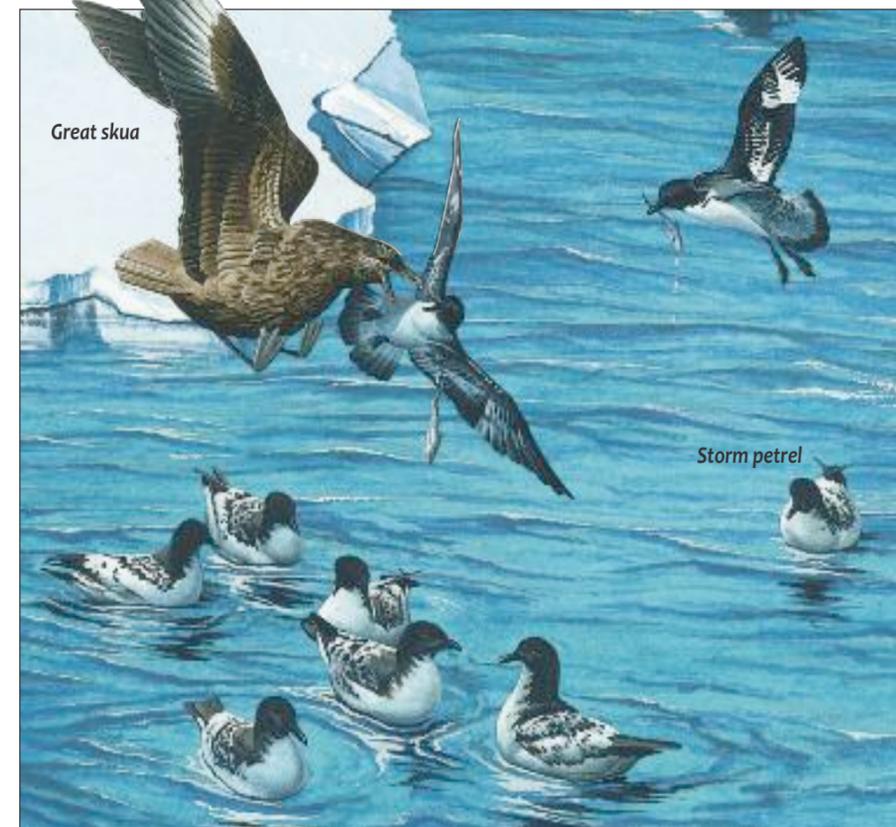
Frigatebird

Skua A grey or brown seabird that lives in polar regions. Skua mainly feed on fish but also steal food from other individuals and snatch eggs and chicks from the nests of other birds. Some larger species, such as the great skua can even kill and eat other adult birds.

Tern A grey or white seabird. Terns, closely related to gulls, live on coastlines, feeding on crustaceans and small fish which they catch by diving from high in the air.



Red-tailed tropicbird



Great skua

Storm petrel

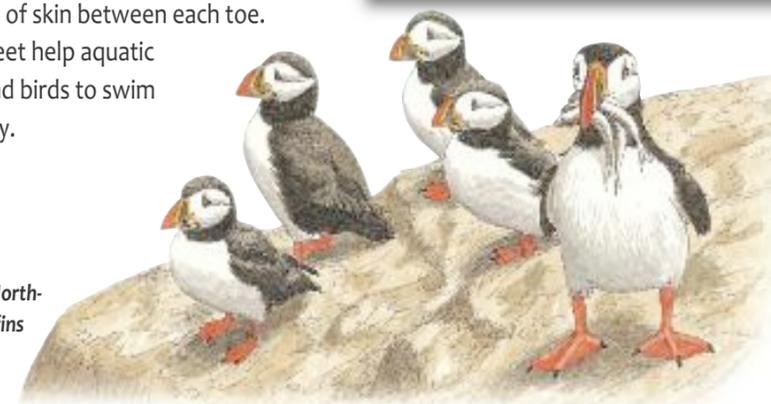
A great skua attacks a storm petrel in order to steal its catch.

Tropicbird A large, white seabird with long, pointed tail feathers. Tropicbirds breed on islands far out in the ocean. They hover above the water before plunging down to catch their prey.

Waders Any of the long-legged birds such as oystercatchers and curlews that wade out into shallow water to feed. Wading birds are commonly found on the seashore.

Webbed feet Feet shaped like paddles with a flap of skin between each toe. Webbed feet help aquatic animals and birds to swim more easily.

A group of North-Atlantic puffins

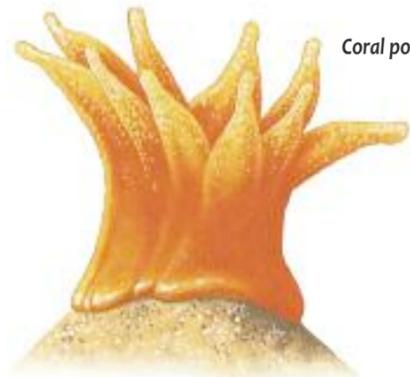


FACTFILE

- ★ Seabirds often live much longer than land birds, reaching ages of 20 to 60 years.
- ★ Seabirds take in large amounts of salt when they drink and feed. To remove excess salt, they have a special gland above their eyes to remove and release excess saltwater. This runs down their beaks and drips away.
- ★ Some cliff-nesting seabirds, such as guillemots, lay pointed, pear-shaped eggs. These are less likely to roll off the rock edge than normal, rounded eggs.

CORAL REEFS

A coral reef is an underwater structure formed from the hard skeletons of tiny animals called polyps. Coral reefs are found in warm, clear, shallow waters around volcanic islands or rocky coastlines. They teem with wildlife. Many small creatures feed on plants called algae (▶20) inside the coral. The coral itself is consumed by some animals such as parrotfish and the crown-of-thorns starfish. Predators, such as sharks, rays and barracudas, prey on the creatures that feed on algae or coral.



Coral polyp

Atoll A ring of coral islands. An atoll forms where a coral reef has grown around a volcanic island. When the volcano stops erupting, it will sink into the ocean floor. As it gradually sinks, the coral reef keeps growing upwards and will eventually be all that shows above water.

KEY	
1 Moray eel	9 Nudibranch
2 Sea snake	10 Crown-of-thorns starfish
3 Reef shark	11 Butterflyfish
4 Sea urchin	12 Grouper
5 Sea horse	13 Giant clam
6 Surgeonfish	14 Lionfish
7 Angelfish	15 Tube sponge
8 Triggerfish	16 Barracuda

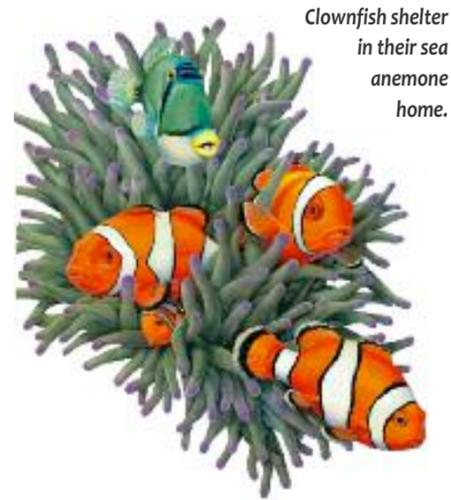
Barracuda A two-metre-long fish that hunts around coral reefs. It has a fierce appearance, with sharp teeth jutting forwards from its lower jaws. It hunts in groups known as **batteries**.

Barrier reef A coral reef that is separated from the shore by a pool of seawater called a **lagoon**. Barrier reefs lie farther from the shore than fringing reefs.

Butterflyfish A small, brightly-coloured fish, often with eye-like markings on its tail. These encourage predators to attack the wrong end of the fish's body, giving it a chance to escape. Butterflyfish feed on small crustaceans and coral polyps.

Clownfish A small orange and white fish that lives inside the poisonous tentacles of sea anemones (▶26). The fish is protected from the poison by a layer of mucus, but its enemies would be stung to death.

Coral A hard substance produced by the skeletons of tiny animals called polyps. Different kinds of polyps produce different shapes of coral. Some are shaped like branching plants, others are flat like a fan, long and thin like pipes or rounded like human brains. Only the living surface of the coral is coloured by the presence of algae (▶20). The layers of polyp skeletons underneath are white.



Clownfish shelter in their sea anemone home.

Crown-of-thorns starfish A large, brightly-coloured starfish (▶21) with at least 12 arms covered in long, venomous spines. It feeds on coral polyps. This can threaten the survival of the reef.

Fringing reef A coral reef that grows in shallow water along a rocky coastline.

Moray eel A three-metre-long eel that hides in coral crevices, waiting to burst out on its prey, a fish or an octopus.

Parrotfish A brightly coloured fish with a hard, beaked mouth. It scrapes algae (▶20) from the reef, biting off chunks of coral as it does so. Its throat contains bony plates that grind the coral into sand and help to digest the algae.

Polyp A tiny animal made up of a stomach, mouth and tentacles. Its soft body is protected by a hollow, cup-like skeleton. When the polyp dies, this forms the hard, dead part of coral and a new polyp grows in the remains.

Sea snake A snake that spends its life in the oceans. Sea snakes live in warm, tropical waters, hunting fish and eels. They breathe air at the surface and have flattened tails to help them swim. There are around 60 species of sea snake, all of which are venomous. Many species have stripy skin, to help them camouflage with the dappled light and shade of the sea.

FACTFILE

★ The Great Barrier Reef, which runs along the northeastern coast of Australia, is the world's largest coral reef. It is more than 2000 km long along.

★ The bright colours and distinctive patterns of many reef fish are thought to help them recognize their own species among the throng of wildlife on the reef.

★ Until about 200 years ago, coral was thought to be a plant and not a creature.

★ Many coral reefs around the world are under threat. Polluted waters, rising sea temperatures, damage by tourists hunting for souvenirs and dredging for shipping lanes all destroy coral that has been growing for millions of years.



FORESTS & MEADOWS

In some cool, clear, shallow waters, forests of kelp—a kind of seaweed—dominate the underwater landscape. They teem with animal life. Some creatures graze on the kelp itself, while they, in turn, are prey for larger fish and mammals. In warmer, sandy shallows, fields of flowering seagrass may grow. Like kelp forests, seagrass meadows are home to many different species. Some animals migrate to the forests and meadows to give birth to their young, away from the dangers of the open ocean.



A weedy seadragon, camouflaged to blend in with weeds and seagrasses.

Algae Plants without true stems, roots and leaves, found in water or moist ground. They include tiny, often single-celled plants known as phytoplankton (7).

Garibaldi fish A bright orange fish that lives in kelp forests. The male gathers algae that grows on the seabed and makes it into a nest. He then makes clicking noises to attract a mate. He will guard his eggs fiercely, chasing off predators many times his own size.



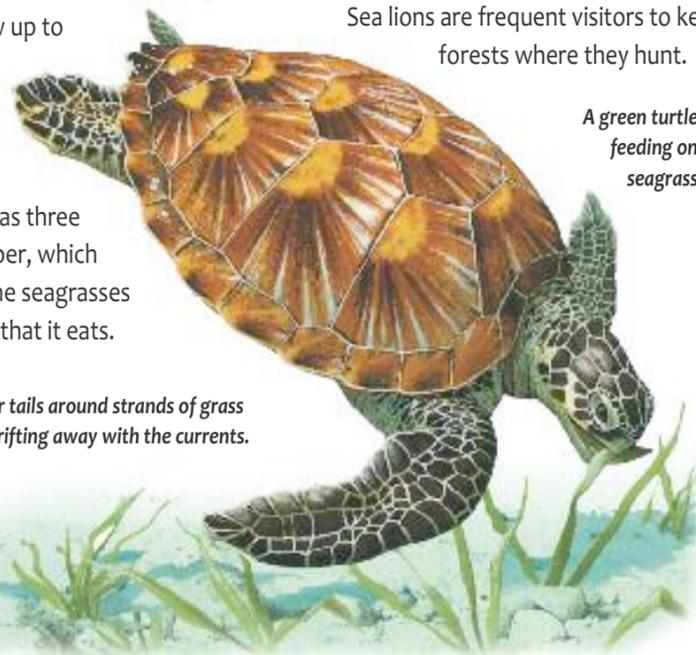
A manatee feeding in a seagrass meadow

Kelp A type of large seaweed that grows in cool, sunlit waters. Kelp fixes to the seafloor and grows up to the sunlight. Gas-filled pockets help to keep it upright in the water. Kelp can grow as fast as 50 cm a day, reaching lengths of 30 to 80 m.

Kelpfish A slender fish with green-brown colouring that helps it blend in with the kelp. The kelpfish feeds on small fish and crustaceans. In the spring, it lays its sticky eggs directly on to the kelp.

Manatee A large, gentle ocean mammal that lives in warm, shallow waters. It is also known as the “sea cow”. It can grow up to 4 m long. It has two large flippers, no rear limbs and a flattened tail. It has three nails on each flipper, which help it to grasp the seagrasses and water plants that it eats.

Sea horses wrap their tails around strands of grass to stop themselves drifting away with the currents.



A green turtle feeding on seagrass

Pinnipeds A group of carnivorous marine mammals such as seals and sea lions. They have four flippers that they use to propel themselves through the water.

Sea horse A small fish with a horse-shaped head and curled tail. Sea horses live in sheltered areas such as coral reefs and seagrass meadows. They wrap their tails around the plants as an anchor against strong currents.

Sea lion A pinniped with four flippers and small earflaps on the side of its head. Its strong front flippers support its body when on land. In the water, it is an agile swimmer, chasing its prey of fish and squid. Sea lions are frequent visitors to kelp forests where they hunt.

Sea otter An otter that lives in kelp forests. It is kept warm by its thick fur coat, which traps air and heat. It keeps down the numbers of kelp-eating sea urchins (9) by eating them. Floating on its back, it cracks open urchins by striking them with a stone placed on its belly.



At night, sea otters wrap strands of kelp around their bodies to stop them from drifting away with the currents as they sleep.

Sea turtle A marine reptile with a hard shell and large flippers. Turtles come up for air every few minutes when they swim. Most species feed on fish, jellyfish and crustaceans but adult green turtles only eat plants such as seagrass.

Seagrass A type of seaweed that grows in warm, shallow waters. Unlike most other seaweeds, it has proper roots, meaning it can only grow in sandy regions. Seagrass is the only flowering plant in the sea.

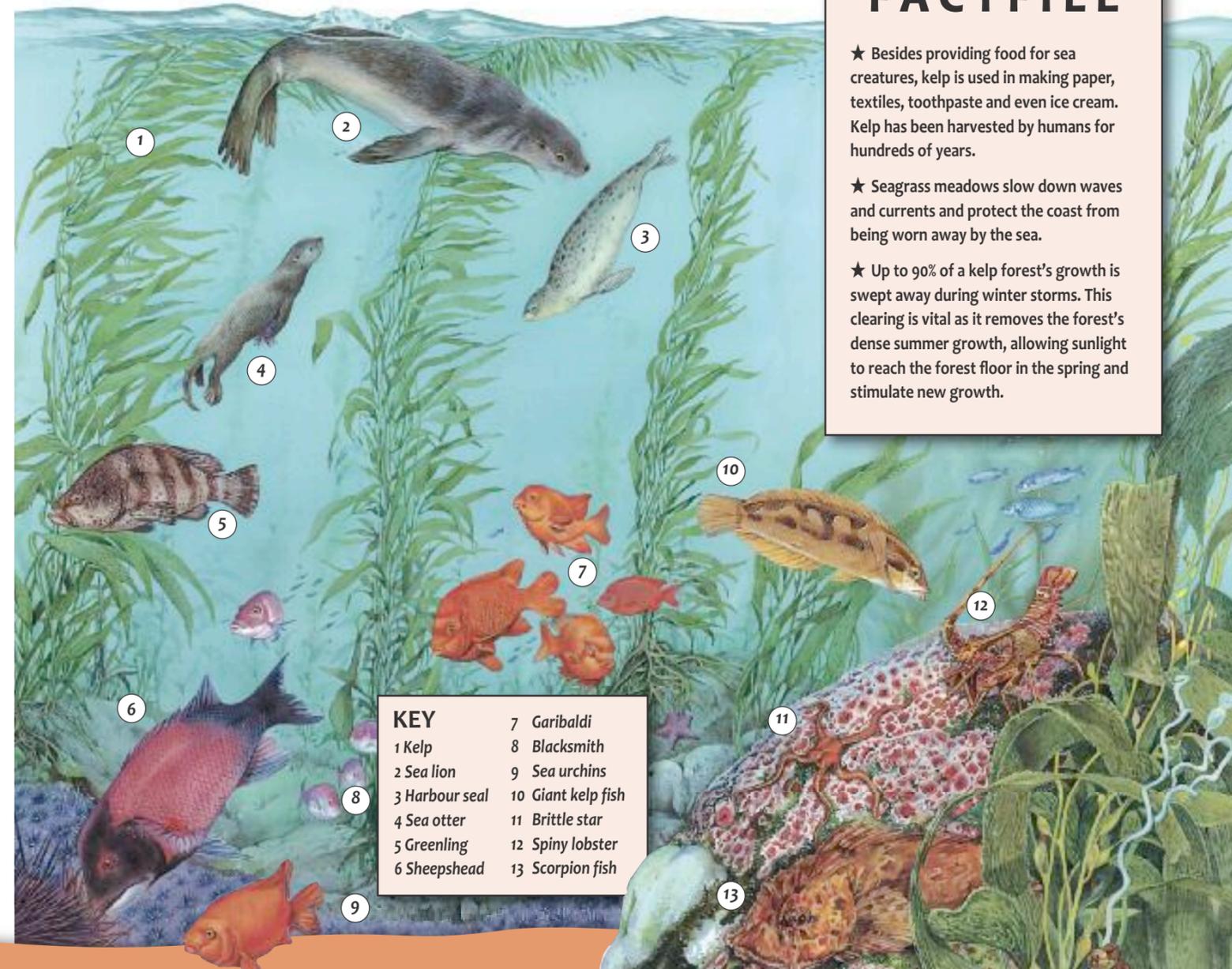
Seal A pinniped with four flippers. Seals have powerful hind flippers. When on land they shuffle along on their bellies. Seals feed on fish, squid and other small sea creatures. They regularly hunt and play in kelp forests.

Sirenians A group of bulky, plant-eating marine mammals that live in warm water. Manatees and their river-dwelling relatives, the dugongs are all sirenians.

Weedy seadragon An Australian relative of the sea horse that is covered in strange, weed-like projections. These help it to blend in with the seaweed around it.

FACTFILE

- ★ Besides providing food for sea creatures, kelp is used in making paper, textiles, toothpaste and even ice cream. Kelp has been harvested by humans for hundreds of years.
- ★ Seagrass meadows slow down waves and currents and protect the coast from being worn away by the sea.
- ★ Up to 90% of a kelp forest's growth is swept away during winter storms. This clearing is vital as it removes the forest's dense summer growth, allowing sunlight to reach the forest floor in the spring and stimulate new growth.

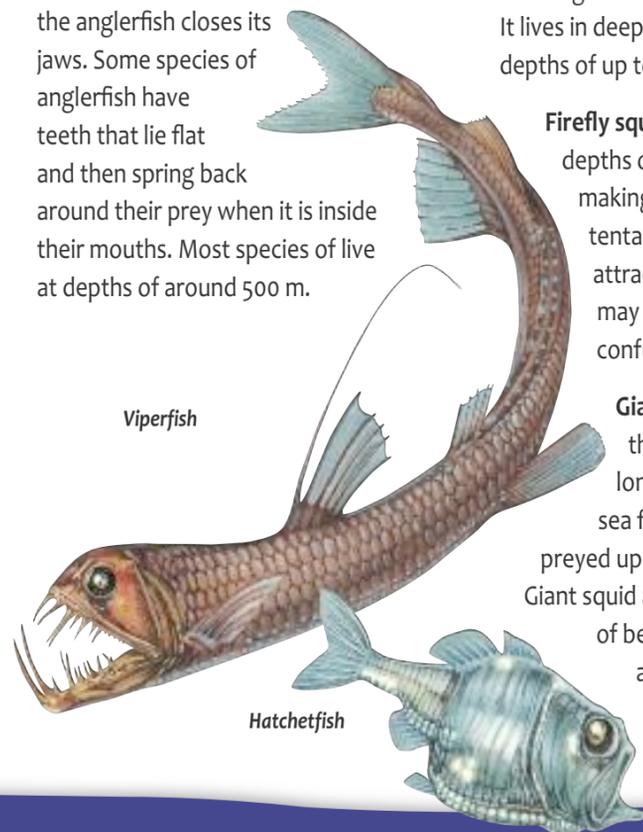


KEY	
1 Kelp	7 Garibaldi
2 Sea lion	8 Blacksmith
3 Harbour seal	9 Sea urchins
4 Sea otter	10 Giant kelp fish
5 Greenling	11 Brittle star
6 Sheepshead	12 Spiny lobster
	13 Scorpion fish

DEEP SEA CREATURES

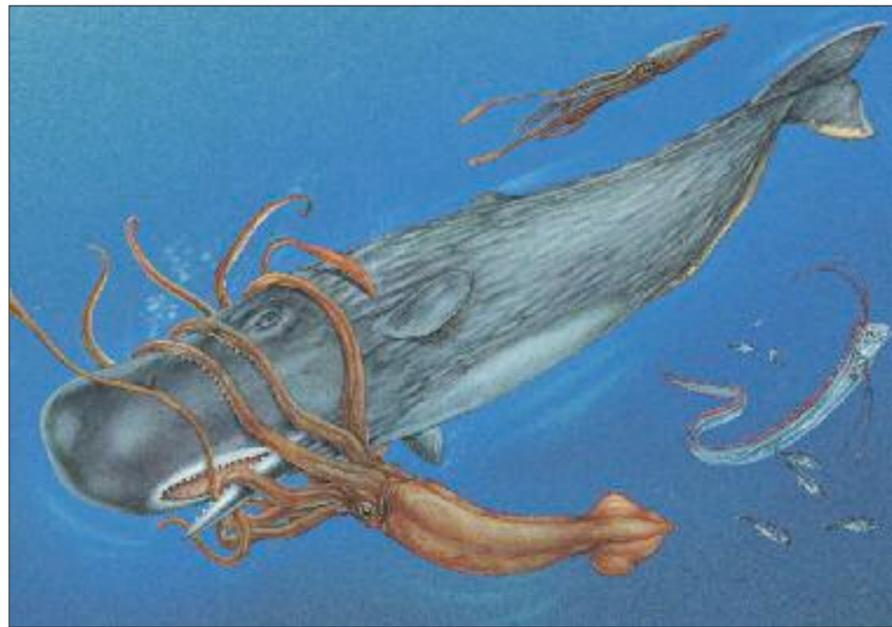
More than 200 m deep, it is dark and cold and no plants can grow. Only a few animals can survive these conditions. Some migrate to the surface every night to feed. Others eat dead matter that sinks from above, or prey on each other. Many creatures can create their own light. Near the ocean floor the water is pitch black and the pressure is immense. Animals rely on touch or smell to detect food. Some of the animals that live at the bottom of the ocean are attached to the ocean floor and look more like plants than animals.

Anglerfish A fierce-looking deep water fish. Anglerfish have a long thin dorsal fin with a light at its tip, called a **lure**. It hangs this in front of its mouth. When its prey lunges at the light, believing it to belong to another tiny animal, the anglerfish closes its jaws. Some species of anglerfish have teeth that lie flat and then spring back around their prey when it is inside their mouths. Most species of live at depths of around 500 m.



Viperfish

Hatchetfish



A giant squid locked in battle with a sperm whale

Bioluminescence Natural light created in the body of a living creature. Many deep water animals are bioluminescent. They may use light to lure prey, or as a signal to other creatures of the same species. They may also flash lights on and off to confuse an attacker.

Brotulid The world's deepest-living fish. It is long and thin with a pointed tail. It lives in deep sea trenches (♣6) at depths of up to 8000 m.

Firefly squid A small squid that lives at depths of 200 to 400 m. It has light-making parts at the tips of its tentacles, which it can flash to attract small fish. Its whole body may light up to attract a mate or confuse a predator.

Giant squid A type of squid (♣9) that can grow to at least 13 m long. Giant squid feed on deep sea fish. They themselves are preyed upon by sperm whales (♣15). Giant squid are thought to live at depths of between 200 and 1000 m, but are difficult to study, so relatively little is known about them.

Gulper eel A two-metre-long eel with a gaping mouth and a light on its tail, used to attract prey. The gulper eel can live at depths of up to 3000 m. It has huge jaws and a stretchy stomach that allows it to swallow animals that are larger than itself.



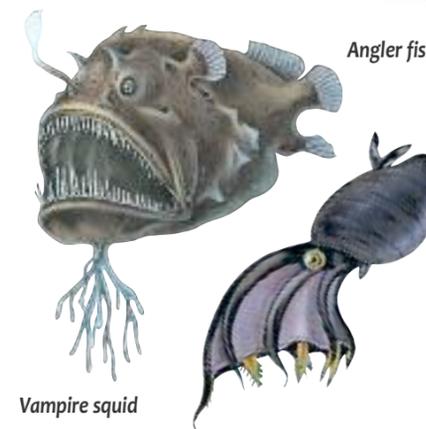
The skeletons of tiny plankton that have rained slowly down from surface waters into the ooze.

Hatchetfish A small, bioluminescent fish that lives at depths of up to 1500 m. It has a flattened body that makes it hard for predators to spot in the water. It feeds on other, smaller fish.

Lanternfish A small fish with bioluminescent spots. It spends the day at depths of 300 to 1500 m but rises to the surface at night to feed on zooplankton (♣7).

Ooze A thick layer of mud and sediments that builds on the ocean floor. It may lie up to 500 m thick in some places. The animals that live on the sea floor must either lift themselves out of the ooze, burrow inside it or find some way of slithering across it. Some animals eat the ooze for the animal and plant remains that it contains.

Rat-tail A common fish, also known as a **grenadier**, that has a long thin tail and swims above the ocean floor. A special sensor running down its spine feels the movements of other creatures nearby. It makes a loud drumming noise by vibrating muscles attached to its swim bladder (♣11). This may be a way of signalling to others of its kind.



Vampire squid

Angler fish

Tripodfish A fish that lives on the ocean floor at depths of up to 5 km. It rests on the ocean floor on a "tripod" made of its long, stilt-like fins and tail. Another pair of fins is held up in the air to detect the movements of passing prey, whereupon the tripodfish pushes itself forward to snatch up its victim.



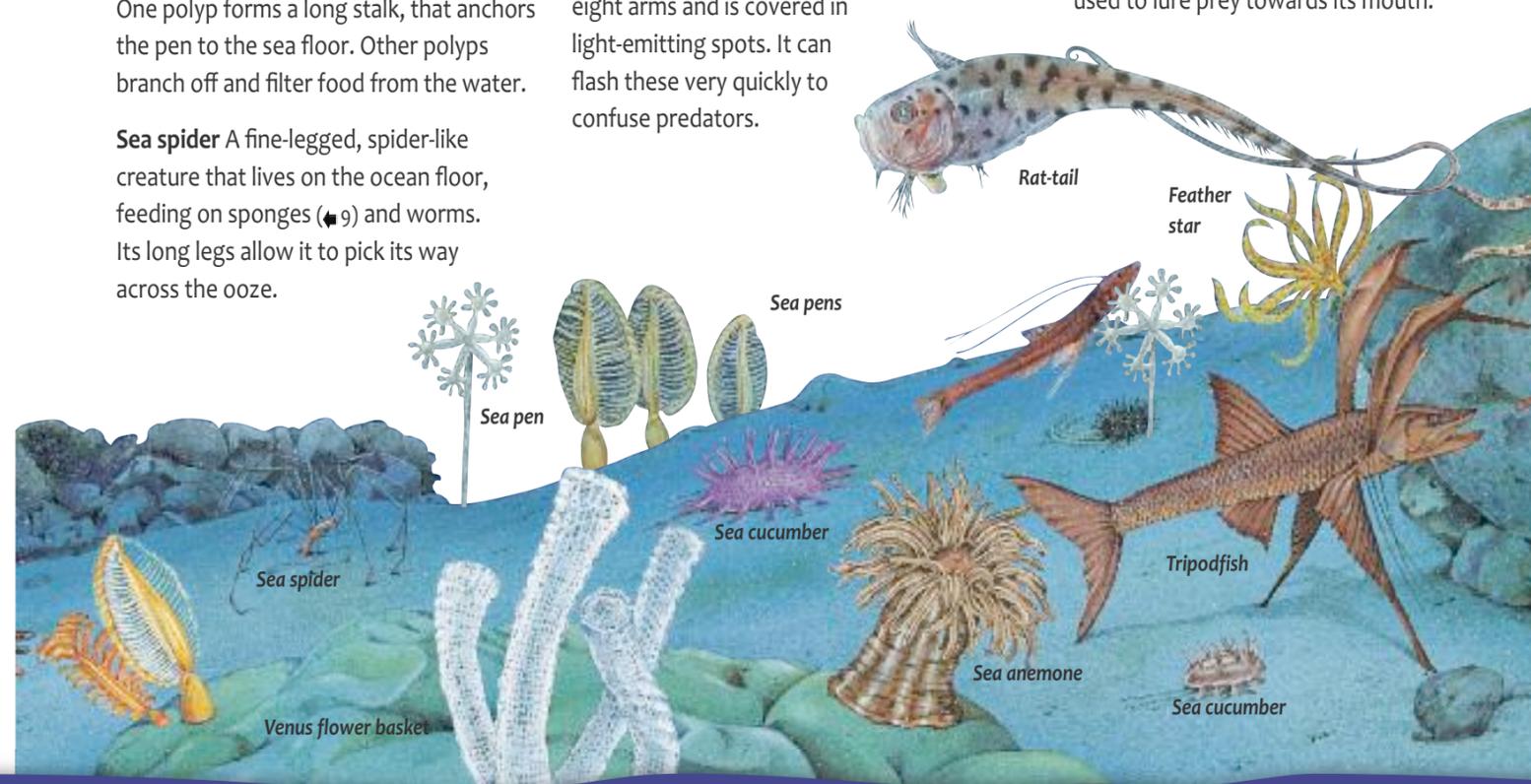
Gulper eel

Sea pen A type of invertebrate (♣8) that can live at great depths. A sea pen is not one animal, but is a colony of polyps (♣19). One polyp forms a long stalk, that anchors the pen to the sea floor. Other polyps branch off and filter food from the water.

Sea spider A fine-legged, spider-like creature that lives on the ocean floor, feeding on sponges (♣9) and worms. Its long legs allow it to pick its way across the ooze.

Vampire squid A small sea creature that lives at depths of 600 to 900 m. It has a web of skin that stretches between its eight arms and is covered in light-emitting spots. It can flash these very quickly to confuse predators.

Viperfish A long, thin fish with fierce jaws and needle-like teeth. The viperfish lives at depths of 80 to 1500 m. It has a special light organ at the end of a spine on its back, which is used to lure prey towards its mouth.



Rat-tail

Feather star

Tripodfish

Sea anemone

Sea cucumber

Sea pen

Sea pens

Sea cucumber

Sea spider

Venus flower basket

FACTFILE

★ The deeper you go in the ocean, the greater the weight of water pressure pressing down from above. Below 50 m, this pressure is too great for human divers.

★ In 1960, scientists descended 10,911 m into the Marianas Trench in the Pacific Ocean in the submersible *Trieste*. To withstand the pressure, the capsule walls were 13 cm thick.

★ Some deep-water animals such as shrimp are dark red. Red light does not reach the depths at which the shrimp live so they are practically invisible in the blue-green water.

★ Cans, bottles and ship wrecks litter the ocean floor. Found on all parts of the ocean floor, especially beneath shipping lanes, is clinker, burnt coal dumped from steamships between the 1850s and 1950s.

POLAR WATERS

Although they are the coldest places on Earth, the oceans at the poles are home to many creatures. Much of the Arctic Ocean is covered with a thick layer of floating ice all year round. In summer, when the waters are teeming with tiny plants and animals, fish, seals, whales and seabirds gather there to hunt for food. Antarctica is a huge landmass, largely covered by a permanent ice cap. There is little food on land, so most animals cluster around the coasts where the ocean waters are rich with plankton and other food.



Emperor penguins

Adélie penguin A medium-sized penguin with a white ring around its eye. Adélie penguins are the favourite food of the leopard seal. Many of these penguins hesitate at the water's edge, none wanting to dive in first, for fear of this ferocious predator.

Antarctica The continent located at the South Pole, surrounded by the Antarctic Ocean. It is the coldest place on Earth.

Arctic The area surrounding the North Pole, including the polar ice cap and the Arctic Ocean.



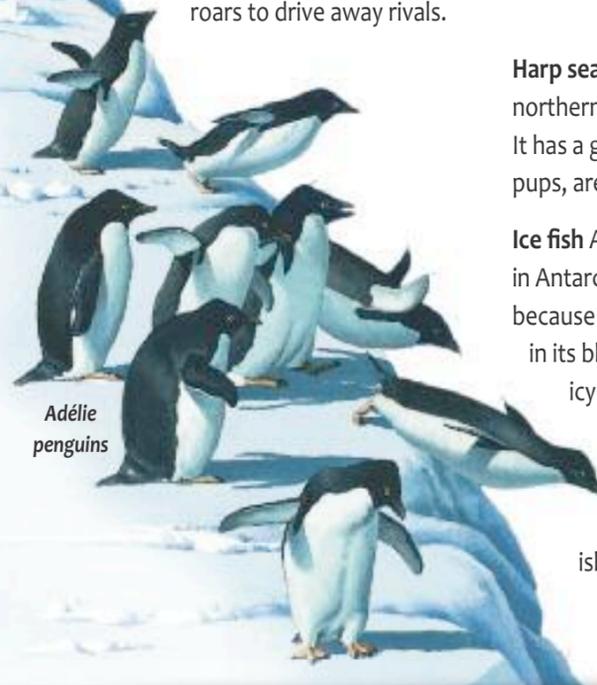
Bearded seal A seal that lives in the Arctic Ocean. It is named after the many whiskers that cover its face.

Beluga whale A five-metre-long whale that lives in the Arctic. In summer, this distinctive white whale feeds on fish and crustaceans found on the seabed beneath the pack ice.

Blubber The oily fat found under the skin of many marine animals living in cold ocean waters.

Breathing hole A hole in the ice where seals and penguins come to the water's surface to breathe. Polar bears sometimes wait at the surface to grab seals.

Elephant seal A large seal that migrates to Antarctica once a year to breed. The male has an enormous, trunk-like nose. It makes threatening roars to drive away rivals.



Adélie penguins

A leopard seal in pursuit of an Adélie penguin

Emperor penguin The largest type of penguin, growing up to 1.2 m tall. It is the only species of penguin to breed during the Antarctic winter. While the females hunt, the males look after the eggs, carrying them on their feet to keep them off the ice. The emperor penguin can remain underwater for up to 15 minutes.



Krill

Harp seal A type of seal that lives in the northern Atlantic and Arctic Oceans. It has a grey body, but its young, called pups, are covered in soft white fur.

Ice fish A semi-transparent fish that lives in Antarctic waters. It is able to survive because it has a natural "anti-freeze" in its blood to stop it freezing in the icy waters.

King penguin The second-largest species of penguin. It lives in large groups on islands in the Southern Ocean. An expert diver, it swims in search of fish and squid to eat.

Krill A small, shrimp-like crustacean. It forms a large part of the diet of many polar animals. Krill spend their days in the ocean depths. Vast numbers of them swim to the surface at night to feed, where whales and seabirds feast on them.

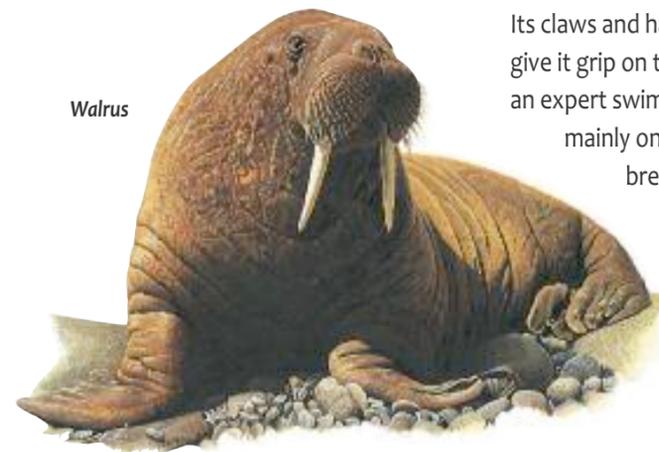
Leopard seal A four-metre-long, spotted seal that hunts in the Antarctic Ocean. Its favourite prey is the Adélie penguin, but it also eats fish, birds and even the young of other seals.

Narwhal A whale native to Arctic waters. Narwhals live in the Arctic all year round, unlike other whales which move south in the winter. Males have a long, spiralling tusk, which is actually one of their two teeth and may be used for fighting. Narwhals feed on fish, shrimp and squid.



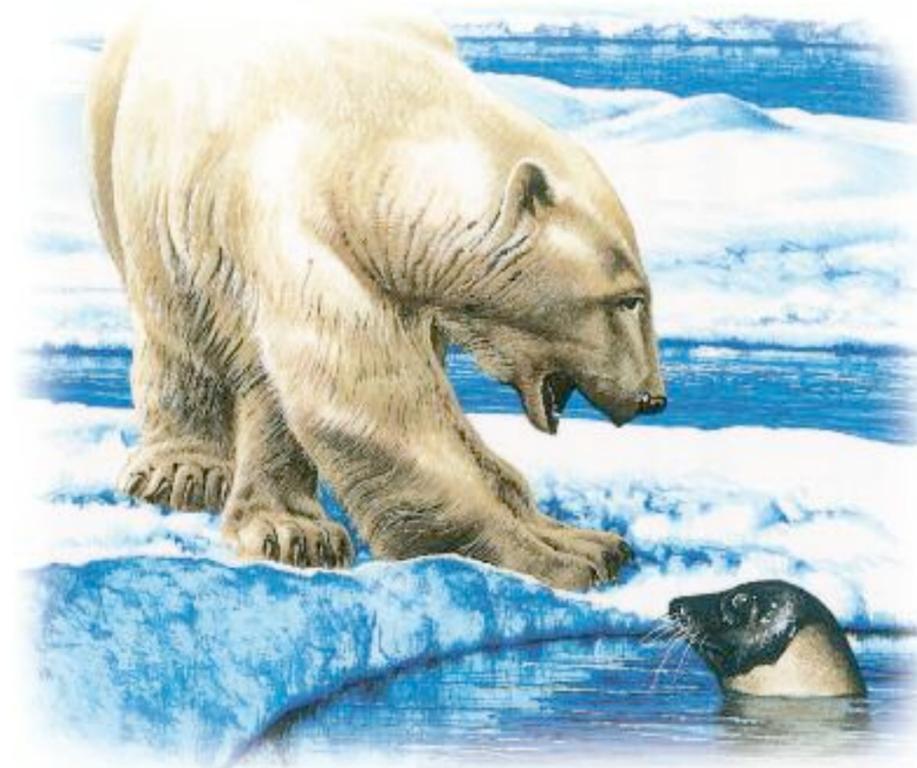
Narwhal

Penguins Flightless birds, many species of which live on cold, southern coastlines near Antarctica. Clumsy on land, penguins are swift and graceful in the water. Their stiff, flipper-like wings pull them through the water in pursuit of fish and squid. To keep warm they have several layers of dense feathers, and a thick layer of blubber. They breed in large colonies on land or on ice.



Walrus

Polar bear A large Arctic bear with a thick, white, waterproof coat. Underneath its fur, its skin is actually black, which helps trap heat from the sun. Its claws and hairs on the soles of its feet give it grip on the Arctic ice and it is also an expert swimmer. The polar bear feeds mainly on seals, which it waits for at breathing holes in the ice. Adult bears roam the ice alone. In winter, females dig dens in the snow to protect them from the extreme cold while they give birth to their young.



A polar bear lies in wait for a seal at a breathing hole in the ice sheet.

Walrus A large sea mammal with two long tusks and powerful flippers. A layer of blubber under its skin keeps it warm in the freezing Arctic water. The walrus is an excellent swimmer, searching the seabed with its sensitive whiskers for crabs and shellfish. Males use their tusks as weapons when fighting over females.

FACTFILE

★ When standing on ice, penguins' special circulatory systems stop their feet from freezing by keeping heat inside the blood vessels, preventing it from being lost through the skin.

★ Walrus' tusks can grow up to 1 m long.

★ In the Middle Ages, narwhal tusks were brought south and traded as unicorn horns. Many Europeans did not realise what these objects really were until their own explorers reached the Arctic in the 16th and 17th centuries.

A two-month-old king penguin



SEASHORE

The seashore is the place where the land meets the sea. The creatures that live on the shore must be able to survive the changing conditions brought on by the tides. They live at different levels, or zones, according to how well they can survive out of water. Shelled animals, which can keep themselves moist, live higher up the shore. Starfish, worms and others live lower down, where it is wet for more of the day. On some shores tidal pools form between rocks.

Anemone A sea creature that looks like a flower. It is a type of cnidarian (8), related to jellyfish (8) and polyps (25). It attaches itself to rocks and uses its tentacles to sting its prey. When in danger, or at low tide, it can withdraw its tentacles.

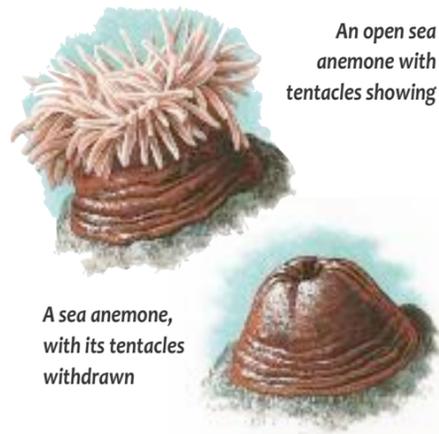
Barnacle An animal with a cone-shaped shell and feathery legs which it uses to scoop food towards its mouth. Barnacles cement themselves to rocks, or other hard objects such as the bottom of ships, or even the skin of whales.

Blenny A small fish that lives on rocky shores and is often found in tidal pools. Most species of blenny are green or brown, in order to blend in with their surroundings and escape detection by predators.

Burrowers Sea creatures, such as worms and clams, that burrow underground at low tide to both keep moist and seek protection from waves or predators.

Hermit crab A type of crab that has no shell of its own but lives in the empty shells of other animals. Hermit crabs scavenge on dead plant and animal debris.

High tide zone The area of the seashore that is covered by the sea only at high tide.



An open sea anemone with tentacles showing

A sea anemone, with its tentacles withdrawn

Holdfast A claw-shaped foot that anchors seaweeds to rocks or the seabed.

Limpet A seashore snail with a flattened, conical shell. Limpets firmly attach themselves to rocks but move about during high tide to look for food.

Low tide zone The area of the seashore that is almost constantly covered by the sea. It is only exposed during unusually low tides. It is inhabited by creatures that depend on the moisture of the sea.

Lugworm A burrowing worm that lives in a U-shaped tunnel in the sand of the seashore. It sucks water and food down the tunnel, then pumps waste back up it.

Mussel A small, black shellfish that lives attached to rocks. Mussels feed on tiny particles of food found in seawater. When the tide goes out they shut their shells, trapping water inside them, which stops them from drying out.

Seaweed A type of algae (20) that grows attached to the seafloor. Seaweeds are a source of food for some animals, as well as a cool, damp shelter for some seashore creatures when the tide goes out. Green seaweed grows near the top of the shore and brown weed near the sea.

Spray zone The area at the top of the seashore, that is splashed by waves at high tide but only covered by the sea during storms.

Starfish An invertebrate (8) with five legs and a mouth on the underside of its body. Using the suckers on its arms, it can fasten on to a shellfish and prize it open to feed on the fleshy parts inside. If a starfish is attacked, it can lose an arm in order to make its escape. This will then grow back.



A starfish opening mussels with its feet

Tidal pool A pool collected between rocks when the tide goes out. Tidal pools may become very warm in hot sunshine or suddenly flooded at high tide. These are rich in life, including animals such as starfish, sea anemones and small fish, which could not otherwise survive so far up the shore.

Tide The rise and fall of the sea every 12 and a half hours. Tides are caused by the pull of gravity that the Sun and Moon have on the Earth. Ocean waters on the side of the Earth closest to the Moon (and the opposite side) bulge outwards, causing a high tide. At the same time, the rest of the Earth has a low tide. The Sun may increase or lessen the Moon's effect.

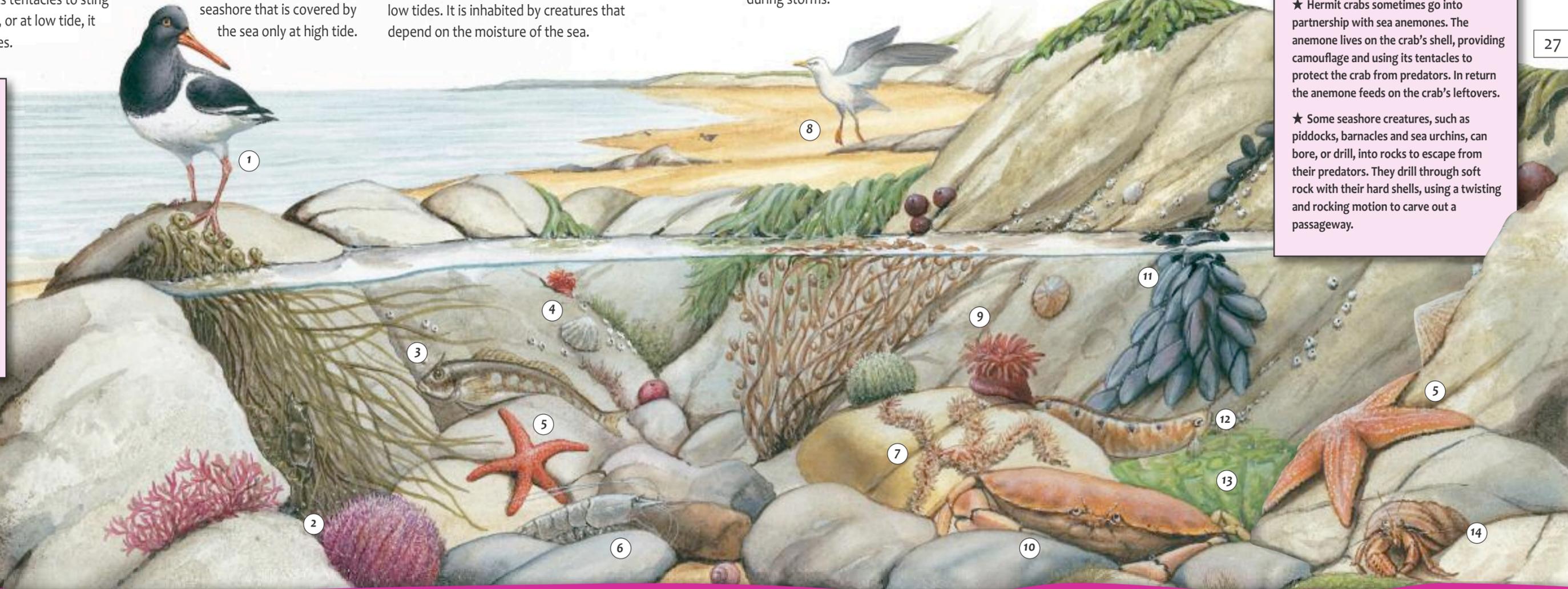
FACTFILE

★ Hermit crabs sometimes go into partnership with sea anemones. The anemone lives on the crab's shell, providing camouflage and using its tentacles to protect the crab from predators. In return the anemone feeds on the crab's leftovers.

★ Some seashore creatures, such as piddocks, barnacles and sea urchins, can bore, or drill, into rocks to escape from their predators. They drill through soft rock with their hard shells, using a twisting and rocking motion to carve out a passageway.

KEY

- 1 Oystercatcher
- 2 Sea urchin
- 3 Blenny
- 4 Limpet
- 5 Starfish
- 6 Prawn
- 7 Brittlestar
- 8 Herring gull
- 9 Beadlet anemone
- 10 Crab
- 11 Mussels
- 12 Butterfish
- 13 Sea lettuce
- 14 Hermit crab



MIGRATION

Many marine animals make long journeys to breed or to reach rich feeding grounds. This is called migration. Some animals may fly or swim huge distances each year. Other animals only make the journey every few years or just once in their lifetime. Animals navigate (find their way) by recognizing landmarks, observing the position of the sun and stars or using scent. Scientists think that some routes are passed down from one generation to another through animal genes. Other animals are thought to navigate by sensing the Earth's magnetic field, though scientists have yet to fully understand this.



Pacific salmon

Arctic tern A bird that breeds in the Arctic in the northern summer, then migrates to spend the southern summer feeding in the Antarctic. This is a round journey of about 71,000 km.

European eel A freshwater eel that migrates across the Atlantic Ocean when it hatches and again, at the end of its life, to lay its eggs and die. The young eels are born in the Sargasso Sea, east of Florida. They drift back to Europe on oceanic currents, then swim up rivers and grow into adults.

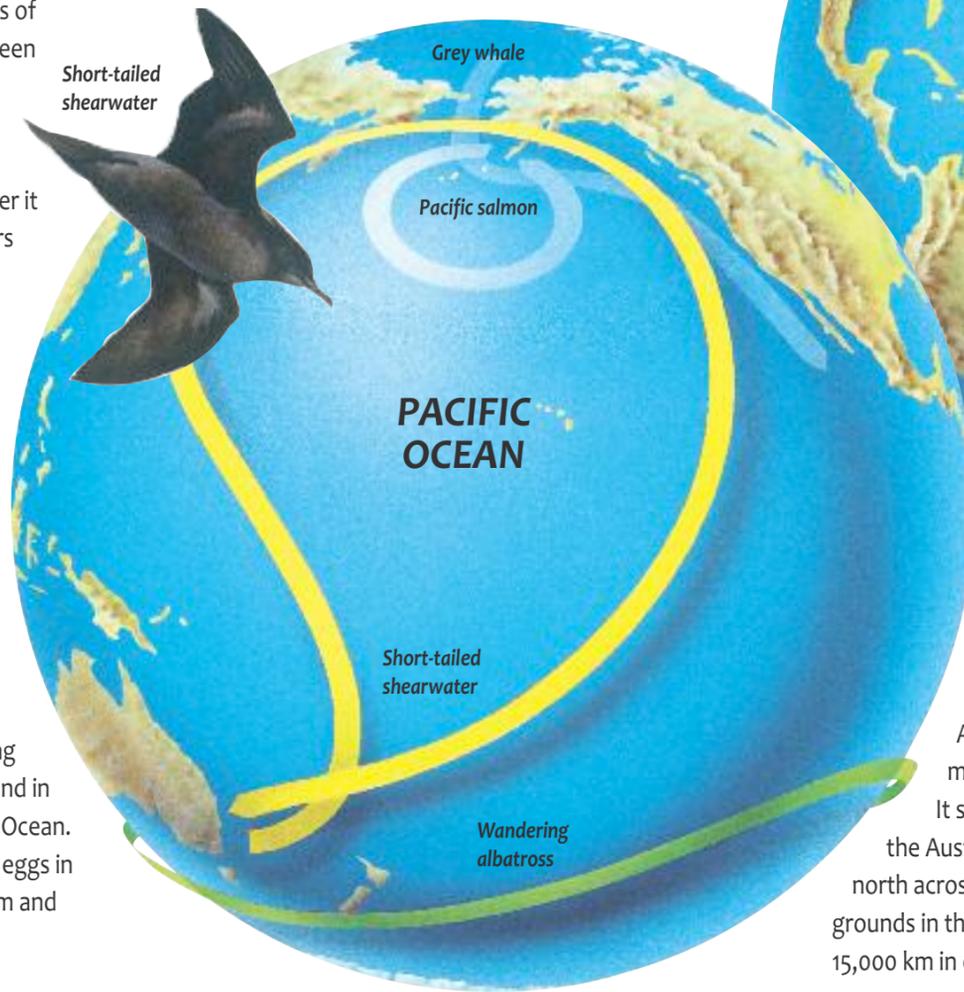
The wandering albatross



Grey whale A large species of whale that migrates between feeding and breeding grounds every year. It feeds in Arctic waters in summer, then, in the winter it migrates to warmer waters in Mexico to breed. The whales travel in small groups, taking two or three months to complete the 10,000 km journey.

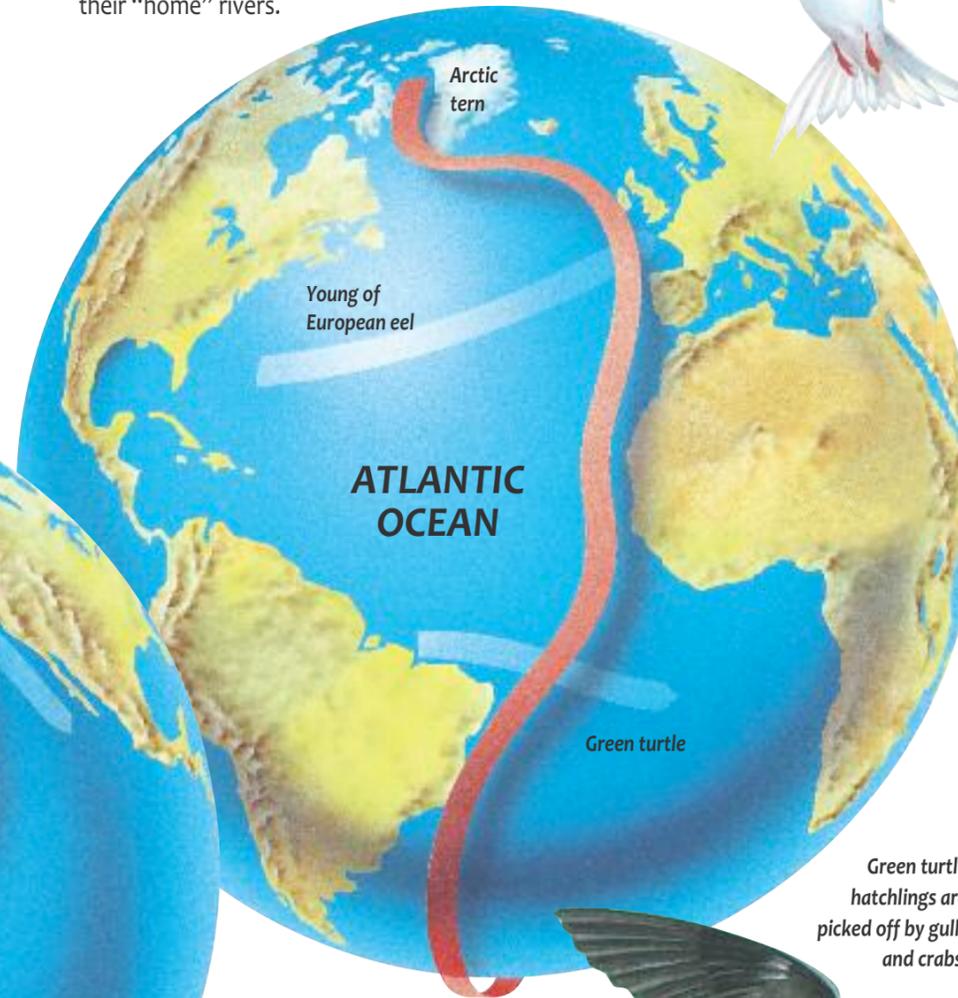
Green turtle A large sea turtle that migrates around 2000 km to lay its eggs. Every two or three years green turtles leave the coast of Brazil and travel to their breeding grounds on Ascension Island in the middle of the Atlantic Ocean. Each turtle lays about 100 eggs in the sand, then covers them and returns to sea.

Short-tailed shearwater

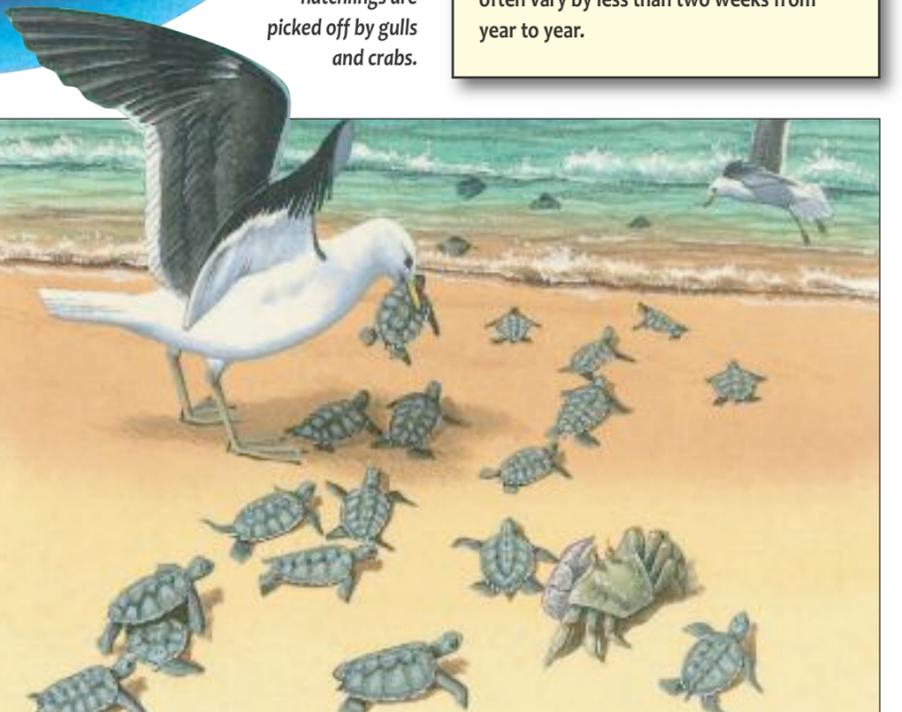


Grey whale

Salmon A fish that is born in a river, lives in the oceans, then swims back to the same river to breed. The journey may exceed 11,000 km. Salmon are thought to find their way by recognizing the taste of their "home" rivers.



Arctic tern



Green turtle hatchlings are picked off by gulls and crabs.

Short-tailed shearwater A bird that makes a seven-month migration every year. It spends its summer breeding on the Australian coast. In April it flies north across the Pacific to feeding grounds in the Bering Sea. It travels about 15,000 km in each direction every year.

Vertical migration The movement of animals up and down through different depths of ocean water. For example, some deep-sea creatures, such as the lanternfish or hatchetfish (12) travel to the upper layers of the ocean to feed every night, returning to the depths during the day.

Wandering albatross A large bird that spends nearly all its life airborne, coming to land on islands only to breed. Every other year it returns to an island near Antarctica where it was born. Here, couples build a nest and lay and hatch a single egg.



Elvers (young eels)

FACTFILE

- ★ The Arctic tern's 71,000 km journey is the longest migration of any animal in the world.
- ★ The wandering albatross covers the greatest distances of any bird over the course of its life. An albatross can live up to 60 years old and travel millions of kilometres during its lifetime.
- ★ The green turtle is thought to be the farthest-travelled reptile in the world.
- ★ Migrating animals time their journeys with incredible precision. Departure dates often vary by less than two weeks from year to year.

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