

# DIVE INTO THE SEA

## Marine Biology



### Marine Biologists – A Sea of Study

The studies of Marine Biology covers a very wide area so there are many different fields within it. Use the information from the topic page to identify which field with Marine biology would deal with each scenario.

#### FIELD of MARINE BIOLOGY

Microbiologist, Fisheries/Aquaculture, Environmental, Deep Sea, Ichthyology, Mammology

#### SCENARIOS

An injured sea-lion has been caught and brought in by a fisherman.



Tiny organisms are causing a strange discolouration in the water close to a popular beach.



'Alvin' the submersible vessel has taken some new footage of hot vents on the sea floor.



Locals have found a large number of dead fish and other creatures washed up on the beach and notice some strange substance in the water.



The high demand for 'red claw' has meant that the industry needs to expand their operations.



On the weekend, 12 year old Jack caught an unusual looking fish and wants to know what it is.



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### How Deep?

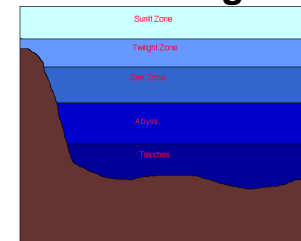
Scientists have divided the ocean into five main layers or zones from the surface to the most extreme depths. Use the information given to match the descriptions to their correct zone.

Name of Zone: The Abyss, The Midnight Zone, The Sunlight Zone, The Trenches, The Twilight Zone

#### Descriptions:

- The surface layer extends from the surface to 200m and is where most of the visible light exists. More than 90% of marine life lives in this zone.
- The water temperature in this zone is near to freezing. From 4000m to 6000m there is no light at all and very few creatures can be found at these crushing depths.
- Extending from 200m to 1000m, this mid-water zone has a diversity of strange and bizarre fish. The light that penetrates to this depth is very faint.
- The deepest points in the ocean are mostly found in water trenches and canyons from 6000m up to 11000m. Life can be found here even though the high pressure and low temperature is incredible.
- This dark zone extends from 1000m down to 4000m where the water pressure is immense. The only visible light is produced by 'bioluminescent' animals.

**\*Draw and label a diagram to show the different layers.**



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### Identify Me

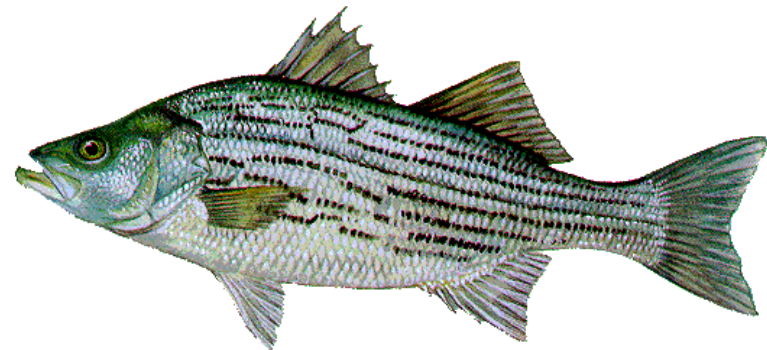
A part of a Marine Biologists job is to be able to identify different creatures of the sea. Match the description, name and picture of each of these animals.

Orange Roughy  
Striped Bass

Sea Otter  
Triton Trumpet

Sea Spider  
Tubeworm

- This tiny, big-eyed animal swims in the deep, cold waters off New Zealand. Its bright orange skin is less striking in its dark, bluish environment. It grows slowly and may live more than 100 years. It used to be called "slimehead" until it became a popular meal.
- Known for its beautiful shell, this creature is found in shallow, tropical waters. By eating the crown-of-thorns starfish, it helps to keep coral reefs in balance. In large numbers, it can destroy the reefs by eating the coral polyps that build them.
- With their red plumes sticking out of white casings, these creatures look like lipstick containers. They thrive near cracks in the hydrothermal vents.
- Surviving in the icy Pacific isn't easy if you are a warm-blooded mammal without a layer of blubber. Fortunately, this animal has dense fur.
- This animal's legs can grow to 30cm. One reason is the chilly waters in which it lives. Cold water contains more dissolved oxygen. More oxygen in your blood means you can support a larger body. After this animal catches its prey, it sucks out its juices.
- The largest member of its family, this stripy animal hatches in freshwater rivers, then spends its adult life either in the ocean, or in estuaries, where the river meets the sea. It eats small fish, crustaceans, and marine worms



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### A Salty Place

Marine biologists study mainly salt water habitats. In this experiment the first five words in each step has been left out. Choose the correct sentence starter from the list to complete the steps Now try this experiment.

#### You will need:

- |                           |                         |
|---------------------------|-------------------------|
| Jug                       | 2 x 1 litre soft-drink  |
| Wooden spoon              | blue/red food colouring |
| 3 glasses (the same size) | a funnel                |
| Warm water                | a spoon                 |
| Salt                      | 2 pencils               |

#### What to do:

- .....warm water. Add a spoonful of salt, stir, and wait until the water is still. Do you see any salt at the bottom of the pitcher? If so, go to the next step. If not, keep adding salt slowly until the salt begins to collect on the bottom. The water is now saturated with salt.
- .....the solution. Each glass should have the same amount. Put one glass aside and put enough blue food colouring into the other glass to turn the liquid dark blue, then stir. This glass of blue solution represents salty ocean water.
- .....with warm water. This glass represents fresh water. Then take the glass with the blue solution (ocean water) and SLOWLY pour it into the glass of warm water (freshwater). This thick solution will pour like syrup. The trick is to pour it gradually at the edge of the glass. Don't mix the solution, just let it sit. What happens? Which liquid is denser — the blue one or the clear one? Why do you think this is?
- .....you put aside earlier, half-filled with the saturated solution. Add some warm water to it until the glass is full. Then, put in enough red food coloring to turn the solution a deep red, and mix well. This glass is filled with a liquid of medium salinity — less salty than the blue water, but saltier than the freshwater.
- .....happen if you SLOWLY pour a small amount of this red solution into the glass with the blue and clear water? Make a prediction and then try it out. What happened?

### Which pencil will rise to the occasion?

- ..... Step 1). Then use a funnel to pour this solution into a soft-drink bottle.
- .....with warm water (but no salt).
- .....happen if you put a pencil into each bottle? Try it out and observe the results. Use a ruler to measure the difference. Measure from the base of the bottle up and see which the greater distance is. In which condition is the pencil higher in the water column?
- .....behaved in the freshwater and saltwater, which do you think is easier for you to float in, a swimming pool or the ocean? Another way of asking this question is: "In which kind of water will you have greater buoyancy — freshwater or saltwater?" Buoyancy is how much something will float.

### Sentence Starters

- What do you predict will
- Take the other glass that
- Half fill the jug with
- Based on how the pencils
- Fill the third glass halfway
- Make more saturated solution (repeat
- Half fill two glasses with
- What do you think will
- Fill an identical soft-drink bottle





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### Ecosystems in the Ocean

We often think of the oceans as one big bowl of salt water. But the fact is there are lots of different environments or ecosystems within the oceans — more than on land. Ecosystems are communities of organisms that depend on each other and their surroundings. Each ecosystem is connected to those around it. Use the clues to identify some of the different ecosystems and find their names in the word search box.

#### CLUES

- places where rivers meet the sea
- the area where the ocean meets the land
- a sea structure made out of living organisms which together form a wall and where thousands of species make their home.
- an undersea extension of a continent which can stretch for many kilometres out to sea
- the lowest layers of the ocean where little or no light penetrates
- the area of the ocean outside of coastal areas where some of the biggest marine life species are found.
- An area where species of trees or shrubs grows in muddy, chiefly tropical coastal swamps, typically having numerous tangled roots above ground that form dense thickets.



M	M	M	M	M	M	M	M	M	M	M	M	M	M	S
A	D	E	E	P	S	E	A	A	A	A	A	A	A	E
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I	I	I	I	I	I	I	I	I	I	I	O	I	S	L
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A	A	A	A	A	A	A	A	A	A	A	A	A	A	O
N	N	N	N	N	N	N	N	N	N	N	N	N	N	C



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This provides gas to a diver through the regulator and is basically used to transport and store high pressure breathing air.

This piece of equipment provides an air space in front of the eyes enabling the diver to see more clearly. An L or J shaped tube fitted with a mouthpiece is connected to it, enabling the diver to breath while on the surface of the water.

### SCUBA DIVING EQUIPMENT

In order to spend time under the waves you require scuba diving equipment. Match the name of the gear with its, descriptions and picture.



- Buoyancy Compensator Device (BCD)
- Fins
- Regulator
- Wetsuit

- Dive computer
- Mask/snorkel
- Tank

This is worn to provide protection, thermal insulation, resistance to abrasion and buoyancy.

This is used by divers to measure the time and depth of a dive so that a safe ascent profile can be calculated and displayed.

Used to help a diver to move through the water by producing lift and thrust to steer while swimming.

This piece of equipment reduces the pressure of the air from the tank and delivers it to the mouth to make breathing possible. It has two parts which are connected through a diver's hose.

This device gives the scuba diver control over buoyancy. It comes in different styles like a jacket or vest and is integrated with a harness to strap the tank on the diver's back, gauges and octopus, It is a wearable inflatable vest with pockets and straps in which all of the other gear is secured.



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### SARAH SHARK

Read the interview with Sarah Richmond on the topic page – Dive into the Sea - and answer these questions.

1. Where did Sarah grow up?
2. How old is Sarah?
3. What is she studying at University?
4. Where did she work before commencing her studies?
5. What is her passion?
6. How many episodes of Sarah Shark is she and her crew hoping to film?
7. What type of shark consumes Parrot Fish? What do Parrot Fish eat?
8. Which species of shark is most commonly linked to shark attacks?
9. Where will the Sarah Shark team travel to film episode two?
10. Where is the ODEX?



Write three more questions you could ask Sarah?

### DIVER IN A BOTTLE

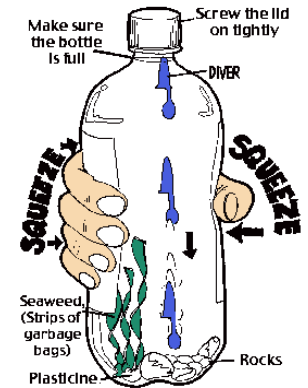
In this experiment a scientific principle is explained but the explanation is mixed up. Put the sentences in the correct order.

#### Materials you will need:

- Paper Clip
- Plastic Pen Top with Clip
- Plasticine
- Empty Plastic Bottle with Lid (2L)

#### Steps:

1. Make a plasticine figure 3.5cm long. Fix the paper-clip to its head and hang it from the pen top. Fill the bottle with water and drop in the scuba diver.
2. The pen top should float with its top just above the water level. Make the figure bigger or smaller if needed. Then pour in more water and screw the top on tightly.



#### Why the diver rises and sinks:

- Now the diver is denser than water, so it sinks.
- When you relax your grip on the bottle, the air in the pen top expands again.
- When you put the pen top in the water, a bubble of air is trapped inside it.
- When you squeeze the bottle, water squashes the air and takes up more space in the pen top.
- This trapped air bubble makes the diver less dense than water, so it floats.
- Now the diver is less dense than water, so it comes back up to the surface.



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### PROTECT SHARKS

In Australia under the Environmental Protection and Biodiversity Conservation Act a number of shark species are listed as threatened.

#### Critically Endangered

- Grey Nurse Shark – east Coast population
- Speartooth Shark

#### Endangered Species

- Northern River Shark



#### Vulnerable

- Grey Nurse Shark
- Whale Shark
- Great White Shark

Here is a description of three of these sharks. Can you identify which sharks are mentioned?

This species has a large, rather stout body and is coloured grey to grey-brown dorsally, with a paler off white under belly. The species has a conical snout, long awl-like teeth in both jaws, similarly sized first and second dorsal fin and an asymmetrical caudal fin. These sharks grow to at least 360 cm total length. It is a slow but strong swimmer and is generally more active at night.

These medium-sized sharks are greyish with small eyes, without distinctive colour pattern, with short and broadly rounded snouts, and erect, broadly triangular, serrated upper teeth. These fish-eaters have adapted to hunting in cloudy estuarine and river waters. They may grow to a length of 2-3m and can be easily be confused with the Bull shark,

This species is closely related to the bottom-dwelling sharks which include the Wobbegong. There is a pattern of lines and spots on the skin of each shark which enables them to 'blend' into their surroundings. This 'camouflage' makes the sharks less conspicuous in their oceanic environment. One of only three filter-feeding sharks this shark feeds on minute organisms including krill, crab larvae, jellyfish etc. Although they have approximately 3000 tiny teeth, these teeth are not used while feeding. Instead, this shark can sieve prey items as small as 1mm through the fine mesh of the gill-rakers.

### THE GREAT WHITE SHARK

Sarah Shark's next episode is focusing on the Great White Shark. Follow these instructions to draw this great creature!



With a pencil, lightly sketch a long oval shape with a dip at the end.



Add an oval for the shark's open mouth, with a lopsided triangle above it for the snout. Below the center of the body, draw a moon shape for the tail fin. Notice that there is an extra point on the upper lobe of the tail and that the upper lobe is slightly longer than the lower.

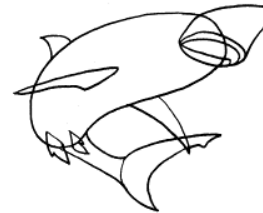
*In most sharks, the upper lobe is quite a bit longer than the lower, but for the Great White it's only slightly longer.*

*The extra point on the upper lobe of the tail is actually the end of its spine.*

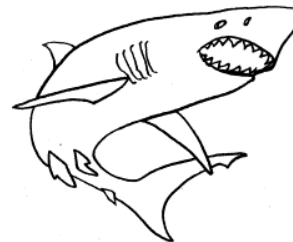


Add two thin triangular pectoral fins on the sides of the shark. Add a small triangle to the top as a dorsal fin.

*The pectoral fins help the shark turn and steer while it swims.*



Sketch two curved lines inside the oval mouth. These will help guide you when drawing the teeth. Draw lines to connect the body and tail. Then add two small pelvic fins right where the body ends.



Add the eye, nostril, five gill slits and teeth. Draw the small, triangular anal fin right near the tail. Smooth out the body lines and erase any that are unnecessary.

You can go over your drawing with a thin black marker at this point.

OR, you can shade your picture with a pencil using cross hatching strokes. Shade the top of the shark, the inside of the mouth, the fins and the tail but leave the belly white.