RSNO
SCOTLAND'S NATIONAL ORCHESTRA

# Sounds of the Deep

Learning Resource:

## Life in the Deep

MARINE CONSERVATION SOCIETY

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# Life in the Deep

**Sustainability Goals:**


**Subject links:**
Science, Geography, Maths, Art

Ages 7-11

**Curriculum links:**
Biodiversity, Adaptations, Habitats, Ecosystems, Material & properties, Oceans, Measure, Creativity

**Ocean Literacy Principles:**
1. The Earth has one big ocean with many features.
5. The ocean supports a great diversity of life and ecosystems
7. The ocean is largely unexplored.

**Learning Objectives:**
- To be able to define the term 'habitat'
- To understand how an animal has adapted to its habitat and why it needs to adapt
- To name animals in the deep ocean

**Resources provided:**
Life in the Deep Fact File
Life in the Deep Image Reel
Giant Creatures cards

**Extra resources required:**
Bottle, tape, tray/container
Measuring tape per group
Blindfolds per group

## Step 1 Background

More is known about the moon than about life in the deep ocean. The deepest part of the ocean, the Mariana Trench, is 11,000m deep. If Mount Everest were to be placed in the trench, it would still sit 1-2 miles below the surface of the water. Life in the deep is hard – there is high pressure, no light, little food and cold temperatures. Animals living in the deep have developed fascinating adaptions to survive. Have a look at the *fact file* for more information.

## Step 2 Set the Scene

**5 minutes – What is it like in the deep ocean?**

Introduce the topic. Ask children why they think it's hard to live in the deep ocean. What are the conditions like? Students should talk in pairs and share thoughts. Explain that creatures need to be adapted to their habitat to survive, and that today you're going to explore how creatures are adapted to live in the deep.

## Step 3 Activities

**Activity 1: 15 minutes - Dark waters**

One of the biggest challenges facing creatures in the deep is the dark. In an open space (assembly hall or outside), split the class into pairs and give a blindfold to each pair. Pairs should take it in turns to explore the area with the blindfold on. Discuss which senses helped students to move around safely, and ask what could have helped them move around more easily. Back in the classroom, show the *image reel* and focus on the dark waters section. Discuss how creatures have adapted to life in the dark using the notes in the presentation.

**Activity 2: 15 minutes – What is water pressure?**

The deeper in the ocean you travel, the greater the pressure becomes, because of the weight of the water above. The deepest a human has ever been able to scuba dive is 318m, which is extremely dangerous. In comparison, the average depth of the ocean is 3700m.

To demonstrate how pressure works, prepare a large plastic bottle with 3 holes along one side, at the top, middle and bottom of the bottle. Tape the holes up and fill bottle with water – you'll also need a container to catch the water in. Ask children which part of the bottle has greater pressure. Explain that you're going to remove the tape and water will spill out of the 3 holes. Ask children to make predictions based on pressure. What might happen to the water from each hole? Remove tape and observe closely. Water will spill out of the bottom hole furthest and fastest because of the pressure above.

Return to the *image reel* and discuss how animals have adapted to high pressure.

**Activity 3: 30 minutes - Day in the life of**

Ask children what they think the temperature is like in the deep and why. One adaptation to very cold temperatures seen in animals all over the world is to grow larger. Large animals have greater fat reserves to keep them warm, and a lower surface to volume ratio to reduce heat loss. In the ocean this is called 'deep sea gigantism'. Return to an open space and split the class into three groups, and give each group a *giant creatures* card and a measuring tape. Groups should measure out their given species and determine how they can best mark the shape of the species using members of the group. Once everyone has done this, groups should reveal their species name, its size and one fact. *Note*: two of the cards include sizes for shallower water species for size comparisons – these should also be measured. In the classroom, return to the *image reel* to look at images of these giant animals.

**Activity 4: 5-10 minutes – Finding food in the deep**

The deep ocean is a vast space and therefore it can be hard to find food. Animals have to adapt to eating a variety of food, and eating as much as they can when they have the ability to do so. In the *image reel* watch the video of the gulper eel. Ask students to discuss what the adaption of this creature is to lack of food in its environment (expandable stomach and huge mouth so they can eat a variety of food and as much as they can). Show the rest of the images and discuss the adaptations.

## Step 4 Extend

**30 minutes - Design a deep sea creature**

Students could design their own deep sea creature using what they have learnt about the harsh conditions and how animals have adapted. They should annotate the picture to explain their creature's adaptations.

## Step 5 Reflect

**5 minutes**

Show the video at the end of the *image reel* to summarise learning. Ask students to explain the word habitat and adaptation. Why is the deep ocean a challenging place to live? Can you give an example of how an animal has adapted to this environment?

## Step 6 Follow up

To follow up work on adaptation, take a look at our *Rockpool* lessons. For further work on ocean giants, take a look at our lessons, *Sharks aren't scary* or *Tremendous turtles*.

# Life in the Deep Fact File

## The Deep Sea

More is known about the moon than about life in the deep ocean.

The deepest a human has ever been able to scuba dive is 318m – but this is extremely dangerous! By comparison, the average depth of the ocean is 3700m.

The deepest part of the ocean, the Marina Trench, is 11,000m deep. If Mount Everest were placed in the trench, it would still sit 1-2 miles below the surface of the water.

Even in the deepest part of the ocean, plastic has been found by submarines on the seafloor.

**Useful definitions:**

**Adaptation** is a change in body shape and behaviour to enable a creature to live in a particular area or in particular conditions.

**Habitat** is the natural home or environment in which an animal, plant or organism lives. A habitat contains all an organism needs to survive, like food and shelter.

## Living conditions

Life in the deep is hard – there is high pressure, no light, little food and cold temperatures. Animals living in the deep have developed fascinating adaptations to survive.

Ghost fish at around 1853m © NOAA Ocean Exploration & Research

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# Life in the Deep Fact File

## Dark

Below 200m there's not enough sunlight to allow plants to grow, and below 1000m there's no natural light at all. Some animals have adapted to have huge eyes or produce their own light. At extreme depths, some animals have adapted to have tiny eyes – and even no eyes at all – as there's no need to use them. Instead they use tactile and sensory clues to find food.

**Spookfish** have highly sensitive, cylindrical eyes to help them look up as well as forward. **Tripod fish** use their long front fins to feel for food. They then use these fins like hands to guide the food to their mouth. **Anglerfish** have bioluminescence on the end of their dorsal spine. This is positioned near their mouth and used to attract prey.

Spookfish
© GreenAnswers.com

Tripod fish © Ocean Exploration Trust

Anglerfish © Superjoseph via Shutterstock

Giant isopod © NOAA Ocean Exploration & Research

## Cold temperatures

The lack of sunlight in the deep means the water temperature is very cold. One adaptation to cold temperatures seen in animals all over the world is to grow larger, which is referred to as the Bergmann's rule. Large animals have greater fat reserves to keep them warm and they have a lower surface to volume ratio to reduce heat loss.

**Deep sea isopods** are crustaceans that look similar to a woodlouse. A typical isopod in shallower waters can measure up to 5cm, whereas a giant deep sea isopod can measure up to 15cm and a supergiant species up to 50cm. Though this might still sound small, it is a huge size difference between shallow and deep water species.

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# Life in the Deep Fact File

## High pressure

The deeper in the ocean you travel, the greater the pressure becomes because of the weight of the water above. In the Mariana Trench, the pressure is approximately 1000 times greater than at sea level.

The **Blobfish** has been voted the world's ugliest fish. This is totally understandable when you see images of them out of the water! But footage of them swimming in the deep sea shows a very different looking fish. Their bodies are gelatinous to be able to withstand the high pressure. When the pressure compresses their bodies in the deep, they appear quite fish-like in shape. But if brought to the surface for study purposes, their bodies relax without that pressure, and turn into a gelatinous blob.

Blobfish © James Joel via Flickr

Gulper eel © NOAA Photo Library

## Little food

The deep is a huge, vast space and therefore it can be hard to find food. Animals have to adapt to eating a variety of food, and eating as much as they can when they have the ability to do so.

The **Gulper eel** has a mouth that can open to 10 times bigger than its own body, which is the biggest mouth to body ratio of any vertebrate. Along with an expandable stomach, this means the gulper eel is able to feed on a range of species and not be restricted by size.

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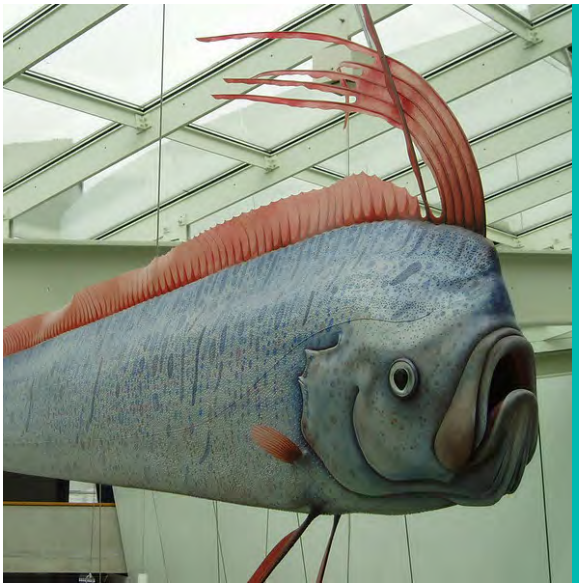
# Giant Creatures cards



© Flickr/Udo Schröter

**Size: 7 metres**

## Giant oarfish

Is the longest bony fish in the world. They don't have teeth because they are filter feeders. Their pectoral fins look like oars. They don't have scales like most fish - instead they have a slimy material called guanine.

© Flickr/Shih-Pei Chang

**Size: 14 metres**

## Colossal squid

They live in the deep ocean around Antarctica. It is the largest invertebrate on Earth and has the largest eyes in the world! Even though they are huge they still have predators. Colossal squid are the favourite food of sperm whales.

**Size comparison:** The common squid that lives in the UK can grow up to 40cm in length.

© Flickr/Choo Yut Shing

**Size: 3.7 metres**

## Japanese spider crab

They have 10 legs and live in the Pacific Ocean near Japan. They live in waters up to 200 metres deep, but move to shallower water (around 50 metres deep) to breed. They are scavengers, which means they eat dead animals and plants.

**Size comparison:** The Spiny spider crab that lives in the UK can grow up to 20cm in length.

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Life in the Deep:

# Experiences and Outcomes

## Science

I can identify and classify examples of living things, past and present, to help me appreciate their diversity. I can relate physical and behavioural characteristics to their survival or extinction. **SCN 2-01a**

I can analyse how lifestyles can impact on the environment and Earth's resources and can make suggestions about how to live in a more sustainable way. **TCH 2-06a**

## Numeracy

I can use my knowledge of the sizes of familiar objects or places to assist me when making an estimate of measure. **MNU 2-11a**

I have worked with others to explore, and present our findings on, how mathematics impacts on the world and the important part it has played in advances and inventions. **MTH 2-12a**

Having discussed the variety of ways and range of media used to present data, I can interpret and draw conclusions from the information displayed, recognising that the presentation may be misleading. **MNU 2-20a**

I have the opportunity to choose and explore an extended range of media and technologies to create images and objects, comparing and combining them for specific tasks. **EXA 2-02a**

I can create and present work that shows developing skill in using the visual elements and concepts. **EXA 2-03a**

## Art

Through observing and recording from my experiences across the curriculum, I can create images and objects which show my awareness and recognition of detail. **EXA 2-04a**

Inspired by a range of stimuli, I can express and communicate my ideas, thoughts and feelings through activities within art and design. **EXA 0-05a** / **EXA 1-05a** / **EXA 2-05a**

I can discuss the environmental impact of human activity and suggest ways in which we can live in a more environmentallyresponsible way. **SOC 2-08a**

**With thanks to our partners**

**Sounds of the Deep is supported by:**

Aberdeen City Council, Aberdeen Endowments Trust, Alexander Moncur Charitable Trust, Balgay Children's Society, Castansa Trust, Cookie Matheson Charitable Trust, David and June Gordon Memorial Trust, Educational Institute of Scotland, Forteviot Charitable Trust, The Gannochy Trust, Glasgow City Council, Hugh Fraser Foundation, Jimmie Cairncross Charitable Trust, Leach Family Charitable Trust, Leisure and Culture Dundee, Leng Charitable Trust, The McGlashan Charitable Trust, MEB Charitable Trust, Nancie Massey Charitable Trust, Northwood Charitable Trust, PF Charitable Trust, Q Charitable Trust, Scott Davidson Charitable Trust, ScotRail, Stevenston Charitable Trust, Tay Charitable Trust, Tillyloss Trust, Walter Craig Charitable Trust, Walter Scott Giving Group.

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Charitable Company registered in Scotland
Company Number: SC027809
Scottish Charity Number: SC010702

The RSNO is supported by the Scottish Government

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