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Subject links:

Science, Geography, Citizenship, ICT, English

Ages 7-11

Curriculum links:

Human impact, Topical issues, UK wildlife, Food webs, Digital skills, Performance

Ocean Literacy Principles:

1. The Earth has one big ocean with many features
4. The ocean made the Earth habitable
5. The ocean supports a great diversity of life and ecosystems
6. The ocean and humans are inextricably interconnected

Learning Objectives:

- To begin to learn how important the ocean is to all life on earth
- To understand how litter in the ocean can harm wildlife
- To explore how litter can affect food chains

Resources provided:

- [Marine Litter Fact File](#)
- [What did the ocean ever do for us?](#) (video)
- [Marine Litter Image Reel](#)
- [Food Chain cards](#)
- [Plastic Ocean Poster](#)

Extra resources required

- Computers (to use in extend activity)

How Clean Are Our Seas?

Sustainability Goals:



Step 1

Background

Litter reaches the ocean in a number of ways: it's washed in from our rivers, is left on our beaches, or is cast overboard from boats.

It not only makes the marine environment look unpleasant, but it impacts the health of thousands of marine animals every year, usually by ingestion, entanglement or suffocation. Chemicals used in, and absorbed by plastics also negatively impact animals' health. Plastic is the most commonly found beach litter material, and it doesn't biodegrade, but breaks down into smaller and smaller pieces which can be mistaken for plankton or other food sources.

Completing this lesson will give students an overview of marine litter.

Step 2

Set the Scene

10 minutes – Why is the ocean important?

Watch the video [What did the ocean ever do for us?](#) as an introduction to why the ocean is so important to all life on earth.

Discuss the video as a class, reviewing the main points raised and observing the need to keep the ocean clean and healthy.

Step 3

Activities

Activity 1: 10–15 minutes – What is marine litter?

Write the words 'marine litter' on the board and ask students to discuss in pairs what they already know about the subject, thinking about what they may have seen on the news or TV. After a few minutes, ask the pairs to try to define the words 'marine' and 'litter'. Next, have a class discussion for students to share what they talked about and add notes to the board. Use the [image reel](#) to illustrate topics in the discussion, and the [Marine Litter Fact File](#) for further information.

Activity 2: 5 minutes – How are animals affected by litter?

Next, focus on how marine animals are affected by litter by using the slide titled *Marine Litter v Marine Life* in the [image reel](#). As a class match the litter item with the animals most likely to be affected by it, and discuss the answers. Note that several items could affect some animals.

Activity 3: 15 minutes – Litter in the food chain

Split the class into small groups and hand out a set of [food chain cards](#) to each one. Ask students to look at the healthy food chain side first, and arrange the animals in the correct order. Then students should study the plastic ocean food chain on the reverse of the card. After 5 minutes, ask each group to reveal their healthy food chain to the class. Then discuss the plastic food chains, thinking about how marine litter can affect many sea creatures, how plastics and their toxins can build up in the food chain and how microplastics could affect humans who eat seafood.

Step 4

Extend

30–40 minutes – Pacific Garbage Patch

Challenge students to find out about the North Pacific Garbage Patch. Start by reading through the information on the [Plastic Ocean poster](#) and identifying key words. Students should then work in pairs to use Google SafeSearch to research the topic further. Using the new information, students could perform a short (2 minute) Newsround-style report on the issue to inform others, or they could create a news article for your school's website.

Step 5

Reflect

5 minutes

Why is it important to keep the ocean healthy and clean? Why is plastic in the ocean a bad thing? How does marine litter affect animals? Can you name an animal that might accidentally eat microplastics?

Step 6

Follow up

This lesson is the first in a series on marine litter. The next lesson in this series is [From Source to Sea](#), which focuses on how marine litter reaches our ocean. Topics covered across the series include: materials; surveying; how to reduce litter, and how to raise awareness of the issue.

Marine Litter Fact File



From source to sea

It is estimated that 11 million tonnes of plastic ends up in the sea worldwide each year (1), and that 80% of litter found in the sea is from inland sources. (2)

Sources on land can include intentional and accidental littering, items flushed down toilets, sinks and drains, windblown litter from bins and landfills, and litter carried by rainwater into drains, rivers and eventually the sea. Litter is also a problem at sea, with sources like fishing, sailing, speed boats, commercial ships and container spills causing litter pollution.



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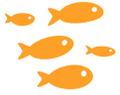
Litter timeline

Litter in the ocean takes longer to degrade than litter on land, but will eventually start to break up due to wave action, currents, saltwater and sunlight. Degradation time varies greatly from 1–450 years depending on the properties of the litter.

Microplastics are a serious environmental issue. They are plastics that have broken up into pieces less than 5mm, as well as pieces that enter the environment this size like microfibres or plastic nurdles, which are the small plastic pellets used in the production of plastic products.

1. Pew 2020
2. Europa 2016

Marine Litter Fact File



Marine life and litter

Litter items can cause harm to all sorts of marine life, from tiny plankton to whales.

Animals can become entangled in litter, causing injury, reduced mobility and even death. Ingestion of litter, particularly plastic, is very problematic for marine life who are unable to digest it. Large amounts of plastic ingestion can lead to starvation, as there is no room left for food. One study found 100% of turtles to have plastic in their stomach. (3) In some areas, the extreme amount of plastic on the sea floor can suffocate the animals and plants living there.

Invasive species

Ocean currents can move plastics around the world. Small animals and plants can hitch a ride on the surface of plastic and travel with the currents, introducing non-native species to new areas. The introduction of non-native species could cause harm to the ecosystem.

Plastic chemicals

Several chemicals used in the production of plastic materials are carcinogenic. Toxic contaminants can also accumulate on the surface of plastic materials that have broken up and been underwater for a long time. When marine animals ingest plastic accidentally, these toxic contaminants enter their digestive systems and could build up in the food web over time.



Gannet carrying fishing rope.
© JHS Archer-Thomson



Microplastic pieces amongst seaweed. © Natasha Ewins

Marine Litter Fact File



Litter surveys

Litter surveys are not only important for clearing rubbish, but also for gathering data on the types of litter polluting our environment. [Beachwatch](#) is our national beach clean and survey initiative, and has been running for over 25 years. Our brilliant volunteers head out to beaches across the UK to clean and survey our coastline, collecting and recording the rubbish they find in a 100m stretch of beach. This litter data helps inform our campaigns and lobby government, and has led to influential changes like the UK-wide carrier bag charge, microbead bans and changes to wet wipe packaging.

We also use the data to determine the sources of litter. For example, if a significant amount of sewage-related debris (SRD) is found in an area, we work with local sewage treatment companies to try to improve treatment plants, and with communities to raise awareness of what should and shouldn't be flushed down the toilet.



Reducing litter

We all need to do our bit to reduce litter in the environment. By rethinking how we shop and what we use in our daily lives, we can all make a difference. Refusing unnecessary plastic and other materials, reducing the amount of products we consume, and repairing rather than replacing are all important actions we can take. Through education, we can help raise awareness, encourage positive consumer behaviour, and campaign for change from businesses and the government.



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Marine Litter Fact File



Recycling

Even if we reduce the number of items we use, we will still need to throw some away. This is where efficient recycling is key. Download a guide from your local council to help students understand what can be recycled at home and at school. Many items can be recycled, but if your local council has limited recycling options check out Terracycle's website for local drop off points.

Plastics can only be recycled at best 2-3 times before they lose their strength, so we still need to move away from plastics to materials that can be recycled time and time again. We need to change how products are recycled, and how we incentivise best practice to ensure materials and resources are valued. This can include redesigning products or calling for economic incentives like Deposit Return Schemes (DRS), where a small deposit is paid when people buy a single-use drinks container and is refunded when they return it to a store or dedicated recycling point.



Circular Economy

We currently have an economy which is linear, which means we make, use and dispose of products using up finite resources. It's estimated that only 9% of all plastic ever made has been recycled, (4) so we know that recycling alone isn't the solution. Instead we need to move towards a circular economy, where products are designed to be used time and again, repairable, or re-designed into new products. The whole life cycle of the product has been considered so very little ends up in landfill.



Litter collected at a beach clean.
© Natasha Ewins



Single-use plastic straws.
© Natasha Ewins

4. Geyer et al 2017



© Wiki/NEON Ja



Phytoplankton

© Wiki/Uwe Kils



Copepod

© Flickr/Jacob Bötter



Herring

© MCS// Mark Kirkland



Grey Seal

© Wiki/Christian Sardet/CNRS/Tara expeditions



Plankton

© Wiki/Alexander Vasenin



Moon Jellyfish

© Shutterstock/William Farah



Leatherback Turtle

© px here



Orca



Phytoplankton are microscopic algae that get their food from the sun



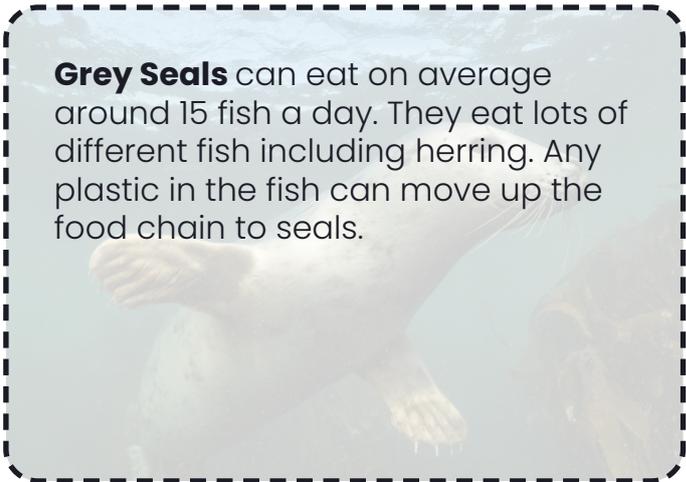
Copepods are a type of zooplankton (microscopic animals). They filter the water (known as filter feeding) to sieve out phytoplankton to eat. When filter feeding they can accidentally eat microplastics floating in the water.



Herring need to eat lots of zooplankton to stay healthy. Herring are also filter feeders, so may eat microplastics floating in the water, as well as any microplastics eaten by their prey.



Grey Seals can eat on average around 15 fish a day. They eat lots of different fish including herring. Any plastic in the fish can move up the food chain to seals.



Plankton is the collective name given to tiny algae (Phytoplankton) and tiny animals (zooplankton) that float in the ocean.



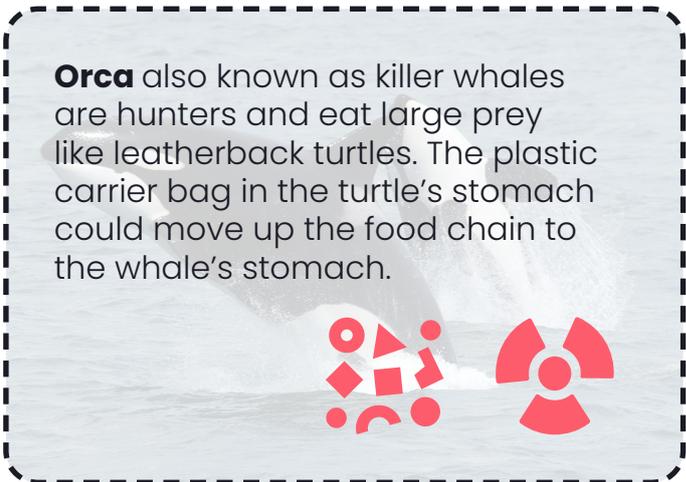
Moon Jellyfish like to eat plankton



Leatherback Turtle favourite food is jellyfish. Unfortunately plastic carrier bags bobbing in the ocean look a lot like jellyfish and turtles can often eat them by mistake.



Orca also known as killer whales are hunters and eat large prey like leatherback turtles. The plastic carrier bag in the turtle's stomach could move up the food chain to the whale's stomach.





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Lugworm

© Flickr/John Haslam



Shore crab

© Freenaturepics/Alan D. Wilson



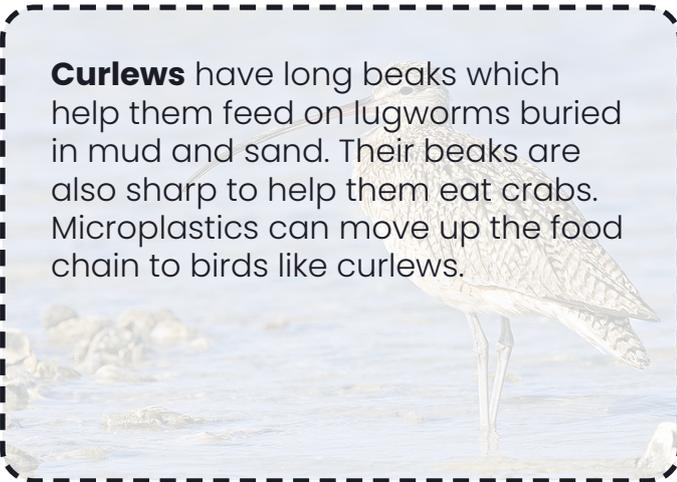
Curlew



Lugworms eat bits of plants and animals they find amongst sediments on the seafloor. They can accidentally eat microplastics in the sediment.

Shore crabs eat many different things including mussels, barnacles, food scraps and worms. Crabs can accidentally eat microplastics through its prey which may contain microplastics.

Curlews have long beaks which help them feed on lugworms buried in mud and sand. Their beaks are also sharp to help them eat crabs. Microplastics can move up the food chain to birds like curlews.



Plastic Ocean

Our ocean has no boundaries, and when it comes to rubbish in the sea, that means it's everyone's problem.

All caught up

Gyres are large rotating currents in our ocean where water spirals around. It's where much of the litter that is floating in the sea collects. The five main gyres across the globe collect man-made debris, especially plastic objects.

Floating rubbish dumps

The North Pacific Gyre contains the biggest rubbish dump on the planet. Nicknamed the 'Great Pacific Garbage Patch', it's estimated to be almost twice the size of the UK! In this area, there's 6 times more plastic than plankton.

A plastic bottle dropped in Canada may end up on the Cornish coast. Marine litter really is a global issue.



You can make a difference

Never drop litter, reduce the amount of plastic you use and recycle more.