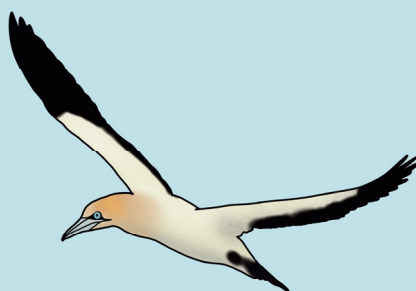
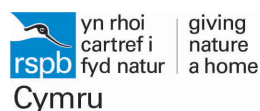


Sea





This education pack was produced by two long standing partnerships, The Pen Llŷn a'r Sarnau SAC and the Llŷn Partnership. All the organisations represented in these partnerships are shown below:



For more information and extra resources please visit:

www.penllynarsarnau.co.uk

or email: info@penllynarsarnau.co.uk



@Pen Llŷn a'r Sarnau



@ACA_PLAS_SAC



@ACA Pen Llŷn a'r Sarnau SAC

Welcome...

Wales could definitely be considered a maritime country. Its huge coastline stretches for 1,680 miles, enveloping the country in its influence, even if in nothing more than the milder wetter weather its proximity brings. The coastline alone offers a wealth of different habitats and along with them species specifically adapted to thrive there. Muddy river estuaries, long sandy beaches, exposed and violent rocky shores, and cliffs, share as many differences as similarities and all can be found along Wales' shores. As you move offshore you may come across the country's largest inhabitants. Cardigan Bay is home to one of only two resident bottlenose dolphin pods in the UK, and every summer our waters are visited by the world's second largest fish, the basking shark, and the fifth largest, the ocean sunfish, drawn here by the plankton blooms that flourish in spring's lengthening days. Welsh seas provide a home for thousands of species, from the tiniest barnacle to some of the world's largest living creatures. No matter how far you live from the sea you are dependent on it for every breath you take as over half the world's oxygen is generated by marine organisms. The sea improves people's health and well-being, providing recreation, food and, employment. It also contributes a lot of the Welsh economy, especially through tourism. However, for a long time this has been a one-sided relationship and protection of the sea has been slower to come and harder to enforce. Our seas are under constant pressure and the more people who understand and appreciate the wonder of our seas, the more likely any protection measures are to succeed and the safer the future of our seas will become.

How to use this pack:

Each topic begins with a basic introduction and ideas for further study. Every activity within that topic starts with the teachers instruction sheet and then the pupils worksheets. (These can also be found as separate sheets to be printed directly from the electronic resources).

The symbols below are found in the top right-hand corner of every activity and provide a quick reference guide for preparing and planning:



Activity booklet type,
in this case Sea



Activity takes place outside
or inside



Individual, partner or group
activity



Time of year this activity
is suitable for - spring,
summer, autumn, winter, or
all year



Time this activity
takes to complete

Where to get more information:

This printed pack is intended to act as a starting point for a much bigger collection of activities that will regularly be updated. These resources will be made available on the Pen Llŷn a'r Sarnau SAC website as they are created and further physical additions will be issued as and when funding becomes available. All activities are available as separate downloads on the website.

Activity overview

This provides an overview of all the activities provided in this edition of Tir a Môr. The key stage information is just to use as a guide, all the activities can be expanded by the teacher to cater for varying levels of abilities and interests. Most activities can be done year round but if there are any that require a specific season they are shown on the activity sheet.

Activity name	Booklet	Topic	Key stage	Outdoor / Indoor
Safe place game	Land	Habitat loss	KS1	Either
Habitat match	Land	Habitat loss	KS2	Indoor
Corridors	Land	Habitat loss	KS2/3	Indoor
Build a bug hotel	Land	Hibernation	KS1/2	Outdoor
Hibernation match	Land	Hibernation	KS2	Indoor
Heathland hunt	Land	Choughs	KS1/2	Either
Legends	Land	Choughs	KS1/2	Indoor
River speed	River	Invasive species	KS2/3	Outdoor
Species survey	River	Invasive species	KS2/3	Outdoor
Match it	River	Invasive species	KS3	Indoor
Which one am I?	River	Invasive species	KS2	Indoor
Ollie Otter's diary	River	Otters	KS1/2	Indoor
Make me	River	Otters	KS1	Indoor
Water wheel	River	Water cycle	KS2	Indoor
Salty saucers	River	Water cycle	KS1/2	Indoor
Strandline hunt	Sea	Strandline	KS1/2/3	Outdoor
Sea search	Sea	Strandline	KS1/2	Indoor
Hidden haiku	Sea	Strandline	KS2	Indoor
Find the food chain	Sea	Food chain	KS1/2	Indoor
Predator versus prey	Sea	Food chain	KS1/2	Either
Make a food chain	Sea	Food chain	KS2	Indoor
Beach detectives	Sea	Pollution	KS1/2/3	Outdoor
Coconut Crusoe	Sea	Pollution	KS1/2	Indoor

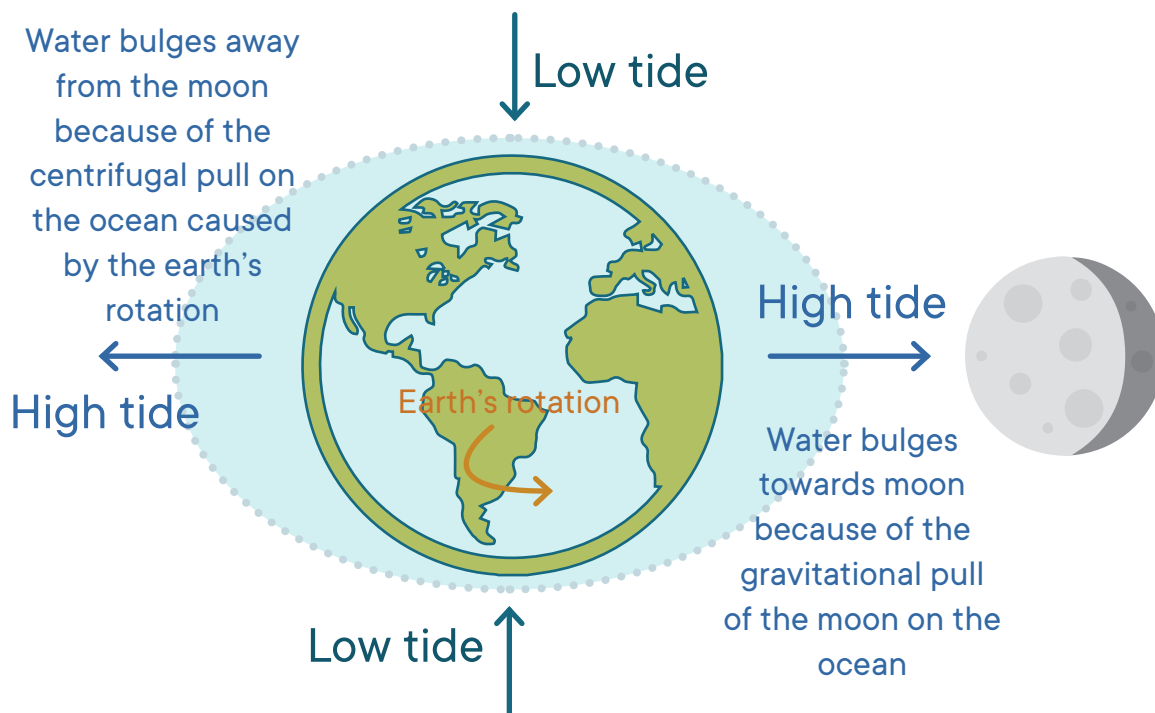
Strandline

Topic: Strandline

Strandline

Introduction:

Everything on the shore is influenced by the tides. This daily rise and fall of water is mostly driven by the moon and its gravitational pull on the earth. The earth's rotation means that we experience two high tides and two low tides in every 24 hours, one high tide because your place on earth is closest to the moon and its gravitational pull, and one because it is furthest away from the moon and the spinning force of the earth's rotation is pushing the water outwards.



The daily changing of the tides means that life on the shore is distributed by its ability to withstand being submerged or drying out. This creates zones which can roughly be divided into upper, mid and lower shore. Species in the upper shore, where they are only submerged by the high tides for a couple of hours at most, can either tolerate desiccation, hide or create their own micro-climate. At the other end of the scale the species of the lower shore can only tolerate being exposed for short periods.

The tide deposits all types of treasures along the shoreline at the highest point of the last tide. This is where you'll find evidence of the species living in our seas. Unfortunately this is also where we see most of the plastic pollution aggregating. The strandline differs from beach to beach depending on the habitats offshore and the prevailing currents and winds. Generally recognisable as a line of seaweed, the strandline can include shells, crab carapaces and mermaid's purses. Unfortunately it also contains plastics, such as nurdles (tiny pellets of plastics that are used by manufacturers in the production of plastic products).

Further research keywords:

Tidal ranges, spring and neap tides, rocky shore zonation, intertidal zone, rockpools, crab moult, ocean gyres, nurdles, egg case hunt, marine litter

Strandline hunt

45 - 60 mins



Teacher's pack

Topic: Strandline

KS: 1/2/3

Activity guide:

Equipment required:

- Clipboards
- Collection trays or buckets
- Equipment to explain how tides work
- Hula hoops

Before arriving at the beach:

1. Introduce the moon as the factor with the greatest influence that causes the tide. As a result of the gravitational pull, the moon causes a swell in the sea on both sides of the earth, namely the two high tides. This can be explained with pictures, or you can use balls to represent the earth and the moon in order to show how the tide moves around the earth. Using a large elastic band is a good way of showing how the sea swells on opposite sides of the earth.

At the beach:

1. Explain the variety of things that can be found in the strandline, both natural and man-made.
2. Spilt the class into pairs. Give them a 30min time limit.
3. The pupils try to find as many items on the list as possible. They also include three other objects they found interesting and draw them into the worksheet.
4. Get the pupils to lay their finds out on the beach in groups in the hula hoops with similar objects. Analyse the children's finds. Go through the items on the list and discuss what they are, e.g. mermaid's purse, whelk eggs, mussels.
5. If you still have time you can get the children to rearrange the finds into hula hoops based on which zone of the shoreline you would find them and go through their adaptations to that zone.

Strandline hunt

45 - 60 mins



Teacher's pack

Topic: Strandline

KS: 1/2/3

Activity guide:

Below are some facts about the things on the seashore hunt to help get your discussions started.

		
<p>Mussel shell - mussels live grouped together in beds. They attach to the sea floor using threads. Starfish eat mussels by prizing apart their shells slightly and then inserting their stomachs to dissolve the flesh.</p>	<p>Whelk egg case - also known as sea wash balls, they are the empty egg sacks of a sea snail called the common whelk. As soon as they hatch they start eating each other.</p>	<p>Razor shells - called razor shells because of their resemblance to old fashioned razors, they live vertically in the sand.</p>
		
<p>Cockle shells - there are different types of cockle. They are food for lots of seashore birds.</p>	<p>Limpets - are adapted to living on the exposed shore by having a hard shell to protect them from heat and waves. They attach so strongly to the rocks that they form a little micro climate around themselves so they don't dry out. Their tongue has been found to contain the hardest biological material known to man.</p>	<p>Shore crab - crabs can only walk sideways. To grow, crabs must get rid of their hard shell and grow another bigger one. This is why we find so many empty crab shells on the beach.</p>
		
<p>Hornwrack - although it looks like a plant, it is actually a colony of animals called polyps which together are called a sea mat. Some polyps protect it, some feed the colony and others reproduce.</p>	<p>Eggcases are also known as Mermaid's purses, they are often found on the strandline. If they have curly tendrils they are from the cat shark, if they have horns they are from a skate or a ray. Take empty eggcases back to the classroom, soak them in water and they will rehydrate and you can use the guides on the Shark Trust website to identify the species.</p>	

Strandline hunt



How many items on the list can you find? Collect one of each if you can!



Mussel shell



Whelk egg case



Razor shell



Cockle shell



Limpet shell



Shore crab



Hornwrack



Lesser spotted catshark eggcase



Spotted ray eggcase

Blank space for drawing and labeling found items.

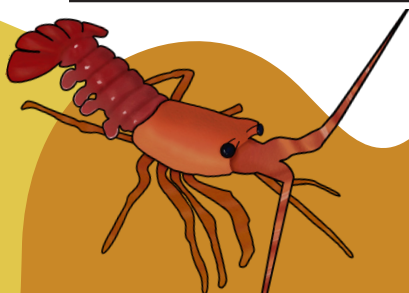
Blank space for drawing and labeling found items.

Blank space for drawing and labeling found items.

Blank space for drawing and labeling found items.

Blank space for drawing and labeling found items.

Blank space for drawing and labeling found items.



The line of dead seaweed along the top of the beach is called the strandline.

* Use the bottom line to add three natural items you have found on the beach. Draw each item and then add their names

30 mins



Sea search

Activity guide:

Equipment required:

- Print the 'Sea search' worksheet for all pupils
- Pencils or pens

To complete the sheet:

1. Each pupil spends time finding the words in the grid and marking them off.
2. To expand the lesson further, the list of species could be talked about and information about each one discussed.

Sea search



Can you find the seashore plants and animals listed in the word search grid below?



Shore crab

Whelk

Barnacle

Mussel

Cockle

Limpet

Eggcase

Hermit crab

Gutweed

Wrack

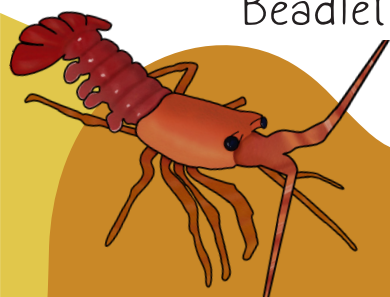
Starfish

Prawn

Beadlet anemone

Kelp

Butterfish



Gutweed is often found where fresh water runs down the beach.



Hidden haiku

Activity guide:

Equipment required:

- Print the 'Hidden haiku' worksheet for all pupils
- Scrap or practice paper or workbooks
- Pencils or pens

Introduction to haiku:

Haiku is a form of short poem originally from Japan. Traditionally they consist of three phases that follow a strict pattern of syllables, five, seven, five. They do not need to rhyme. They have often been used to depict moments from nature.

Example: the lines have been broken into their syllables using bold and non bold.

5 syllables **White**caps on the bay:
7 syllables **A** broken signboard banging
5 syllables In **the** April wind.

— Richard Wright, collected in *Haiku: This Other World*, 1998

Before starting the worksheet:

1. Introduce the idea of haiku to the class and share some examples.

To complete the sheet:

1. Each pupil spends time creating their haikus. They could use rough paper to figure out the final version before entering it on to the worksheet.
2. The pupils read out their finished verses and the rest of the class guess which species they are describing.

Hidden haiku



Use the lines below to write two haikus describing the seashore plants and animals we have been learning about. Remember not to use the creature's name, so that other people can work out which animal your poem is describing.

Haiku rules: There are three lines to each poem. Five syllables in the first line, seven syllables in the second and five in the third.

Big sharp claws clicking
Wide orange shell protects me
Walk sideways quickly

**It's describing an edible crab, did you guess it right?*

1

.....

.....

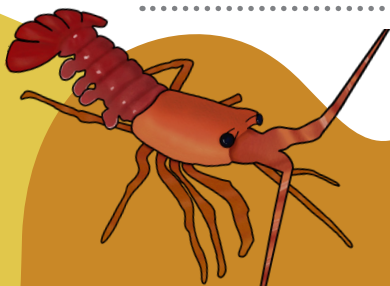
.....

2

.....

.....

.....



Edible crabs can grow up to 30cm across!

Food chain

Topic: Food chain

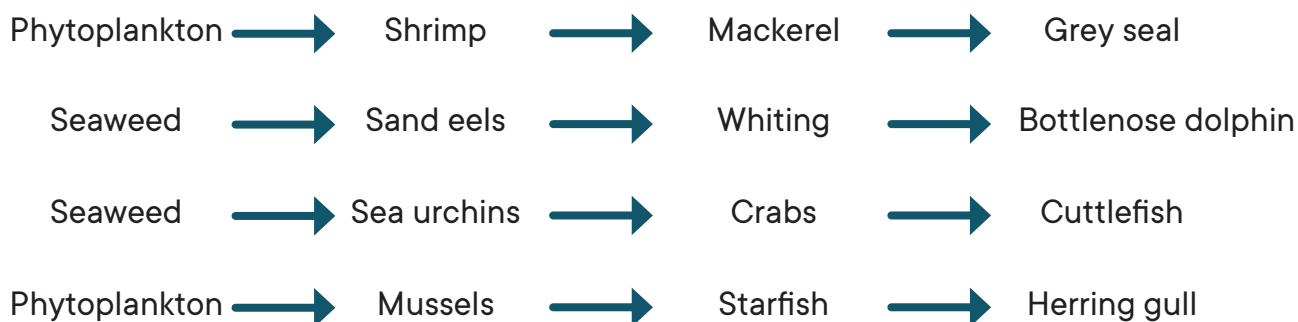
Food chains

Introduction:

All living things depend on each other to survive. Food chains are a way of showing how the energy from food moves from organism to organism.

Food chains always start with a **producer** - they create their own food from sunlight. Producers are eaten by **consumers** and consumers are eaten by other consumers.

Examples:



Food chains are made up of organisms that get their food in different ways. As previously described, producers make their own food usually from sunlight. These are then eaten by consumers. Consumers can be broken into different categories separated by what they eat.

Herbivores only eat plants.

Omnivores eat both plants and animals.

Carnivores only eat other animals.

These can be divided again by how they get their food.

Prey are animals that are eaten by another animal.

Predators are animals that get their food by killing other animals.

Scavengers eat what they can find, including dead animals.

Within food chains animals can be both predator and prey.



Food chains interlink and overlap with each other. This is called a **food web**. Understanding these food webs can help us to understand the effects of many things on the environment including pollution, habitat loss and species extinction.

Further research keywords:

Ecosystem, pyramid of numbers, photosynthesis, biomagnification, bioaccumulation, mercury in fish, trophic level, apex predator, autotroph, keystone species

30 - 45
mins



Find the food chain

Activity guide:

Equipment required:

- Printed photo cards
- Printed arrows

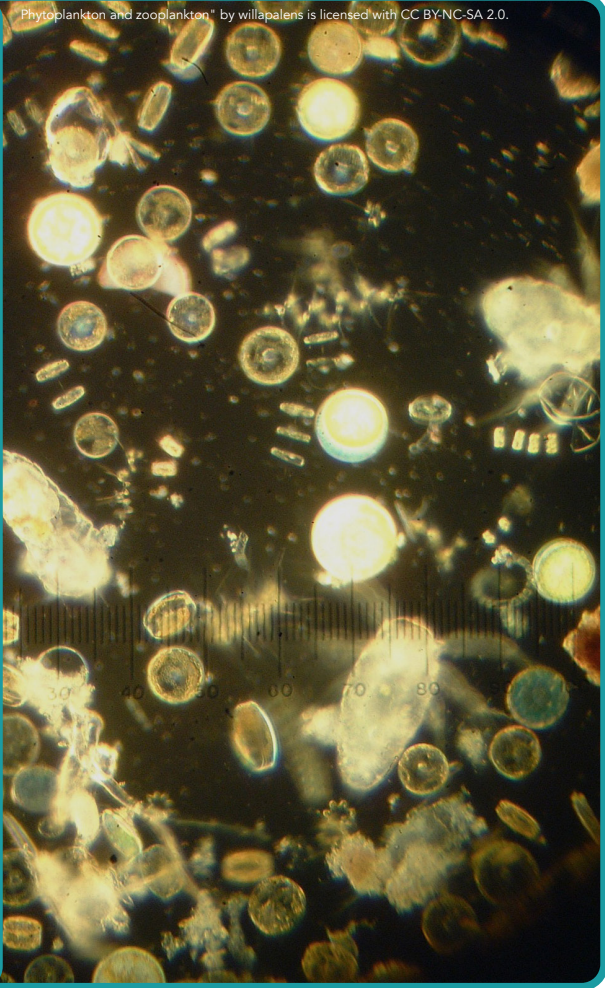
Before the lesson:

1. Print the species photos included for the food chains and a set of arrows. They are labelled S_FC_1.

In the classroom:

1. Either split the class into groups of four, or do the activity as a whole class, with four pupils holding the photos and the whole class deciding where they should stand.
2. Place the three arrows on the floor with gaps in-between. Give out the four photos from that food chain, get the pupils to put them into the right order.
3. There are six different food chains included based on UK marine species.

Phytoplankton



Phytoplankton and zooplankton" by willapalens is licensed with CC BY-NC-SA 2.0.

Shrimp



Crangon crangon (dorsal).jpg" by Hans Hillewaert is licensed with CC BY-SA 4.0.

Mackerel



Mackerel by wbaiv is licensed with CC BY-SA 2.0.

Grey seal



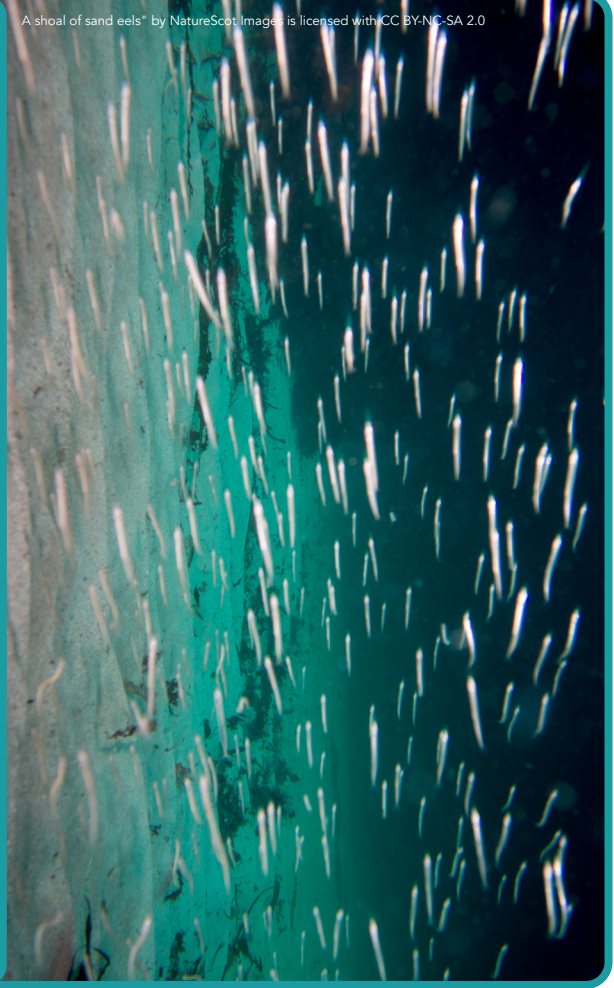
© Ben Porter

© NWWT



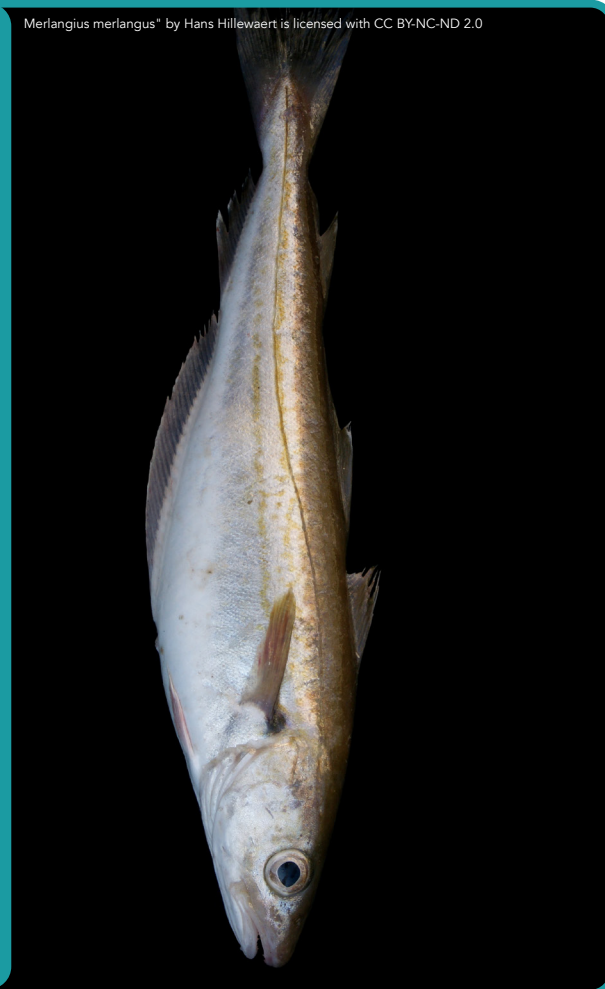
Seaweed

A shoal of sand eels* by NatureScot Images is licensed with CC BY-NC-SA 2.0



Sand eel

Merlangius merlangus* by Hans Hillewaert is licensed with CC BY-NC-ND 2.0



Whiting

© NWWT



Bottlenose dolphin

Seaweed



© NWWT

Sea urchin



Sea Urchin by gordon.milligan is licensed with CC BY 2.0

Crab

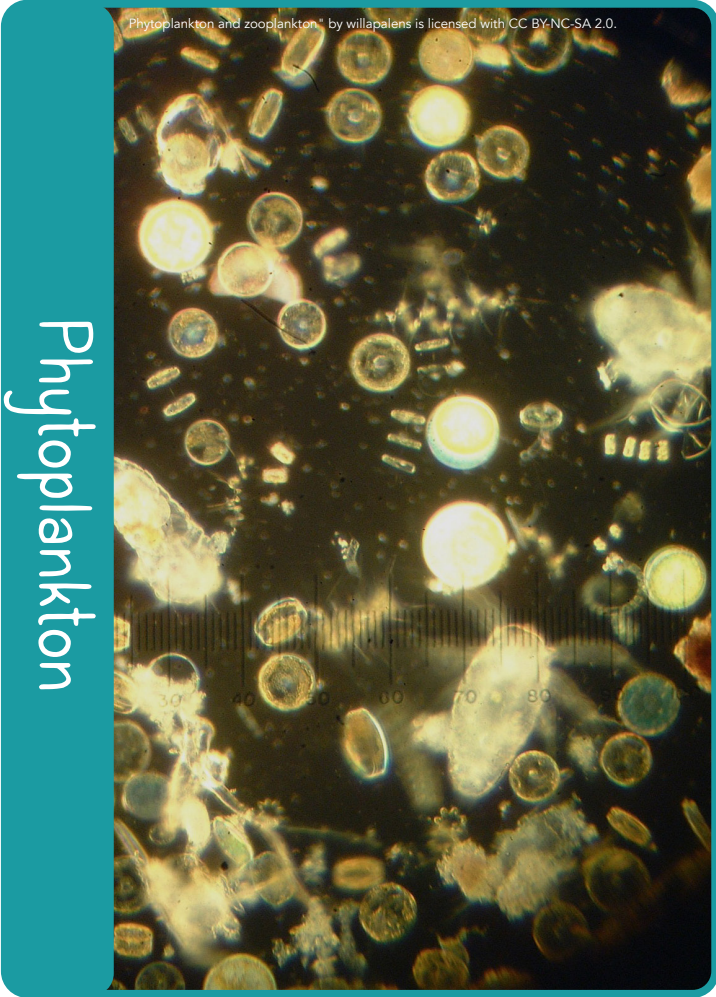


© Paul Kay

Cuttlefish



© Paul Naylor



Phytoplankton and zooplankton" by willapalens is licensed with CC BY-NC-SA 2.0.

Phytoplankton



© NWWT

Mussel



© NWWT

Starfish



"Herring gull - European" by naturallengland is licensed with CC BY-NC-ND 2.0.

Herring gull

© NWWT

Seaweed



A shoal of sand eels" by NatureScot. Images is licensed with CC BY-NC-SA 2.0

Sand eel



© Jamie Larke / NWWT

Puffin



Great Skua by Noel Reynolds is licensed with CC BY 2.0

Great skua



Algae



Culzean Castle, by byb64 is licensed with CC BY-NC-SA 2.0

Limpet



© NWWA

Wrasse



© Paul Kay

Bull huss



© Rohan Holt

Predator versus prey

15 - 30 mins



Activity guide:

Equipment required:

- Printed tokens
- Something to mark out the game area and the safe zone

Before the lesson:

1. Print the token page. They are labelled S_FC_2.
2. Set out the whole game area and the designated 'safe' area - this is the prey's habitat and they cannot be caught there because they are adapted to it and can find safe niches to hide in.
3. Distribute the plankton food tokens throughout the game area.

To play the game:

1. Pick 2 - 4 pupils to act as predators. The rest of the pupils are the prey.
2. The aim is for the pupils to collect as many plankton tokens as possible. They have to avoid being 'eaten' (tagged by the predators).
3. Set a timer for the game play and then start the game. The predators run around trying to tag the other pupils. If caught by a predator, the pupils move to the side and sit until the end of the timer.
4. Once the timer is up, all the 'prey' that survive come together and their plankton food tokens are counted. The one with the most wins. They have to have collected at least 3 - this is to demonstrate that the animals have to leave their safe hiding places to feed otherwise they would starve.

60 mins



Make a food chain

Teacher's pack

Topic: Food chain

KS: 2

Activity guide:

Equipment required:

- Print the 'Make a food chain' worksheet for all pupils
- Pencils or pens
- Books / resources and computers or tablets for independent research

Before starting the worksheet:

1. Introduce the idea of food chains to the class and share some examples. This could be done using the other two activities within the topic.
2. Introduce the idea of independent research and explain all the sources available.

To complete the sheet:

1. Each pupil spends time researching potential food chains in the marine environment.
2. The pupils then share their examples with the rest of the class. The lesson could be expanded by creating class food webs from any species in the pupils' food chain examples that overlap.

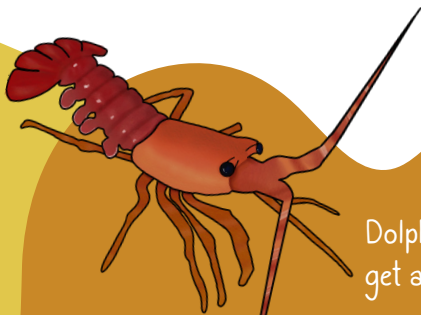


Make a food chain

Find out about food chains in the sea. Use the boxes below to draw in the plants and animals you have found out about to create two food chains. Write the organism's name and whether they are a herbivore, carnivore or omnivore.







Dolphins don't need to drink. They get all their water from their food.

Pollution

Topic: Pollution

Pollution

Introduction:

Pollution is the introduction of something into the natural environment that causes adverse changes.

Some pollution is visible whilst other types are not. There are many kinds of pollution that threaten the marine environment. This lesson will focus on just one - plastic pollution. This type of pollution provides a good example because the effects are so considerable and actions to combat it can be taken at an individual level.

Plastic enters the oceans in many different ways. Some gets into the sea from towns and industries far inland, getting washed into rivers and storm drains. Some comes from people leaving rubbish on beaches, whilst other plastic is dropped at sea.

Plastic pollution is a problem for many reasons. It can injure or kill animals through physical entanglement, it may be ingested, and chemical pollutants in the sea build up on the plastic making it toxic. Below are just a few examples of ways plastic is damaging marine life:

- Animals mistake plastic items for food. It fills up their stomachs so they can't eat anymore and end up starving to death.
- When a fishing net or pot is lost at sea it carries on catching animals - this is known as ghost fishing.
- Marine mammals and turtles need to be able to surface to breathe. If they get trapped in floating plastic they may drown.

Plastic pollution is a global problem. Ocean currents are continuously moving around the world, carrying litter from one country's shores to another. Here in Wales we often find plastic from North America and Canada, brought here by the Gulf Stream. Ocean currents can cause huge amounts of plastic pollution to build up in dense patches, in the middle of the ocean. These regions are called 'garbage patches'.

Everybody can help to reduce plastic pollution. Below are a few easy things to do:

- Avoid single use plastic when you can, for example always carry a refillable water bottle with you rather than buying bottled water. Bring your own shopping bags and use reusable straws.
- Never leave rubbish on the beach or river banks. Always dispose of it properly.
- Recycle everything you can.
- Take part in local beach cleans.
- Do not flush anything down the toilet other than toilet paper.

Further research keywords:

Great Pacific garbage patch, nurdles, lego on beaches, friendly floaties, micro plastic, anthropocene, [oceancleanup.com](https://www.oceancleanup.com), the Great British beach clean, microfibres, microbeads

Beach detectives

45 - 60 mins



Teacher's pack

Topic: Pollution

KS: 1/2/3

Activity guide:

Equipment required:

- Hula hoops
- Gloves
- Bin bags
- Litter pickers (optional)

At the beach:

1. Lay the hula hoops out on the beach.
2. Divide the class into groups. Go through safety briefing - see below for some points to cover:
 - Keep in sight of the adults at all times
 - Be aware of the tide changing
 - Always wear gloves
 - Do not pick up broken glass, needles or anything you are not sure of
3. Pupils collect as much litter as they can, then bring it back to the hula hoop area and sort it into different groups, by type e.g. bottles, bags, fishing equipment.
4. These groups are then used to start a discussion about what everything is, how it got into the sea and what could be done to improve the situation.
5. There is a sheet included in this pack with a few examples of what you might find and some interesting information about the items to help with the discussion.

45 - 60 mins



Beach detectives

Activity guide:

Below are some facts about the things on the beach clean to help get your discussions started.

		
<p>Nurdles - nurdles are small pellets of plastic. It is the raw material that companies use to manufacture plastic goods. They end up on beaches when containers are lost overboard whilst being shipped across the globe and washed downstream from industrial sites into the sea.</p>	<p>Wet wipes and sanitary products - these are flushed down the toilet, but the majority are made of plastic and do not biodegrade.</p>	<p>Fishing litter - most nets, boxes, tags, floats and lines used in the fishing industry are made of plastic. They can end up discarded in the sea where they could continue to capture marine life by accident - this is called ghost fishing. Look out for lobster tags from the USA and Canada, you can record the tag numbers and send them to the Marine Conservation Society.</p>
		
<p>Balloons - released accidentally or for charity events and memorials, they eventually burst and usually end up in the sea where they do not break down and are often mistaken for food.</p>	<p>Disposable BBQ and food packaging - often left on the beach by holiday makers.</p>	<p>Plastic packaging - sometimes you can find plastic packaging with old designs because the litter has been floating around the ocean for years and years.</p>

Coconut Crusoe

60 - 90
mins



Teacher's pack

Topic: Food chain

KS: 1/2

Activity guide:

Equipment required:

- Print the 'Coconut Crusoe' worksheet for all pupils
- Pencils or pens
- Scrap, practice paper or workbooks

Before starting the worksheet:

1. This works best if it is done after the beach detectives worksheet, but can also be done independently if some examples of beach litter are brought into the classroom and discussed beforehand.

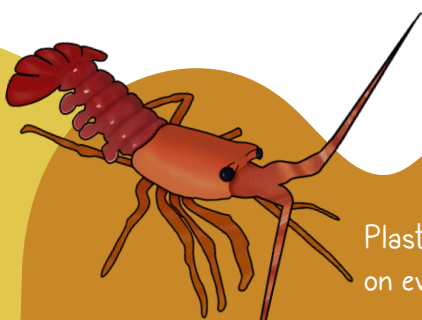
To complete the sheet:

1. Each pupil chooses an item of beach litter - either that they found on the beach or that was discussed in the introduction.
2. The pupils write a story about how the item reached Wales and think about all the different environments and species it would have seen on the journey.

Coconut Crusoe



A series of horizontal dashed lines for writing, consisting of 15 lines spaced evenly down the page.



Plastic pollution can now be found on every beach in the world.

The end.



For more information and extra resources please visit:
www.penllynarsarnau.co.uk
or email:
info@penllynarsarnau.co.uk

