MAKING MORE OF THE COAST

A project developed by Solway Firth partnership with support from Rotary International

Teachers Notes

Resource box

The Solway Sea Chest resource box includes artefacts collected from Dumfries and Galloway beaches that can be used to identify where litter on our beaches comes from, discuss solutions to the problem and develop ways to raise awareness and campaign for a change in behaviour. In the Sea Chest there is a Message in a Bottle activities booklet which details a series of 7 learning activities. There are also information sheets on the different artefacts included with these notes. These can all be found online at https://www.solwayfirthpartnership.co.uk/community/making-more-of-the-coast/

Background Information on Beach Litter

The Marine Conservation Society https://www.mcsuk.org/ocean-emergency/ocean-pollution/ runs beach cleans and gathers data that is used to campaign for change. A drop in litter levels can in part be attributed to single-use plastics bans and charges put in place across the UK. Marine Conservation Society data supported Scotland's banning of the manufacture and sale of plastic cotton bud sticks in October 2019.

The carrier bag charge, which was increased to 10p in April 2021 in Scotland, is another policy which has likely had a positive impact on Scottish beach litter levels.

Although plastic cotton bud sticks and carrier bags are not so common on our beaches plastic bottles remain a serious issue in Dumfries and Galloway.

Our seas are being choked by rubbish, our coastline is littered with plastic bottles. In 2018 the UK Government said it would introduce a deposit return scheme, but it has not yet been implemented.

- It is estimated that **8 billion drink bottles and cans** were sent to landfill, incinerated or lost on land or sea in 2019
- Marine Conservation Society supporters have collected rubbish and surveyed their findings - over the last 5 years **an average of 45 drinks containers were found on each 100 metres of beach they cleaned** around the UK
- We need our governments to protect our ocean, our beaches and the precious marine wildlife found there
- A deposit return scheme would help to ensure that at least **90% of bottles and cans are collected**, reused or recycled
- It needs to be comprehensive, simple and consistent to work and it must include plastic, aluminium and glass

1,531 Marine Conservation Society volunteers cleared and surveyed a total of 15,575 metres of Scottish beach during a week in September 2021 as part of the Great British Beach Clean. Throughout the week, they filled 592 bags with litter, weighing 2,002kg.

Here's what they found:

- 346 items were found on average per 100 metres; with the average dropping over the last five years.
- An average of 10 **plastic cotton bud sticks** were recorded, dropping 50% from last year.
- An average of three **single-use plastic shopping bags** were recorded for every 100 metres of beach, dropping from an all-time high of 17 recorded on Scotland's coast in 2013.

- 70% of Scottish beach litter collected made of **plastic or polystyrene**. An average of 101 plastic or polystyrene pieces were found for every 100 metres of Scottish beach surveyed.

Every beach is different but an overview of debris on Scottish beaches has been summarised by the Marine Conservation Society.

The debris collected was also analysed to establish the source of litter found on beaches demonstrating that a significant much of what we find has come from the land and washed into the sea.

In Dumfries and Galloway the litter on our beaches is often made up of materials that float and have washed down rivers, gathered by the Irish Sea and then transported by wind and waves on to our beaches. The prevailing south westerly winds mean that bays that face to the south-west generally have much more debris than beaches that face towards the east.

A project called Scrapbook Scrapbook Project | Moray Firth Coastal used aerial photography to survey beaches around Scotland. The map on this site demonstrates that remote south-west facing bays are the places where most debris is washed up.

Solway Firth Partnership website www.solwayfirthpartnership.co.uk/environment/marine-litter/ has more information about marine litter including an interactive map showing where community volunteers are cleaning beaches https://www.solwayfirthpartnership.co.uk/environment/beach-cleans-along-the-solway/

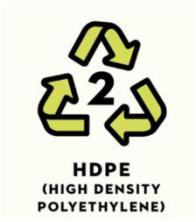
Recycle the final option

Most single use water bottles are made from petroleum derived polyethylene terephthalate (PET) which is one of the easiest plastics to recycle and can be made into many products including fleece jackets, carpets and more bottles.

Deep River Rock is a brand launched in 1994 and owned by Coca-cola. The water is sourced and bottled in Co. Antrim and is sold throughout the island of Ireland. The brand has invested in 100% Recycled Bottles and markets it as proudly supporting a sustainable future. However, even recycled water bottles are discarded carelessly by users and are washed out to sea. The Irish Sea gathers floating plastic and sends it towards the Dumfries and Galloway Coast. More brands are demonstrating their commitment to sustainability by using recycled plastic in their products. Remember Recycling should be the final option after first considering Refuse, Reduce, Reuse and Refill.

Dumfries and Galloway kerbside recycle: ✓

Traced from source

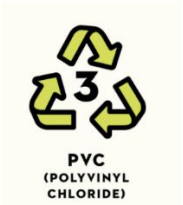


Most single use milk bottles are made from high-density polyethylene (HDPE) a thermoplastic polymer made from petroleum. It is one of the most versatile plastic materials and is widely recycled. The recycling process involves collection, sorting, cleaning, shredding before being made into plastic pellets, known as nurdles, which are then used to make new plastic products.

Milk is often distributed to local markets and the providence is promoted on labels. Milk containers that have retained their labels provide an accurate method of tracing the source of debris on the beach. Milk bottles found on Dumfries and Galloway beaches can be traced to Scotland, England, Ireland and the Isle of Man.

Dumfries and Galloway kerbside recycle: ✓

Race escapees

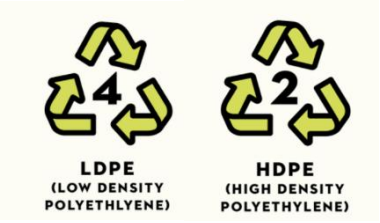


PVC (polyvinyl chloride) and V (vinyl) is cheap, tough and weathers well, so is commonly used for toys as well as shampoo bottles, bubble wrap and piping. PVC and V is difficult to recycle but some is done in specialist facilities.

Plastic ducks found on the strandline provide clear evidence that much of the litter found on Solway beaches is washed down to the sea in rivers. Duck races are a popular fund-raising activity but sometimes the ducks escape recapture. A rash of yellow ducks found on our coast with “World Record Duck Race Ireland 2006” printed on their chests were some of the 150,000 ducks launched into the River Liffey, Dublin. They were washed into the Irish Sea eventually arriving in Dumfries and Galloway and some travelling as far as Norway where plastic waste washed up on beaches often originates from Scotland! Plastic ducks accidentally lost from a container ship in the North Pacific have been used to understand ocean currents and the spread of plastic across the world.

Dumfries and Galloway kerbside recycle: ✗

On target



Shot guns are used for country sports or pest control. The plastic casings are generally made from low density polyethylene (LDPE), the same plastic commonly used for plastic bags. The internal wads are made from high density polyethylene (HDPE). Both cases and wads are often discarded on land and frequently found on beaches. Gun clubs and game shoots are aware of the environmental hazard caused by plastic pollution and are seeking ways to dispose of cartridges in a responsible way.

The term wad refers to an internal part of the cartridge that separates the shot from the powder and contains the shotgun shot. The wad leaves the gun along with the shot and is more difficult to retrieve than the cartridge casing that remains in the gun. Efforts are being made to phase out plastic wads and replace them with biodegradable materials.

Put a lid on it

Polypropylene (PP) is used to make most plastic bottle lids but is usually different this material from the plastic used to make the bottle. This used to cause problems at the recycling plant where it is important to separate plastics to be recycled. For this reason, we were asked to remove lids before recycling, however most recycling plants including Dumfries and Galloway, now separate the different plastics as part of the process (shredded bottles float in water while the shredded caps sink).

Bottle lids are used to promote plastic recycling often printed with a message or the three arrows of the international recycling symbol. The symbol was designed in the 1970s when students across the USA were challenged to design something that would raise awareness of environmental issues.

Dumfries and Galloway kerbside recycle: ✓

Caught by the wind

Polystyrene can take several forms including a clear brittle plastic (CD disc cases) or foam plastic (take away food containers) or expanded (packaging). Polystyrene is difficult to recycle and is usually not accepted in recycling depots.

A cigar-shaped float is the commonly used float on rocky shores in sea fishing and allows the angler to adjust the depth of the hook and bait. It consists of a tubular float, usually between 100 and 200mm in length, which can have line passed through it. Usually made from expanded polystyrene, the same material frequently used in packaging, it is the perfect material for a float. The buoyancy of lost angling floats means they are often caught be the wind and thrown high up on our beaches. Expanded polystyrene is made up of small balls and when it breaks up these balls, often mistaken by marine life as food, and releases hazardous toxins into the ocean.

Dumfries and Galloway kerbside recycle: ✕

Sticky problem

Thousands of plastic cotton bud sticks were flushed down toilets every day instead of being put in the bin. They were generally made from polypropylene (PP) and their shape and size meant they passed through most sewage treatment works and washed out to sea. The plastic sticks float on or near the surface of the sea and became one of the most common finds during beach cleans.

To halt the habit of flushing cotton bud sticks down the toilet a change in behaviour was required. However, an alternative solution was identified - change the material cotton bud sticks were made from. Working with manufacturers a change to card sticks was proposed because it is a material that would break down before reaching the sea. Some companies began to make changes preventing some sticks from reaching the sea and paved the way to legislation to ban the manufacture and sale of plastic cotton bud sticks. In the future there will be less cotton bud sticks on our beaches.

Toxic nurdles

The raw materials for manufacture of most plastic items are transported round the world as small plastic pellets. A vast number of pellets are used every year to make plastic products but during the process many are lost and are washed into seas and oceans sometimes ending up on our shores. These pellets are known as nurdles and are a hazard to wildlife because they are persistent, potentially toxic and float near the surface of the sea and are mistaken for food.

Both on beaches and in the sea the pellets are almost impossible to capture and remove. The solution requires companies making, transporting and using pellets to ensure they are not lost into drains, rivers and oceans. Simple actions such as improved procedures to prevent spills and fitting filters to drains will limit the loss of nurdles in Scotland, the UK and worldwide.

Find out more by looking at the Great Nurdle Hunt webpage.

Balloon heartbreak

Latex balloons are associated with celebrations of all kinds and despite being biodegradable they are still a problem in our seas. At best a free flying balloon becomes litter; at worst it harms wildlife. A latex balloon takes at least 2 years to breakdown – plenty of time to injure wildlife. Bobbing along on the seas surface a discarded balloon can be mistaken as a jellyfish by a leatherback turtle that has migrated great distances to arrive in the Solway in the search of its main food source.

Beach clean ups don’t solve the problem but can be used to draw attention to the issue and help drive positive change. Earlier this year the releasing of helium balloons outdoors was banned on the Isle of Man and many Local Authorities (but not Dumfries and Galloway Council).

Dumfries and Galloway kerbside recycle: ✕

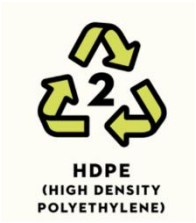
Don’t let go!

Foil balloons look fun at a birthday party but are not much fun when it comes to recycling. They are made from a polyester film of stretched polyethylene terephthalate (PET) and coated with a metal foil that make them look bright and shiny. Because these balloons are made up of a mixture of materials they are very hard to recycle. To add to the problem balloon ribbons are also usually made from a type of plastic called polypropylene (PP) which is strong and long lasting. Wildlife can easily get tangled up in ribbons and die.

To make sure that balloons do not end up in our seas it is very important that you please remember **DON’T LET GO!!**

Dumfries and Galloway kerbside recycle: ✕

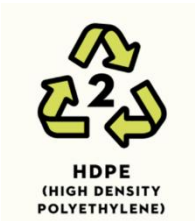
Versatile boxes



Fish boxes are a common find on the Dumfries and Galloway coast. Very robust and often brightly coloured a pile of fish boxes give the impression that commercial fishers are responsible for much of the debris on the beach when the majority of plastics originate from the land. Made from high-density polyethylene (HDPE) it is a plastic that is widely recycled. Fish boxes found on beaches are rarely recycled and despite being marked “No Unauthorised Use” they are often repurposed, from plant propagation to tool storage they have many uses.

Names on boxes suggest most found on our shore have been lost from Irish fishing vessels but occasionally they have come from further afield. This fish box from a fish auction in Zeebrugge, Netherlands and it is unlikely that sea currents have delivered it to the Galloway shore. It probably hitched a ride on a trawler in the Irish Sea before being lost overboard.

Fish Nets



Rope and fishing net can be made from a combination of different materials making then difficult to recycle. However, most netting found on the shore is green trawl net made from high-density polyethylene (HDPE) which is strong enough to haul fish into a boat. Although the plastic is easy to recycle net and rope made from HDPE is not accepted at most recycling plants because it gets tangled up in machinery causing breakdowns and delays.

Large nets lost in oceans can drift as ‘ghost nets’ and catch marine wildlife. Fortunately, large nets are not a common find on the Dumfries and Galloway shore but small pieces of net and rope are frequently found on the strandline.

Gill nets are made up of a fine nylon mesh usually hanging from a series of small floats. Invisible to fish they swim into the net and get caught by their gills giving the net its name. The mesh becomes easily tangled and washes up on the beach as a ball of mesh and floats.

Toothbrush mystery

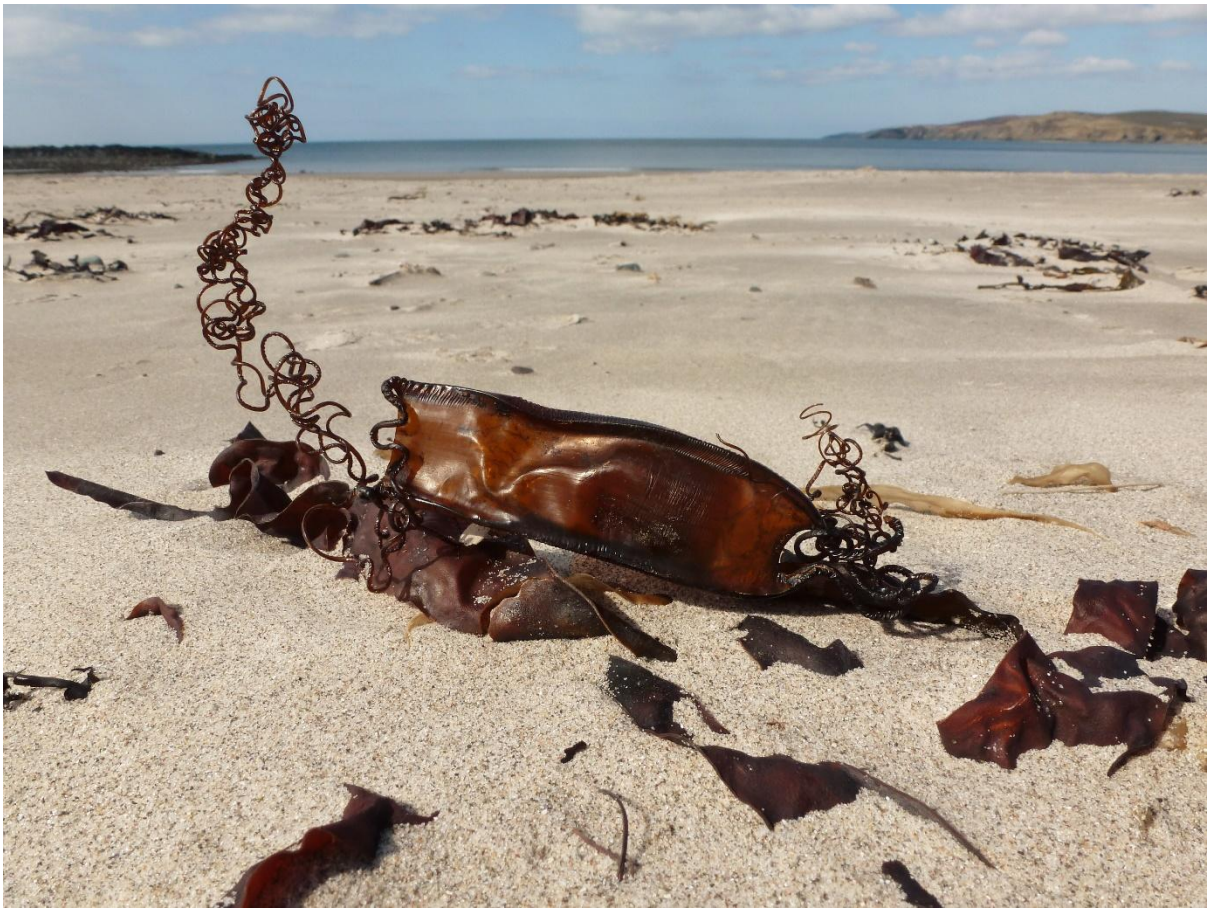
Toothbrushes are a surprisingly common find on the beach but it is a mystery how they get into the sea in the first place. They are usually made from plastic including nylon bristles and a synthetic rubber grip. Because they are made from a composite of different types of plastic and hard to break apart, they are difficult if not impossible to recycle.

A single person uses 300 toothbrushes during their life time (an average of four toothbrushes per year) which produces 5.5kg of plastic waste.

Other items that have a short lifespan and are made of a composite of different types of plastic including dummies and some toys!

Dumfries and Galloway kerbside recycle: ✕

Empty purses



The egg cases of sharks and rays are anchored to the seabed by spiral tendrils, or curled horns, until the tiny fish hatch and the empty leathery pockets drift onto the strandline as mermaids' purses.

Different egg laying sharks and rays have distinctly shaped egg cases. Black, square-shaped cases with horns in each corner belong to rays. Small black or golden rectangular cases with tendrils are produced by the dogfish, or cat shark. Similar in shape but more than twice as big and sturdy in construction is the egg case of the Bullhuss, or Nursehound, which migrates to shallow water to lays its eggs.

Find out more about egg cases by looking at The Great Egg-case Hunt page by the Shark Trust which includes information on identification.

Sailor’s sponge

Like balls of yellow or white bubble wrap on the strandline they are often known as sailor’s sponges. In fact, they are clusters of empty common whelk egg cases.

The common whelk is a scavenger that lives on the sea floor. They gather together to lay the eggs and each ‘ball’ often consists of egg cases produced by several individuals. Each capsule contains thousands of tiny eggs however, only a few snails nibble a hole in the egg case to crawl away because the first snails to hatch dine on their siblings!

Common whelks are caught in pots off the coast of Dumfries and Galloway and is mostly exported to the far east where it is a delicacy.

Buoyant seaweed

Knotted wrack or egg wrack has long leathery fronds with egg-shaped air bladders that help keep the seaweed nearer the surface of the sea to be nearer to sunlight. Varying from dark olive green to pale brown it turns black when it is dried. It grows one bladder each year and may live for many years. This seaweed thrives in sheltered rocky shores where it grows mostly in the middle shore.

Seaweeds are a group of simple, plant-like marine organisms called algae. They come in an amazing variety of shapes, sizes and colours and many common seaweeds are easy to identify.

Find out more about seaweeds by looking at The Big Seaweed Search run by the Natural History Museum which includes information on identification and recording finds.

Driller killer

Seashells are a common find on the beach. They are the exoskeletons of molluscs such as snails and clams and made from calcium carbonate – the same material as chalk. Seashells grow to accommodate the growing creature by adding material at the margins.

Dog whelks (top) are common on rocky shores and although they are usually white, they can also be found in colours ranging from black to orange and sometimes have stripes too. Their shape is influenced by where they live - longer and thinner in sheltered bays and rounder on exposed shores. They feed on barnacles and molluscs by using a file like tongue to drill a hole through their shells. It injects enzymes to digest the prey within the shell and then sucks out the resulting ‘soup’!

Mussel shells (bottom) with holes in them have been eaten by dog whelks.