

SOLWAY SHORE ACTION



MEASURING MARINE LITTER

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Introduction

The broad aim of the Solway Shore Action Project supported by the Scottish Government's Marine Fund Scotland was to encourage positive action contributing to over 200 miles of cleaner coast in Dumfries and Galloway. One of the objectives of the project was to improve data collection of marine litter removed by volunteers and analyse data to understand type and sources of marine litter. Recording the type and source of the debris helps build up a picture of where marine litter originates and informs discussion about possible solutions.

Measuring marine plastic

Data gathered by the project has measured weight of debris rather than abundance. The effort put into beach cleaning in Dumfries and Galloway in the 2024/5 project exceeded previous 202/24 and 2022/23 projects (61 / 49 / 45 beach cleans, 732 / 608 / 613 volunteers, 31 / 22.3 / 21 miles) the weight of debris removed is higher than the previous year but continues to be lower than 2 years ago (9 / 5.6 / 10 tonnes). The increased weight removed was skewed by a small number of previously uncleaned beaches being tackled and masks the general trend for smaller amounts of debris removed at previously cleaned locations. The smaller amounts of debris removed at many beaches was a result of volunteer effort to remove marine litter faster than it is washed up.

To achieve an overview of marine litter types and likely sources of beach debris, they were identified using observations by beach cleaners and logging where and when items from far off places were found. It is clear from our observations and discussions with beach clean groups from other parts of the UK that the type of debris washed up was highly variable from beach to beach and at different times of the year.

Detecting sources of either the exact location plastics enter the sea and those industries or individuals responsible for it is difficult to ascertain. The most common debris on the shore was small unidentifiable scraps of plastic produced by weathering and fragmentation of larger items and were classified as non-sourced. For larger unbroken items it was often possible to distinguish between likely consumer, fishery or agricultural sources.

Beaches on the Dumfries and Galloway coast usually have a large proportion of single use plastic bottles and caps. A trial collection and analysis of single use bottles gathered four months after a beach clean was undertaken to explore the potential for gathering detailed information on age and source of recently arrived marine litter.

Plastic trackers

Trajectory models have been developed by scientists in recent years to accurately simulate the drift of buoyant marine plastic using wind and wave data in addition to ocean current data. An accesible plastic tracker map on the Ocean Clean Up website was used to help identify the likey source of plastics found on our beach cleans.

Source of plastic

Consumer litter

Marine litter stemming from land-based activities is thought to originate mainly from populated coastal areas, although it was likely that some will come from vessels in the Irish Sea including ferries, container ships or fishing boats. Consumer litter mostly consists of small low density items such as packaging and with generic products available in many places it was difficult to identify a source.

Small items are usually over-looked by beach cleaners, but larger items are eye catching and easier to identify the providence. Examples found included:

- Refuse and recycling bins that come from the Isle of Man, Northern Ireland and Wales.
- Distinctive balls from games in Ireland including Gaelic footballs and sliotars used in hurling.
- Milk containers that have retained their labels providing an accurate method of tracing the source of debris on the beach. These were traced to Scotland, England, Ireland and the Isle of Man.
- Single use bottles for water and soft drinks from an identifiable source with some appearing to have come from far away. Bottles were identified from China, South Africa, Turkey, Argentina, Belgium, France and Spain. Most of these bottles were thought to have been discarded from passing cargo ships that had stocked up with bottled water at a foreign port.



Sliotar from Ireland.

Fisheries litter

Robust plastics used in the fishing industry were noticeable because of their large size and bright colours. Commercial fishing debris was common on the Dumfries and Galloway coast but was mostly made up of small offcuts of rope and net, in contrast with other places on the west coast of Scotland, large nets and long rope are relatively rare. The exception was on beaches that are inaccessible where many fishboxes have built up over the years. Fishboxes often have details of owners printed on them but these have not been recorded during beach cleans.

Regulations requiring labeling of fishing gear for creel fishers means that the owners of lost items could often be identified. Buoys from the Isle of Man, NW England and Wales were common finds and along with recovered creel parts which were usually donated to local harbour masters to distribute to local fishers.

Robust buoyant plastics from lobster and crab traps can travel great distances and although not common they did provide evidence of the journeys undertaken. Recent finds included top entrances from Florida, ownership tags from Rhode Island, licence tags from Nova Scotia, escape hatches from Maine and bait jars from Newfoundland.

Crates and lids from Spain that are used in the shellfish industry were common finds.



Bait pot from Newfoundland.

Agricultural and countryside sports litter

Debris associated with farming practices and countryside sports were commonly found. Items including livestock mineral containers and shotgun cartridges and plastic wads. No research was undertaken to identify where the items collected on beach cleans had originated, however anecdotal evidence suggests these plastics wash off the land into rivers and then become marine litter.

Satellite trackers

Occasionally items used for gathering scientific data on ocean currents or meteorological conditions have been found on the shoreline. A tracker buoy was recovered and the journey it took in the Irish Sea shared by Bangor University. A Vaisala radiosonde weather sensor was also recovered from the Machars coastline.



Tracker buoy released by Bangor University.

Bottle survey

Single use plastic bottles and caps are one of the most common items collected on beach cleans and if the labels are still attached and use by dates are still legible the source and age can be recorded.

A closer look was taken at the bottles washing up at a beach on the Dumfries and Galloway shore. All bottles along a 1km length of beach between Ardwell Bay and Saltpan Cottage were removed on 10th October 2024. On 6th February the beach was revisited and the bottles collected were taken away for analysis.

One hundred and eleven bottles were gathered during the February beach clean and analysed to record type of plastic and cap type / brand and type of beverage / source / age.

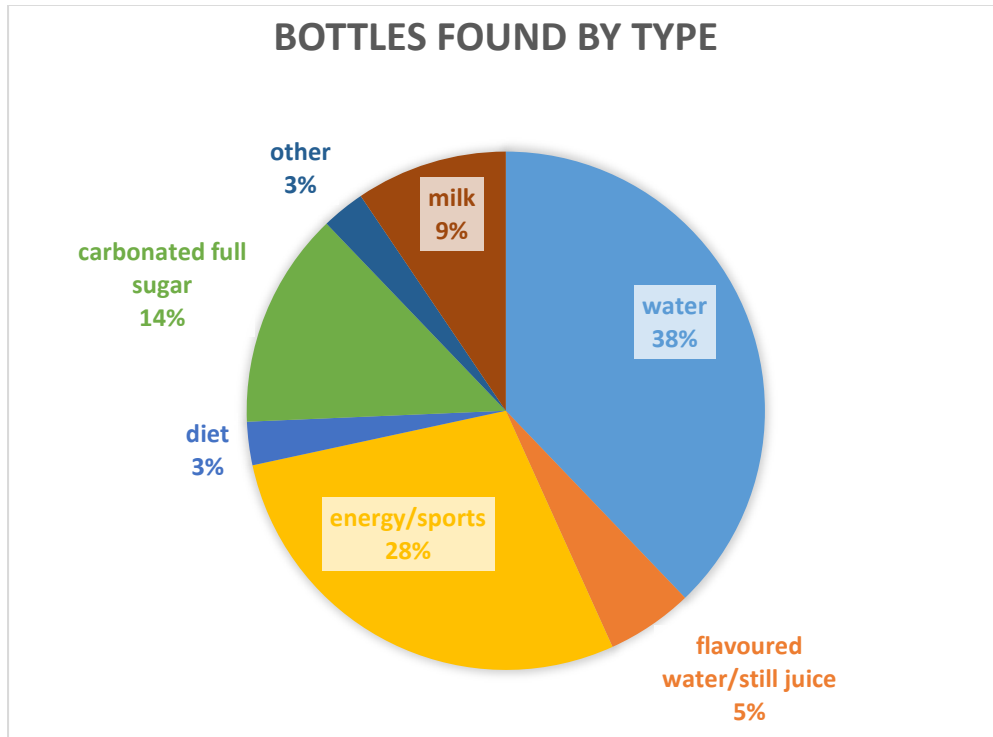
Type of plastic and cap type

95.5% (106 number) of the bottles collected were PET (Polyethylene terephthalate) with the remaining 4.5% (5 number) bottles made of HDPE (High Density Polyethylene).

93.5 % (104 of the 106 number) PET bottles had caps retained. 1.8% (2 of the 5 number) HDPE bottles had caps. 12.5% (14 number) had tethered caps.

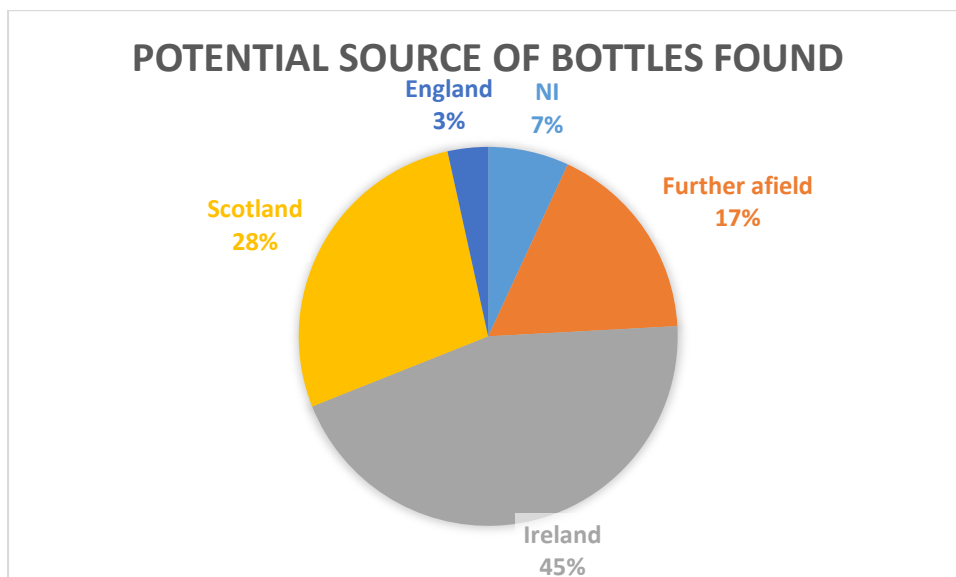
Brand and type of beverage

Where the drink type could be identified it was found that 43% were water / flavoured water, 17% soft drink, 28% energy drink (high caffeine and sugar content) and 9% milk / flavoured milk / protein drink. The distinctive shape of many soft drink bottles means many of the unidentified bottles are likely to be for water. The brand of drinks was identified for 70 bottles (63% of those found). Although many brands are universal, some have a restricted distribution.



Source

Of the identified sources 5 bottles (17%) were identified as coming from far off countries including China, Turkey and Belgium, however they did not show signs of wear and tear and are unlikely to have travelled any great distance. 15 bottles were from Ireland / Northern Ireland (45%).



Age

38.5% (43 number) of the bottles had recent best before dates (2024 – 2026). 6.5% (7 number) had best before dates of 2023 or earlier and bottles with no discernable best before date due to wear likely to predate 2024.



Single use drinks bottles – energy drink from Ireland.

Survey summary

Evidence from a single survey rarely provides all the information required to draw conclusions, however the initial results do raise some topics for further investigation.

Most bottles had caps on. HDPE (High Density Polyethylene) is less dense than water and will float with or without cap attached. However, drinks bottles are usually made from PET (Polyethylene terephthalate) which is denser than water and tends to sink to the bottom of the sea. PET bottles with caps on, either filled with air or liquid, will float and are more likely to be washed up on our beaches. In the summer of 2024 EU policy came into force requiring plastic bottles to have tethered caps with the aim of reducing single use bottle cap waste. In the UK many manufacturers found it easier and cost effective to use the same design. An unintended consequence of this new policy is for more discarded bottles to retain caps leading to more bottles washing up on the coast.

The source of most bottles was difficult to ascertain either because most brands are available in all the countries around the Irish Sea or labels were missing. A small number of bottles could be traced to countries far away and are believed to have been discarded from passing cargo ships that have stocked up with bottled water at a foreign port. Some brands are distinct to Ireland including Riverrock water and BPM energy drink. A Deposit Return Scheme was

introduced in Ireland on the 1st February 2024 which may reduce the number of single use bottles being discarded and ending up on a beach.

The bottles collected were known to be recent arrivals on the beach because a beach clean had taken place 4 months earlier. The majority of the bottles appear to predate 2024 which means that they have taken over a year to be washed up on this beach. Perhaps these older bottles have been floating in the sea for more than a year or have been washed up on other beaches before being relocated by stormy seas.

More research is needed to identify trends in single use plastic bottles we find on our beaches and discover the impact of recent policy change. Will the Deposit Return Scheme in Ireland lead to a fall in Irish bottles or will tethered caps mean more bottles remain buoyant and so get washed up on our beaches?

Recommendations

- Continue to log items for far off countries found on beach cleans.
- Investigate potential beaches to trial micro litter sampling
- Collect and analyse single use bottles collected from quarterly visits to beaches to establish annual changes and trends.
- Identify beaches and set up trial for a detailed 'deep dive' survey to analyse all items collected.
- Investigate the potential of working with academic partners.