

The Big Microplastic Survey



Resource Pack

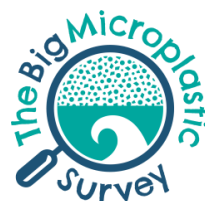
Introduction

Thank you for registering your interest in The Big Microplastic Survey. Microplastics are one of the biggest issues facing the oceans at this time. They are having an impact on marine animals, ecosystems and ultimately human health.

In order to be able to do something about this problem we need to know where the microplastics are, how much there is and what type of plastic it is. There are already lots of scientists undertaking research around the world finding out more and more information about microplastics everyday. However, the issue is so big that they cannot do it alone. That is where you come in.

Undertaking a scientific microplastic survey is easy and most of the things that you need to do it are everyday household items. This resource pack will provide you with guidance on how to undertake your survey, how to analyse the data and what to do with the results.

By taking part in this survey you are adding valuable and important research data that will enable us to expand our existing knowledge of the issue and hopefully bring about change in the future. On behalf of Just One Ocean and the University of Portsmouth, thank you for your support.



What are we looking for?

For this citizen science project we are interested in plastic pieces that are in the 'micro' and 'meso' range:

Microplastics: plastic pieces less than **5mm in size** (we are interested in microplastics between 1 – 5mm).

Mesoplastics: plastic pieces **5mm to 25mm in size**.

If your piece of plastic is bigger than 25mm in any dimension please do not include it.



Why have we selected this size range?

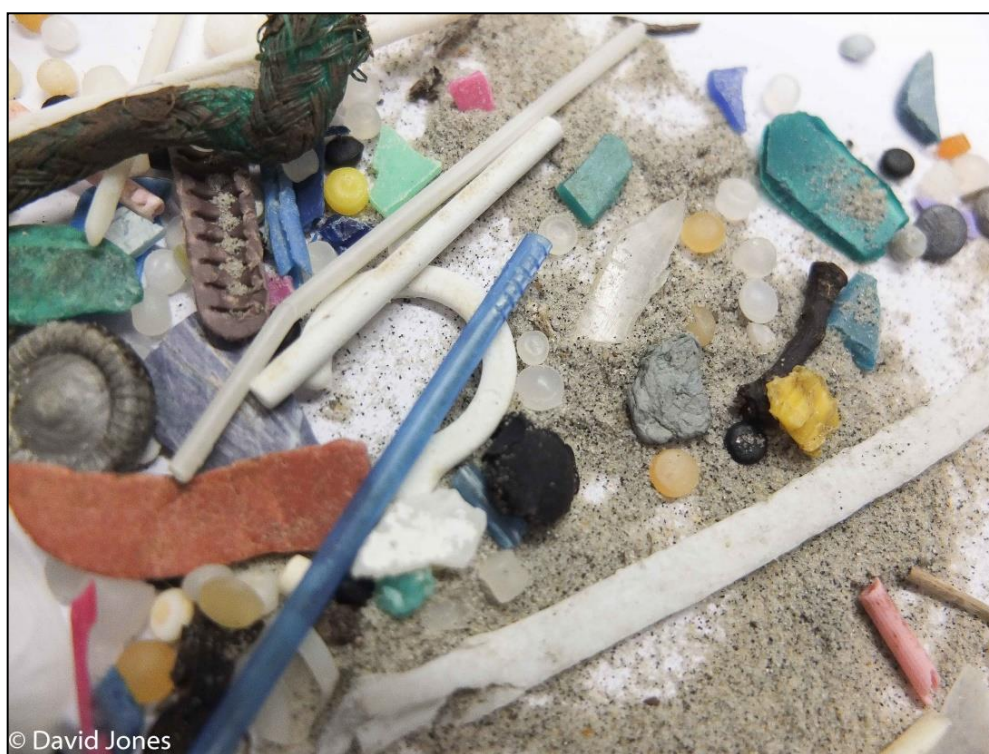
- We can see it without any special instruments, although a magnifying glass can help with the analysis.
- The majority of household kitchen sieves have a 1mm mesh approximately so that makes life easier.
- It is the size range that is most readily ingested by seabirds and other marine animals.

Primary and Secondary Microplastics & Mesoplastics

The plastics we are looking for can be divided into two main groups, primary and secondary. You may find both types during your survey.

Primary plastics are those items that are manufactured to be small in the first place.

Secondary plastics started life as something big, but have broken down over time, becoming small often unrecognisable pieces.



A typical mix of primary and secondary micro and mesoplastics

Things that may look like plastics:

Some things may look like plastics but are not. These include:

- Wax
- Charcoal
- Latex (balloons)
- Paper/card

Please do not count these in your survey.

Microplastics Guide

Primary Microplastics

Spherical Nurdles

Majority are clear/opaque but they can be different colours. They often show signs of contamination indicated by a yellowing in colour. Smooth sided, no straight edges. Often not perfectly spherical due to erosion.



Cylindrical Nurdles

Distinct cylindrical shape, smooth sides and flat ends without ridges. Come in a variety of colours. Should not be confused with bio beads (see bottom of page).



Disk Shaped Nurdles

Look like flat disks or lentils. Come in a variety of colours. Some are smooth while some have a small indentation in the centre.



Cube Shaped Nurdles

Mostly clear/opaque, often yellowing from contamination. Often not a perfect cube shaped, sometimes more rectangular or with irregular shaped edges. Defined corners.

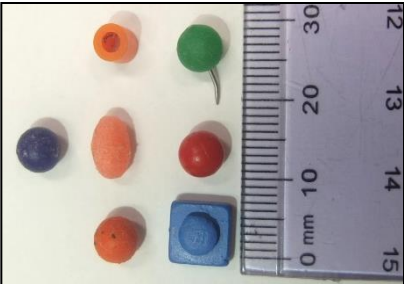






Bio Beads

Look very similar to cylindrical nurdles, except the sides have very distinct thin ridges, making them look like they have been squashed. Can come in a variety of colours but are mostly black or grey.



Microplastics Guide

| | | |
|-------------------------|---|--|
| Primary Microplastic | <p>Other Primary Microplastics Other pieces of plastics that are primary (made in a small size and intact), for example fishing beads, and small Lego.</p> |  |
| Secondary Microplastics | <p>Expanded Polystyrene (EPS) Soft balls of polystyrene, or pieces from cups and packaging. Very soft and compress under pressure. Often look flat. EPS balls = a single ball (round or flat). EPS piece = two or more balls joined together, or any larger piece.</p> |  |
| | <p>Secondary Microplastics (1 – 5mm) Fragments of larger items. Can be any colour. Not recognisable as a particular object. Often irregular and angular shape.</p> |  |
| Mesoplastics | <p>Primary Mesoplastics (5 – 25mm) Recognisable and whole items. For example, bottle tops, rawl plugs, toothpaste caps, bottle rings.</p> |  |
| | <p>Secondary Mesoplastics (5 – 25mm) Pieces that have broken off from something bigger. They have irregular shapes, very often angular. Found in a variety of colours.</p> |  |

When & where should you survey?

Whilst we would love to have samples from every beach and shoreline, it is very difficult to sample in rocky areas and on pebble beaches. We recommend that you stick to sand and small gravels.



Sands and light gravels are easy to survey



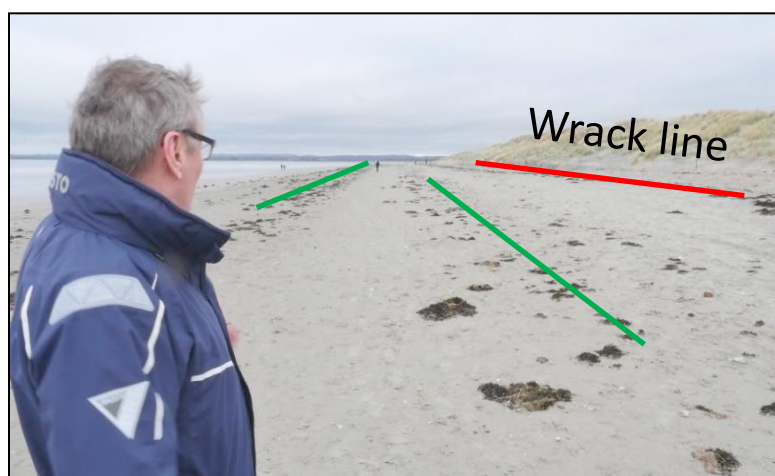
Pebble beaches are hard to survey

We recommend that you undertake your survey on an **outgoing tide**.

This is the safest time because there is less risk of being caught out by the tide, and you will also be able to see various **strandlines**.

Strandlines are areas of the beach where successive high tides have deposited seaweed, other organic debris and of course, microplastics.







The best place to survey is the highest strandline, also known as the **wrack line**.



Looking at the various strandlines on a beach

Survey Equipment

The survey has been designed to enable people to be able to undertake their own data collection without expensive equipment. The following is suggested:

| | |
|--|--|
| <p>1m 'square' of rope, or thick string (4m length in total). This is to map out the sample areas, and create a 'quadrat'. Tent pegs or something similar (e.g. stones) are useful, to peg the corners.</p> |  |
| <p>Two buckets, or containers, preferably light coloured, making it is easier to see the floating microplastics.</p> |  |
| <p>10cm square template. You can make these out of all sorts of things including sticks tied into a 10cm x 10cm square or a 10cm x 10cm square cut into cardboard.</p> |  |
| <p>A kitchen sieve. Sieve mesh needs to be approximately 1mm in size.</p> |  |
| <p>A spoon. This is for scooping out sediment and mixing in the bowl.</p> |  |
| <p>A container for microplastics. This is so you can take your plastics home to sort them.</p> |  |

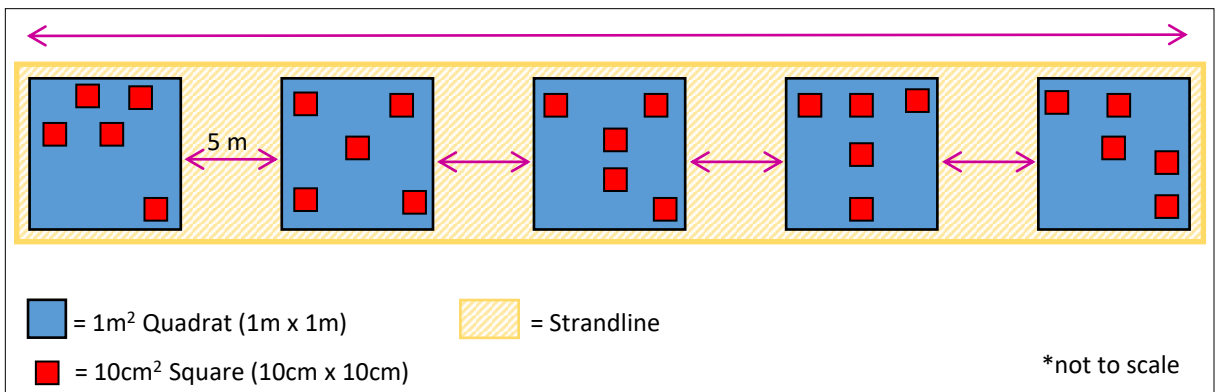
Survey Techniques

Although there are many scientists undertaking surveys around the world, there is very little consistency between the methods being used. We have designed a systematic survey and sampling method that provides a representative sample that can be easily replicated. This means that **results** from **anywhere in the world** can be **compared**.

What makes up one survey?

One survey is made up of 5 x 1m² quadrats (blue square). Within each quadrat you need to take 5 x 10cm samples (red square).

Quadrats should ideally be 5m apart. A diagram explaining the process is shown below*:



As shown in the diagram above, one survey = 25 individual 10cm² samples.



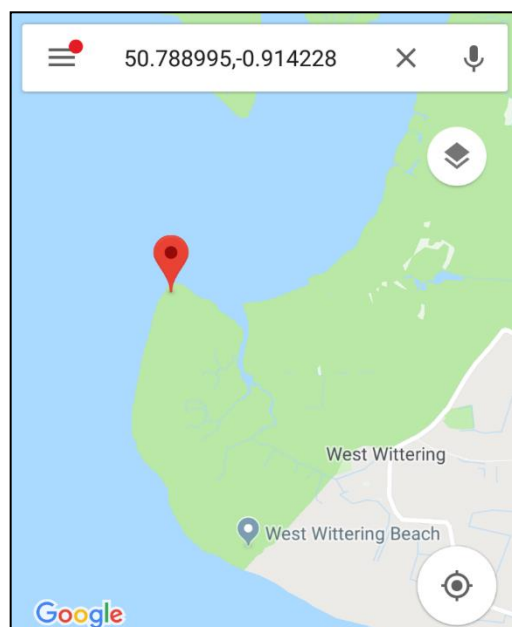
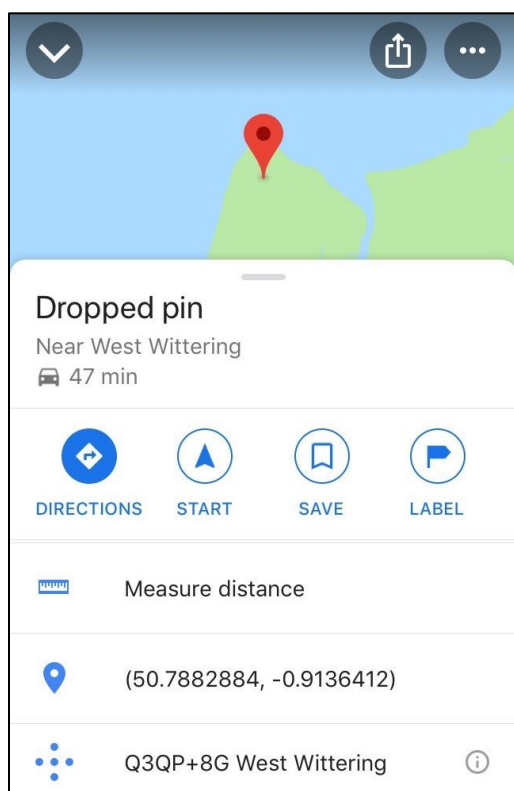
Before starting the survey

Identify your start point.

It is important that we know where you are doing your survey so that we can add it to our map.

Decide where you are going to start your survey. Remember that you want to be able to survey a 25m stretch of shoreline so make sure you have enough space.

Then you need to find the coordinates of your position. If you have a GPS you can use that. If not, you can use Google Maps on your phone.






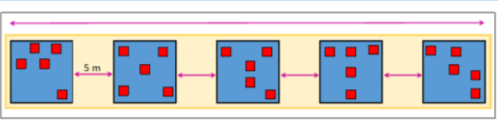


Open Google Maps and hold your finger on the screen where you are. A red marker will appear and the coordinates will be shown in the bar at the top, or the menu at the bottom.

Alternatively, when you upload your data onto our data app you will find a map which will give you the opportunity to record your position.

Please include the coordinates to at least 6 decimal places if you can, for example 1.234567 -1.234567

Survey Technique

| | |
|---|--|
| <p>Once you have selected your survey area, lay out your rope using tent pegs or something similar. It doesn't have to be a perfect square. If there is a lot of vegetation in the quadrat, shake off any plastics and put the vegetation to one side.</p> |  |
| <p>Using your 10cm² template as a guide, take 5 random samples from the 1m² square quadrat area. You should use the spoon to dig first 2cm (1 inch) of sediment.</p> |  |
| <p>Fill one of your buckets with sea water, taking care to check there are no plastic particles floating on the surface. Put the 2cm of sediment into the seawater. Do this 5 times in the quadrat & then stir the sediment to release any plastic that might be within it.</p> |  |
| <p>You may now see plastics floating on the top. Pour the water through the sieve into the second bucket (you can use this water again). The sediment that is left in the first bucket can be discarded.</p> |  |
| <p>Remove any obvious and visible vegetation from your sample and place the microplastics in a container (takeaway food trays work well) for further analysis.</p> |  |
| <p>Move along your 25m survey line and repeat the process another 4 times. Samples from all 5 quadrats should go into the same container (takeaway tray or similar). Congratulations you have just undertaken a scientific microplastic survey.</p> |  |

Can I collect more if I want to?

As you are going through your survey, your eyes will be drawn towards pieces of plastic that have not fallen within the dimensions of your 10cm square template. It is very tempting to just pick them up and put them in the collection, however try and **resist the temptation**. The important thing is that we have consistent data from around the world so that we can compare and contrast the results.



Once you have finished taking your samples, please feel free to pick up and remove as many microplastics as you wish, but **please don't add them to any samples you send us**.

What if I don't find anything?

It is quite possible that you might not find anything. Whilst you might think this is disappointing it is actually a good thing and we need to know about it. So if you don't find anything **please complete the data app anyway – then we can let everyone know it's clean and check in the future to see if that changes**.

Sorting your sample

Once you have collected your sample it needs to be sorted and analysed. Doing this at home is easier but it can be done at the beach. The first part of the process is to **allow it to dry** and then remove any organic material (seaweed, sticks, leaves, shells). The only way to do this is by hand and depending on your sample it can take some time.



Non-plastics can still get into your sample. If you are not sure if something is plastic just drop it into a cup of salt water. Pieces of coral and shell will sink to the bottom. The plastics we are looking for will float.



Categorising your sample

After you have separated out all the organic material it is time to categorize your sample into different types and colours.



The guidelines in this resource pack will help you to identify most of the things you are likely to find. Please take the time to carefully identify the items. You might want to use the [data recording form](#) to help as you work through your sample.

There may be things you are not sure about. For example, not all spherical nurdles are totally spherical and colours can vary. You can get several shades of reds and greens and blues! DON'T WORRY. Just give it your best shot.

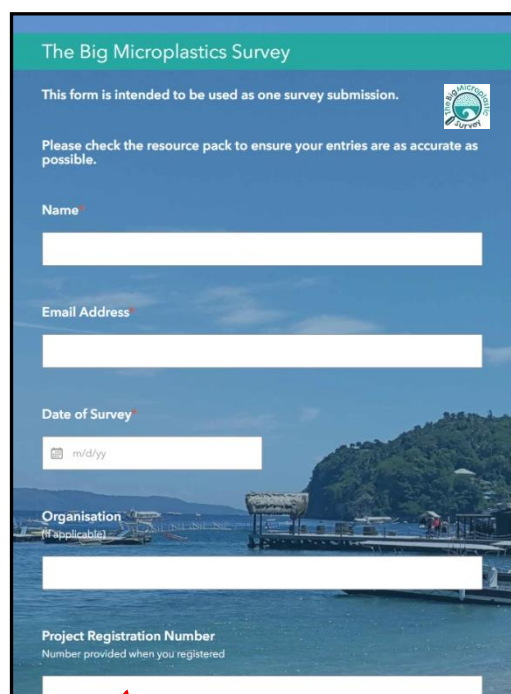


Red and yellow fishing beads (primary microplastics)

Uploading your data

The data you have collected now needs to be uploaded. This can be done by using the [Big Microplastic Survey Data App](#). The app has drop down menus for all of the items that you are likely to find.

We have a limited number of colours **so please use the one that is the closest match**. You **will need** enter the **Project Registration Number** which was sent to you when you registered for the survey. Also please remember to submit a photograph as well and include a **scale** (e.g. a ruler or coin) for your sample somewhere in the image (see bottom photo).



The Big Microplastics Survey

This form is intended to be used as one survey submission.

Please check the resource pack to ensure your entries are as accurate as possible.

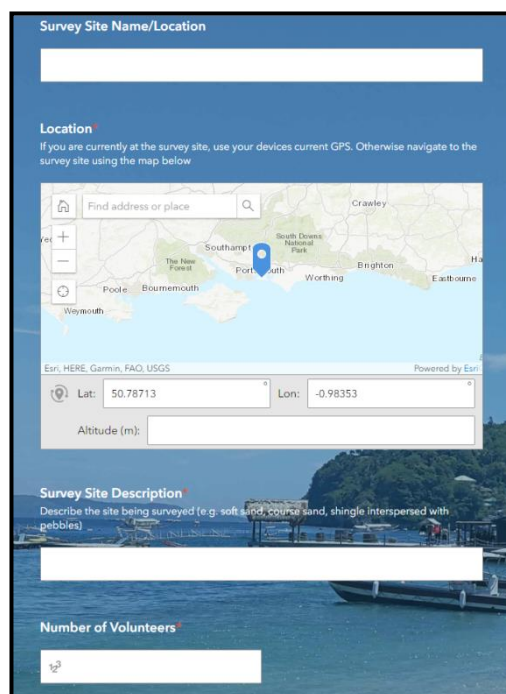
Name

Email Address

Date of Survey

Organisation (if applicable)

Project Registration Number
Number provided when you registered



Survey Site Name/Location

Location

If you are currently at the survey site, use your devices current GPS. Otherwise navigate to the survey site using the map below

Find address or place

Esri, HERE, Garmin, FAO, USGS

Powered by Esri

Lat: 50.78713 Lon: -0.98353

Altitude (m):

Survey Site Description

Describe the site being surveyed (e.g. soft sand, coarse sand, shingle interspersed with pebbles)

Number of Volunteers

You must include the Project Registration Number sent to you when you registered.



Using the Data Recording Form (if you don't have internet access)

You might want to download and print a copy of the [data recording form](#) to help while you are going through your sample. However, it is also really useful if you don't have access to the internet when you are doing the survey. Simply fill in the data manually onto the data form and then upload the data to the [data app](#) when you have internet access . You can download the data form [here](#)

The image shows three data recording forms for microplastic survey. The top form is for 'Cylindrical' nurdles, the middle for 'Disk' nurdles, and the bottom is a partial view of another form. Each form has columns for 'Colour' and 'Number of pieces'.

| Type of Nurdles | Colour | Number of pieces |
|-----------------|--------------|------------------|
| Cylindrical | White | |
| | Clear/Opaque | |
| | Black | |
| | Yellow | |
| | Green | |
| | Grey | |
| | Blue | 1 |
| | Red | |
| | Other | |

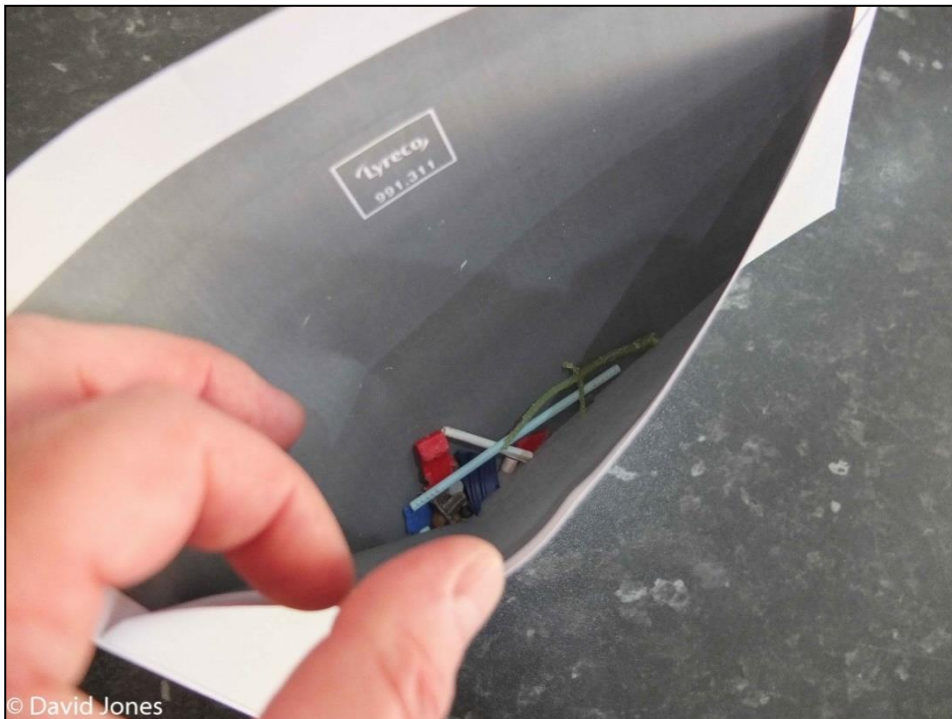
| Type of Nurdles | Colour | Number of pieces |
|-----------------|--------------|------------------|
| Disk | White | |
| | Clear/Opaque | |
| | Black | 1 |
| | Yellow | |
| | Green | |
| | Grey | |
| | Blue | 1 |
| | Red | |
| | Other | |

| Colour | Number of pieces |
|--------------|------------------|
| Clear/Opaque | |
| er | 1 |

Please send us your sample

We actually want your samples.

If you are able to send us your sample that would be great as it will enable us to undertake further study in the laboratory.



Unfortunately, at this time we are not in a position to be able to refund the cost of the postage so you will be doing it at your own expense. Please send them to:

The Big Microplastic Survey,
School of Environment, Geography and Geosciences
University of Portsmouth
Burnaby Building
Portsmouth
United Kingdom
PO1 3QL

If you do send us your sample, **REMEMBER TO WRITE THE SURVEY REFERENCE NUMBER ON THE ENVELOPE .**

Health and Safety

We want you to be safe when you take part in The Big Microplastic Survey. Whilst the activity is inherently safe, there are a few things that you should consider before undertaking the survey.

Slips and Falls Make sure you wear suitable footwear, especially if access to the coast or river you are going to survey means having to walk or climb over wet rocks.

Weather Don't forget to check the weather forecast before you go and wear appropriate clothing. Be prepared for the unexpected.

Tides Ideally you should undertake your survey on an outgoing tide. Make sure that you have an exit route to safety at all times.

Contamination Some of the plastics you handle may have contaminants on them including tar, oil and other possible toxins. Make sure you either wear gloves, or wash your hands thoroughly after the survey. In addition, please be careful when sieving and watch out for any broken glass and sharp objects that might be in the sample.

Mud If you find yourself on mud it is going to be really difficult to get any good results so the best option is to look elsewhere. In addition, avoid working alone if there are likely to be any muddy areas in your survey location.

First Aid If you are organising an event for a group of people it is a good idea for one person to take a first aid kit – just in case.

Warning Signs Adhere and respect any warning signs and stick to designated paths where possible. And remember to make sure that your activities are not being undertaken in environmentally sensitive areas without checking with the authorities first.

And finally ...

We want to say **thank you very much** for taking part in The Big Microplastic Survey. We cannot solve this problem as individuals and this project will go a long way towards helping us understand the scale and impact of microplastics in our rivers, lakes and on our coastlines.



You may find that you felt inspired by being involved in this survey. If you did, why not do another one. Remember to let others know about this project so they can also understand the issue and get involved.

