

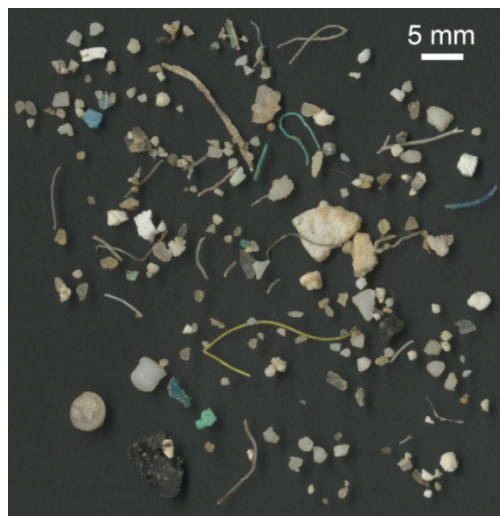


Surface Ocean Plastics Distribution

Critical Question: How do ocean surface currents impact the distribution of floating ocean plastic pollution?

Introduction: Increasing production, use and disposal of plastic products leads to the accumulation of plastic debris in the marine environment. Some types of plastic float on the surface of the ocean; when these items end up in the marine environment they break apart into smaller and smaller pieces due to UV rays from the sun, heat and wind and wave action. These small pieces, typically less than 5mm in diameter, are called **microplastics** and are carried around by surface currents in the oceans.

Below is an example image of what this debris typically looks like.



Brainstorm some **impacts** that this pollution could have on the marine environment:

Plotting Oceanographic Data:

Sea Education Association (SEA) takes college students out to sea on tall ship research vessels to conduct oceanographic research – since the mid 1980’s they have been towing a surface plankton net which collects zooplankton and any plastic floating at the surface. Individual pieces of plastic are counted and quantified.

The net is 1 meter wide and is typically towed for approximately 1 nautical mile (1 nautical mile = 1,852m). The number of pieces collected in each tow is counted and then converted to the number of pieces that would be in a square kilometer of the surface of the ocean.

Here you will be using part of the SEA dataset to plot the distribution of plastic in the North Atlantic Ocean. Use the data table below to plot each point on the map provided.

- You will be using the **Latitude** and **Longitude** where each sample was collected to locate where to plot each point.
- You will need to create a scale to represent the different values of plastic concentration – this can be different color dots, different shapes or different size dots (example: locations with low plastic concentrations could have a small dot and a location with a very high concentration could have a large dot, or low concentrations could be blue and red as high).
- Determine the **range** of the plastic concentration and create your scale. Create a **key** to represent the scale you create and add the key to your map.
- Add a **title** to your map also.

Sample Number	Latitude - °N	Longitude - °W	Plastic Concentration - Pieces per km ²
1	31.67	67.67	3031
2	32.07	47.08	73,484
3	39.22	69.71	0
4	42.35	69.70	505
5	28.50	46.74	38,606
6	30.93	64.60	107,991
7	20.04	68.45	4,688
8	11.82	66.38	540
9	19.35	68.30	0
10	25.21	79.91	2160
11	24.38	82.92	444
12	24.08	84.11	2,700
13	32.49	77.97	0
14	25.39	79.38	0
15	11.81	65.99	0
16	31.70	71.32	13,495
17	31.00	68.78	12959
18	29.42	60.80	11339
19	30.93	54.12	128769
20	32.99	63.46	95596
21	34.17	64.37	248920
22	34.60	63.75	2700
23	37.05	63.73	5400
24	37.79	68.37	0
25	39.54	64.31	540
26	42.82	68.95	0
27	44.49	61.11	1080
28	40.44	64.78	3780
29	33.66	58.72	22701
30	36.08	67.67	6479
31	31.74	78.64	4266
32	21.61	57.66	2700
33	15.12	68.68	1028
34	16.58	70.77	900
35	17.08	73.99	0

Analyze the results:

After you have all the points plotted on the map, look over the results. Do you see any **patterns** in the distribution of plastic in the North Atlantic? If so, what are they?

Explain why this distribution makes sense (use your knowledge of ocean currents):

Do all the points fall exactly within the larger pattern or is there some variability?

What are some possible explanations for this?

Do you think these 35 sample locations are enough to draw conclusions? If you had more data, do you think the same patterns would be apparent? Explain your reasoning.

Brainstorm some possible **solutions** to the issue of plastic pollution:
