

## Plastic Soup is everywhere

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[www.wur.eu/plastics-fulmars](http://www.wur.eu/plastics-fulmars)


## IF BIRDS WERE HUMANS.....

Northern Fulmars found dead on North Sea beaches have over 34 pieces of plastic in their stomach with an average mass of 0.31 gram of plastic per bird. The quantity in an individual bird may vary strongly, but almost every Fulmar (95%) has some of it in the stomach.

Importantly, this 0.3 gram average plastic mass in beached birds is representative for all Fulmars in the North Sea, as it has been demonstrated that healthy birds fly around with approximately the same quantity of plastics in their stomach as found in the beached corpses mostly used for monitoring. Possibly 0.3 gram does not sound like a lot, but if one imagines a fulmar at a human body-size ( $\pm 100$  times as heavy) that small quantity proves to represent a lunchbox full of plastics (for details see the 'lunch recipe below and picture on next page).

In the most polluted parts of the North Sea, such as the English-French Channel, the average quantity increases to above 0.5 gram per Fulmar stomach, whereas further to the north the quantities decrease. Our 'champion' Fulmar had over 20 gram of plastic in the stomach, representing over 2 kilogram at the human body mass.

### Recipe for a plastic fulmar lunch

AVERAGE QUANTITY OF PLASTIC IN STOMACHS OF FULMARS FROM THE NORTH SEA				Human scale
Data as published in: <i>Van Franeker et al (2011) Environmental Pollution 159: 2609-2615.</i> (average for stomachs of 1295 Fulmars from over all of the North Sea over the period 2003-2007)				
 <b>Wageningen Marine Research</b> WAGENINGEN UNIVERSITY & RESEARCH	percentage of birds investigated that proved to have plastic in the stomach	average number of plastic particles per Fulmar stomach	Average mass of plastics in a Fulmar stomach (body mass Fulmar c.700 g)	average plastic mass in the stomach scaled to human body mass (mass of c. 70kg)
	<i>incidence</i>	<i>number of items</i>	<i>gram plastic</i>	<b>GRAM PLASTIC</b>
<b>Industrial plastic granules</b>	59%	3.1	0.065	<b>6.5</b>
<b>USER PLASTICS</b>				
<b>Sheetlike</b>	50%	3.6	0.014	<b>1.4</b>
<b>Threadlike</b>	43%	2.1	0.011	<b>1.1</b>
<b>Foamed</b>	64%	7.3	0.042	<b>4.2</b>
<b>Fragments</b>	87%	16.7	0.153	<b>15.3</b>
<b>Others (eg balloonrubber)</b>	19%	1.7	0.027	<b>2.7</b>
<b>Total</b>	<b>95%</b>	<b>34.4</b>	<b>0.312</b>	<b>31</b>

North Sea governments have set a target for acceptable environmental quality in which at most 10% van Northern Fulmars carries more than 0.1 gram plastic in the stomach. Currently, over 60% of North Sea Fulmars exceed this 0.1 gram limit. Only Fulmars living at great distance from our industrialized world, e.g. those living in the Canadian high-arctic seas, approach this target.

It may be estimated that fulmars 'digest' each month roughly 75% of the plastic in their stomach, continuously replenishing it with new plastics. Obviously, there is no real digestion. All that happens is that plastics gradually wear down and break up into small pieces in the muscular stomach until they are small enough to pass into the intestines. During gut passage, plastic dust and micro-particles may leach built-in or adsorbed chemicals before they are excreted. Excreted plastics may then start a new cycle of plastic soup in our oceans, only in a smaller size range, affecting the smaller life forms in the same food chains that nourish wildlife as well as humans. This plastic lunch never ends.



Dead Northern Fulmar on the beach.



Balloon remains from a fulmar stomach



An  $\pm$  average stomach content



An extreme stomach content



**Translation to a human perspective** To the left of the tweezers is the average quantity of plastic in stomachs of fulmars in the North Sea (0.31 gram plastic in different categories); to the right of the tweezers, this same quantity has been translated to represent the stomach content of a fulmar at human body size (31 gram plastic; top row from left to right: sheets, fragments and threadlike plastics with foamed plastics and industrial granular plastics below)