Characteristics of Plastic in stomachs of Northern Fulmars (*Fulmarus glacialis*)

-Preliminarily Results-

Susanne Kühn & Jan van Franeker

Fulmar pecking on floating plastic (© S. Kühn)

Fulmars as a monitoring tool

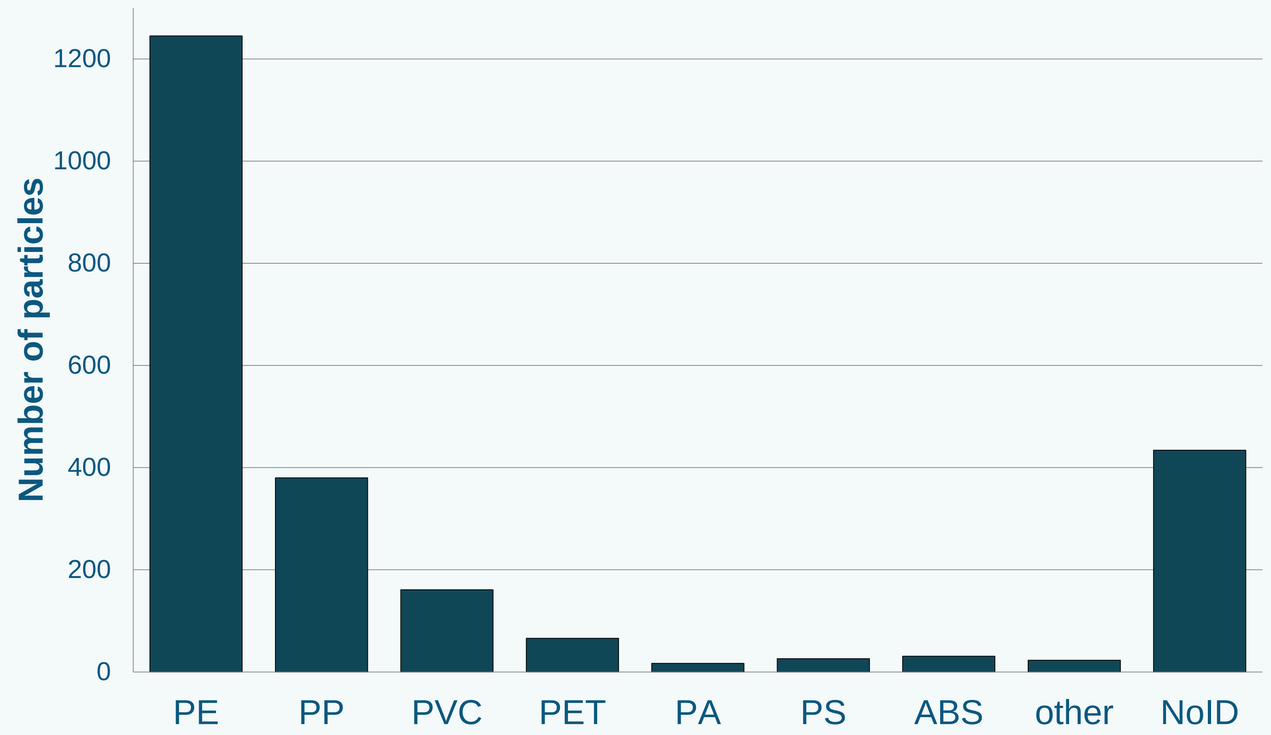
Northern Fulmars are seabirds that regularly ingest marine plastic debris. The species is used as an indicator for marine plastic pollution by OSPAR and the EU[1]. Low-density plastic floats on the surface unless it gets bio-fouled and therefore may sink[2]. As Fulmars are surface feeders, it is assumed that most plastic is directly taken from the water surface although part of materials could be ingested indirectly via prey.

Identification of plastic types

Infrared spectroscopy (NIR "DTS-Phazir-1624" and FTIR "Varian 610IR") was used to identify polymer types of plastics found in stomachs of Fulmars around the North Sea and Iceland. Plastics were categorized following their specific gravity and compared to the density of North Sea water at average temperature (~1.026 g/cm³).

***Table**: Plastic types ingested by Northern Fulmars and specific gravities ('densities') in comparison with sea water (in the category "other" plastic types with an occurrence < 1% are grouped; NoID stands for "not identifiable")*

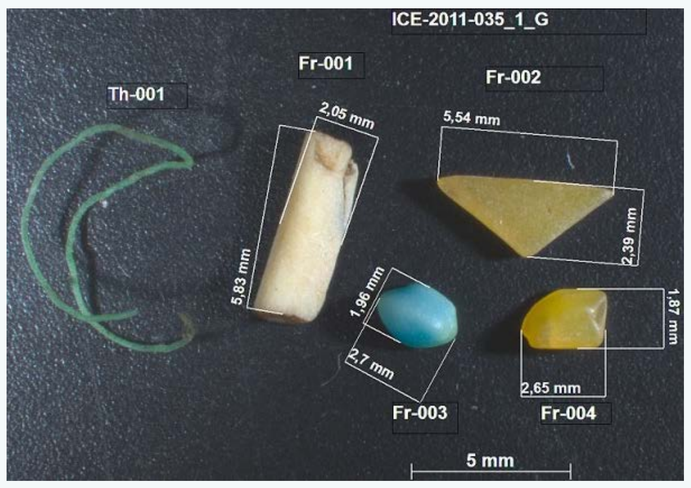
Density	Material	Proportion of items in stomachs	Cumulative percentage
light plastics <1.026 g/cm³	PE	62.0%	Floating 81.0%
	PP	19.0%	
heavy plastics >1.026 g/cm³	PS	1.1%	Sinking 3.3%
	ABS	0.3%	
	PVC	1.0%	
	PET	0.2%	
	PA	0.7%	
	other	0.9%	Unknown 15.7%
	NoID	14.9%	
Total		**100%**	



Frequency of polymer types ingested by Northern Fulmars (n plastic particles =2383)

Results

Most of the plastic items (81%) found in Fulmar stomachs were floating polyethylene (PE) and polypropylene (PP). Only 3.3% of the particles belonged to plastic types that sink out of the feeding range of Northern Fulmars.



Plastic thread and fragments ingested by an Icelandic fulmar

The results indicate that much of the plastic ingested by Fulmars originate from surface waters. However, due to biofouling and turbidity also light weight plastics are frequently found deeper in the water column and near the bottom. Plastics ingested indirectly by feeding on deeper feeding prey, discards or offal could thus originate from below the surface or bottom. The Northern Fulmar is thus suitable for monitoring debris at the sea surface, but to some extent results will also reflect plastic pollution in deeper water layers.

References

[1]Van Franeker et al., Environ Pollut 159: 2609-2615 (2011)

[2]Fazey & Ryan, Environ Pollut *210*: 354-360 (2016)

Netherlands Organisation for Scientific Research

IMARES Wageningen UR
P.O. Box 57 NL-1780 AB Den Helder
Contact: **susanne.kuehn@wur.nl**

www.wageningenur.nl/plastics-fulmars