

# First evidence of retrospective findings of microplastics in harbour porpoises (*Phocoena phocoena*) from German Waters

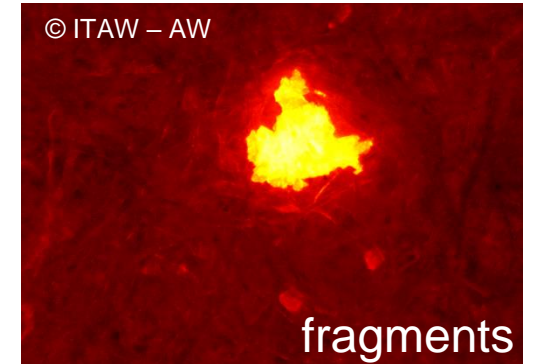
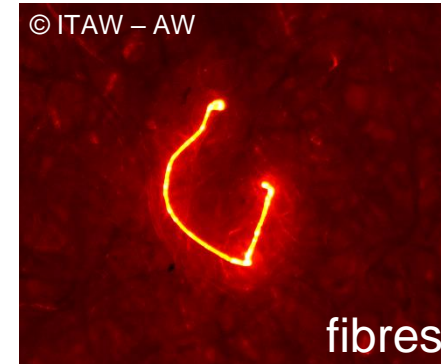
C. Philipp, B. Unger, S. Ehlers,  
J. Koop, U. Siebert



## Introduction

### Microplastics (MPs)

- <5 mm
- fibres & fragments
- **primary MPs**
  - extra synthesised & manufactured for different industries
- **secondary MPs**
  - larger plastic items break down to small pieces (e.g. UV light, physical forces)



## • Current Knowledge in Microplastic Occurrence in Marine Mammals

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- **North Sea**

- Netherlands:
  - harbour porpoises, >1 mm
  - harbour seals, > 300 µm
- Great Britain: var. of species, > 35 µm

- **Baltic Sea**

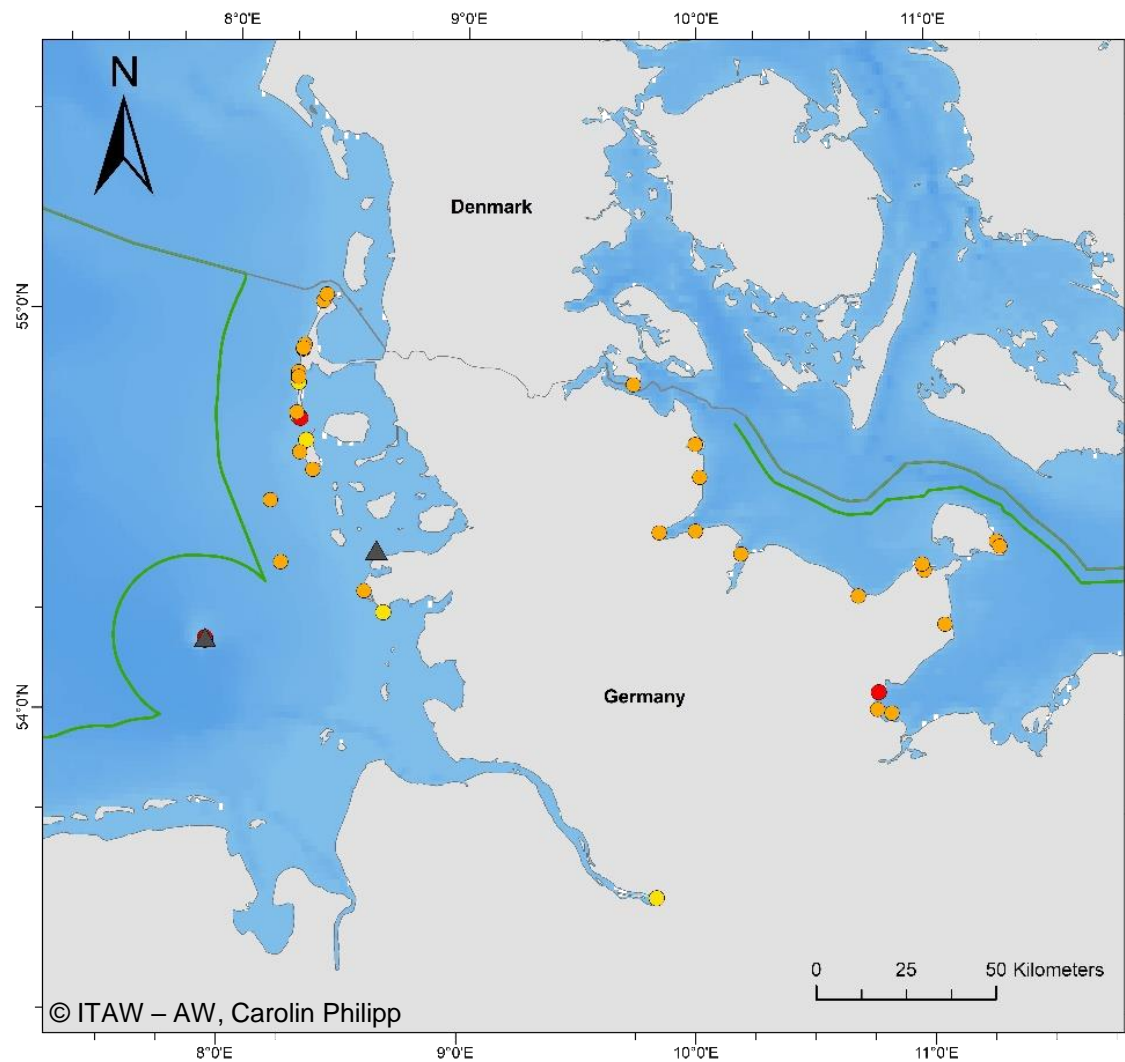
- no study investigates microplastic occurrence in marine mammals

- **first time:** investigation gastrointestinal tract (GIT) samples of marine mammals **from German waters** (North Sea and Baltic Sea)
- since marine mammals are highly mobile, **results could be compared** with other studies from the North Sea (North Atlantic Area)
- links between **microplastic exposure & health status** are scarce

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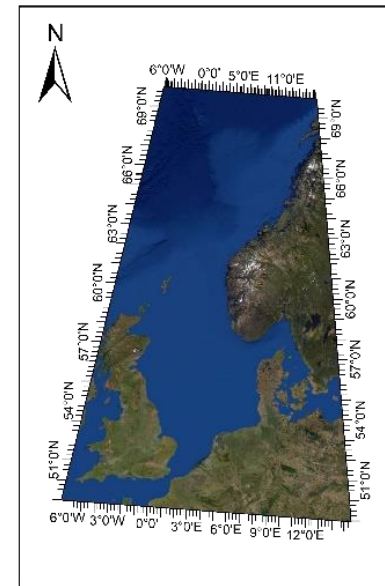
[Bravo Rebolledo et al. 2013; Hernandez-Milian et al. 2019; van Franeker et al. 2018; Nelms et al. 2019]

# Survey Area



## Samples

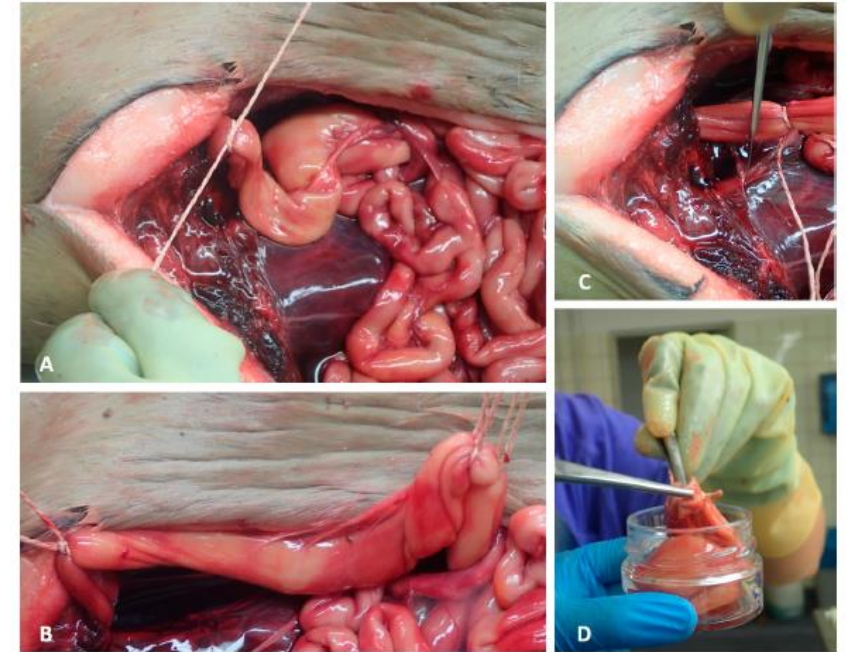
- Harbour seal (n=5)
- Grey seal (n=5)
- Harbour porpoise (n=30)
- ▲ Seal scat (n=9)
- Exclusive Economic Zone (EEZ)



Coordinate system: ETRS 1989 LAEA  
 Projektion: Lambert Azimuthal Equal Area  
 Date: ETRS 1989  
 Unit: Meter



- **Samples:** collected since 2014
  - **intestinal** samples (incl. faeces) of all three species
    - during regularly conducted necropsies
    - stored in glass jars at -20°C



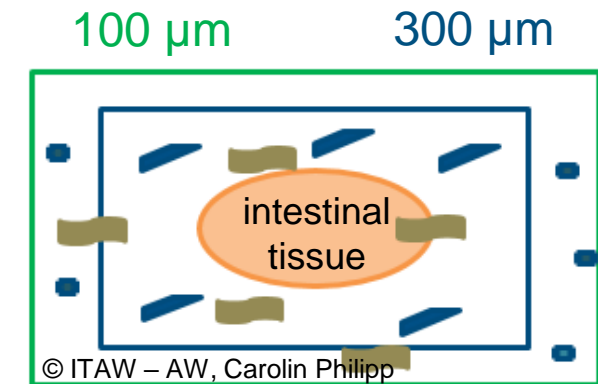
Philipp et al. 2020

# Sample Collection



**focussing on MPs  $\geq 100 \mu\text{m}$**

- **Samples:** collected since 2014
  - **intestinal** samples (incl. faeces) of all three species
    - during regularly conducted necropsies
    - stored in glass jars at  $-20^{\circ}\text{C}$
- **Purification:**
  - samples are sewed into a double-layer washing bags
  - washing machine (enzyme detergents were added)
    - hard parts + intestinal tissue
    - rinsed into a glass beaker with saturated NaCl solution (density separation)
    - filtered onto cellulose filters



## Materials & Methods



Article

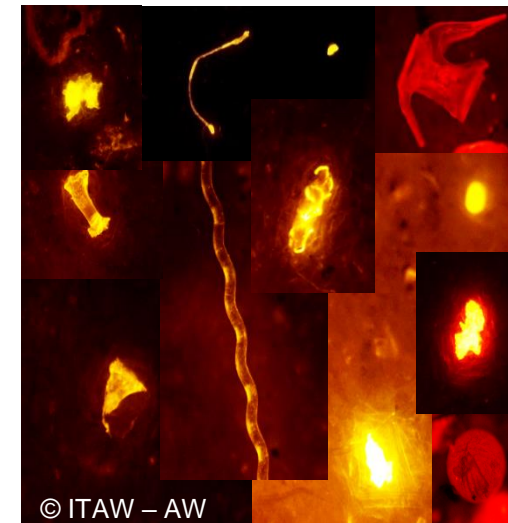
### Handle with Care—Microplastic Particles in Intestine Samples of Seals from German Waters

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focussing on MPs  $\geq 100 \mu\text{m}$

- How to identify microplastic particles?
  - Identification: Nile Red staining + Fluorescence microscopy
  - Polymer identification:  $\mu\text{FTIR}$  spectroscopy





# Microplastic Burden



**North Sea**

**14**

**123  
microplastics**

**86 %**

**Baltic Sea**

**16**

**278  
microplastics**

**100 %**



**Mean±SD<sub>BS</sub> = 18.27 ± 14.54**  
**Mean±SD<sub>NS</sub> = 8.2 ± 7.89**

**significantly higher  
burden in the  
Baltic Sea**



adult



juvenile

**no significant  
differences  
concerning sex  
and age**





## Microplastic Burden: Identified Polymers in the Baltic Sea ( $\mu$ FTIR)

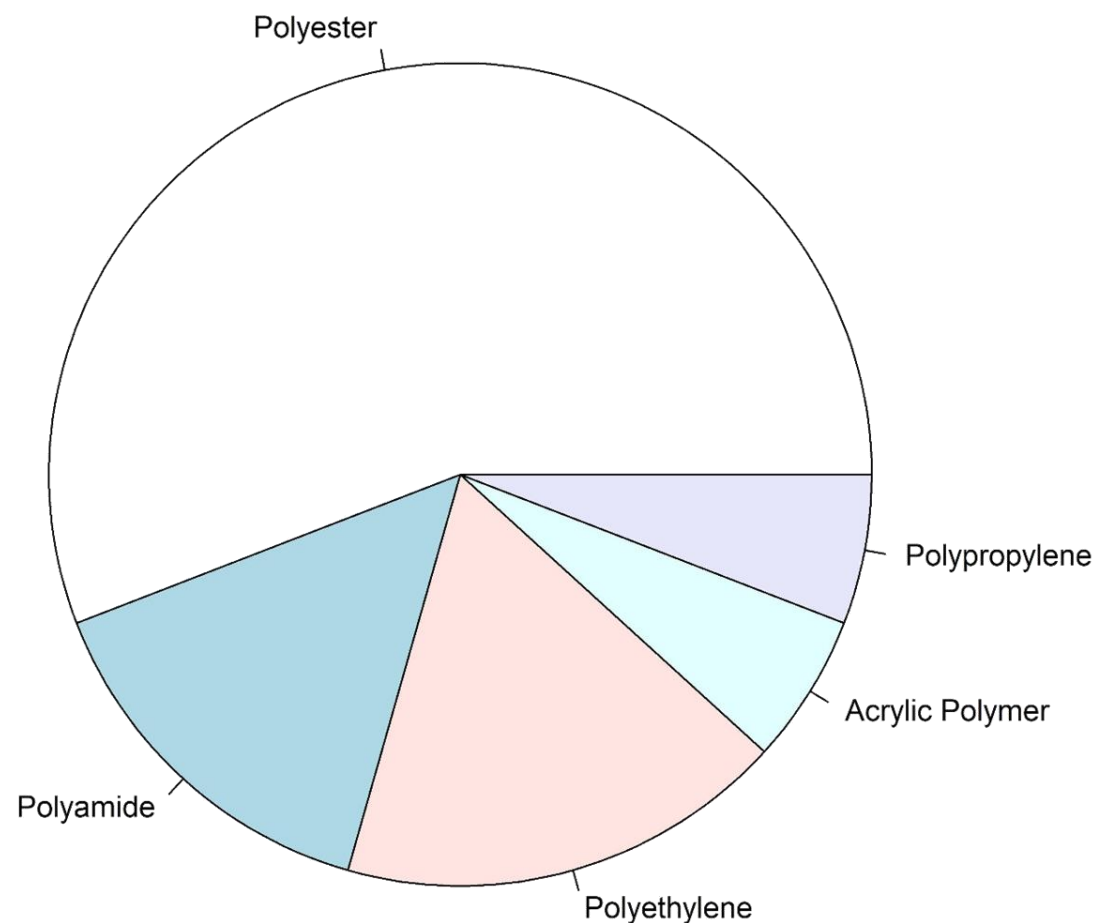
- **Baltic Sea: subset of 34 particles were identified**

### Potential sources:

**Polyester & Polyamide:** lost fibres of washed cloths

**Polyethylene & Polypropylene:** packaging material

**PEST, PE, PA & PP:** fishing gear





## Conclusions

- **harbour porpoises** of the North Sea & **Baltic Sea** are **exposed to microplastic**
  - a significant higher burden was identified in individuals from the Baltic Sea
  - studies investigating demersal & pelagic fish species coincide with our results
- **no differences between ages & sexes**
  - no accumulation over the lifespan
  - egestion of microplastics is clearly determined
- **first evidence:**
  - **a good nutritional status** is likely joined with a **high quantity of microplastics**
    - healthy individuals feed continuously → **high rate of ingestion/egestion**
  - the **favoured prey / feeding strategy** might play a role

**needs to be  
continued in  
future studies**

Thank you for your interest and your attention!



Umwelt  
Bundesamt

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Sonja Ehlers

**ITAW necropsy team** for collecting the samples & data

**Seal Rangers** of Schleswig-Holstein for collecting carcasses



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