# MICROPLASTICS IN THE BALTIC SEA – CURRENT KNOWLEDGE AND FUTURE PERSPECTIVES

**Inga Lips**

Department of Marine Systems

27.11.2018

# OUTLINE

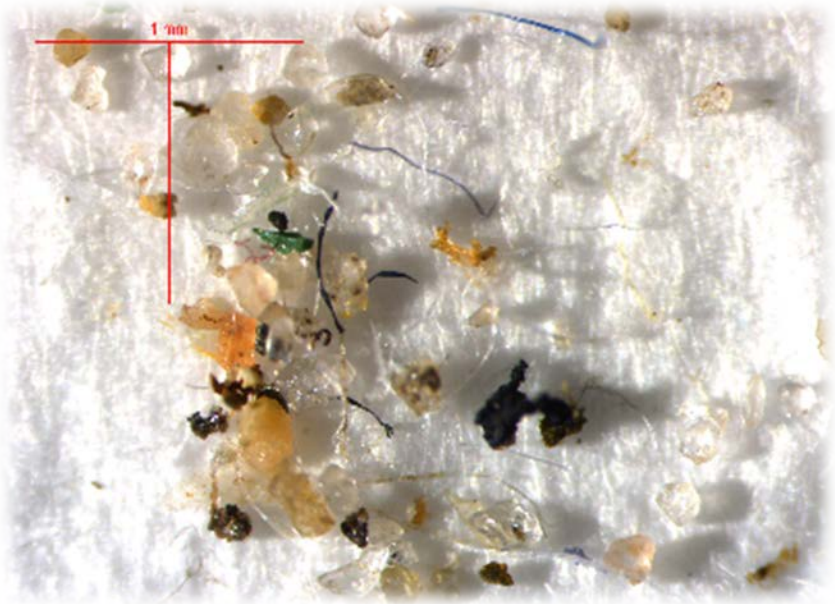
## MICROPLASTIC

– definition and sources
– problems

## MICROPLASTICS IN THE BALTIC SEA

– sources and pathways
– concentrations:
on the sea surface
in the sediments
in the sandy beaches
in the biota

## FUTURE PERSPECTIVES AND CHALLENGES




TAL TECH

# DEFINITION AND SOURCES

Microplastic is defined as small <5 mm plastic particles - A vast majority is invisible to the naked eye.

- Primary microplastic

http://compomat.com/cosmetic-raw-ingredients/

De Falco et al 2018; Envir. Pol. 236

- Secondary microplastic

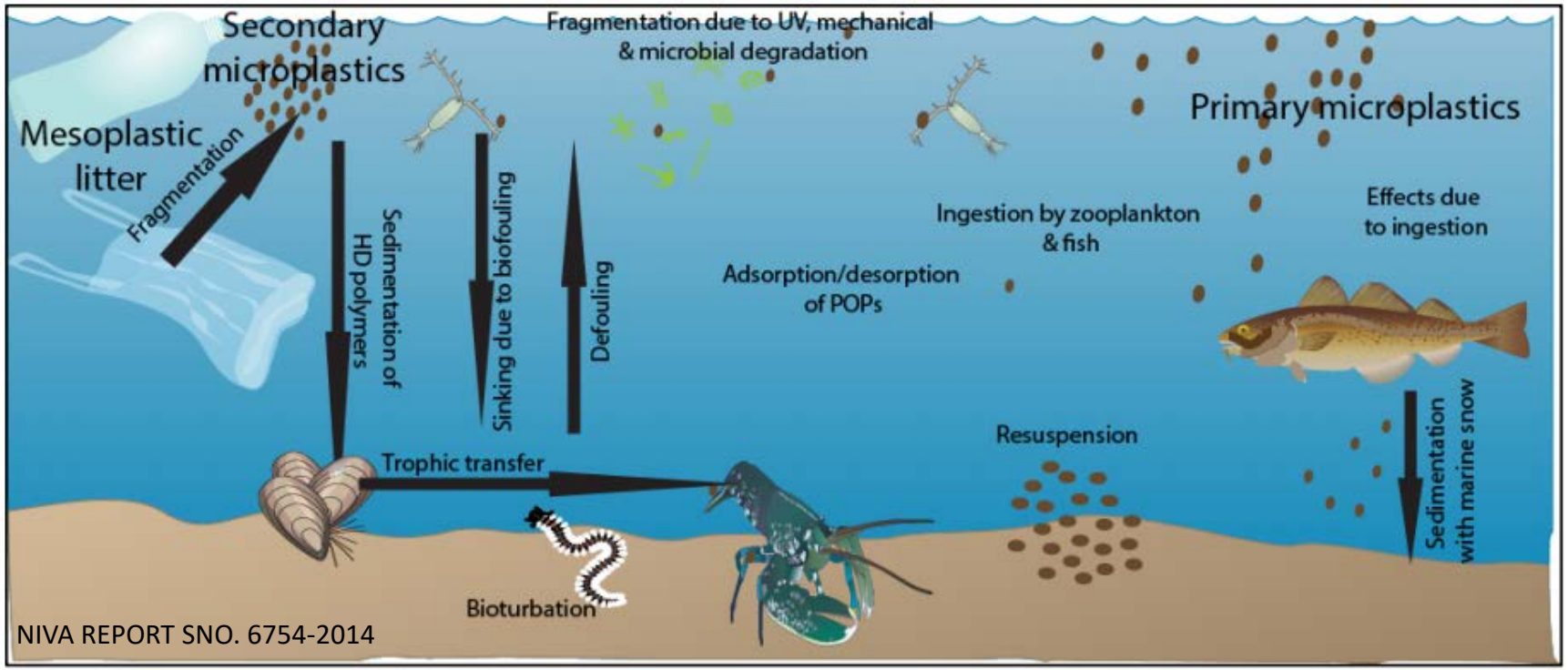
Darcey Rakestraw

www.bioenergyconsult.com

# PROBLEMS

Once in the environment, the microplastics concentrate pervasive bacteria and pollutants.

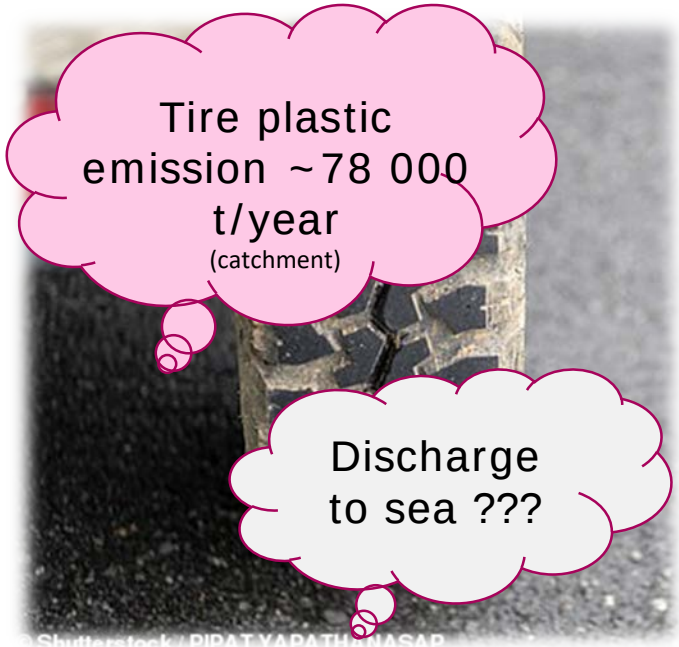
They are consumed by aquatic organisms, which can result in gastrointestinal infections, toxifications, blockages, reproductive problems, starvation – problems that ultimately work their way up the food chain.



# SOURCES

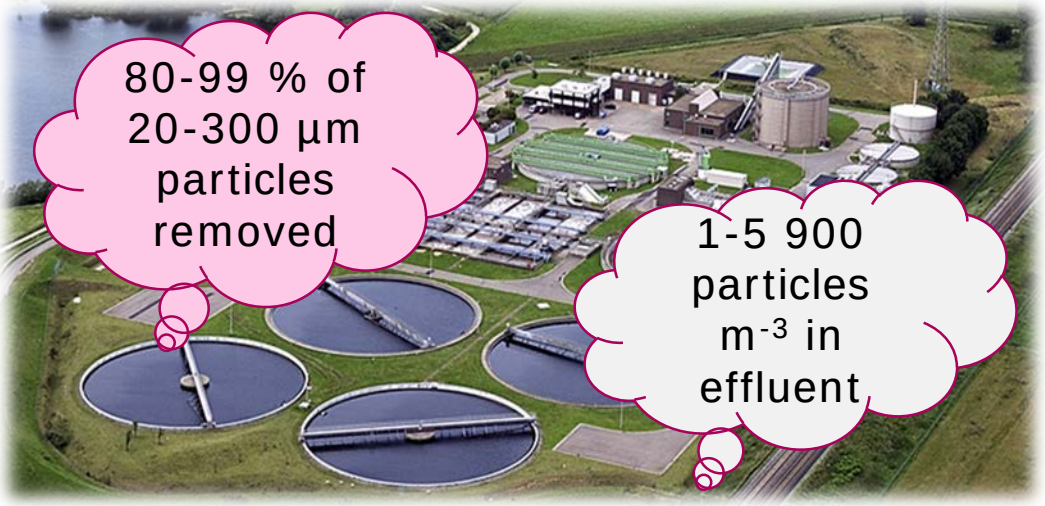

~120 t/year consumed (catchment)
~9 t/year reach surface waters


~400 t/year lost (Sweden)
Discharge to sea ???

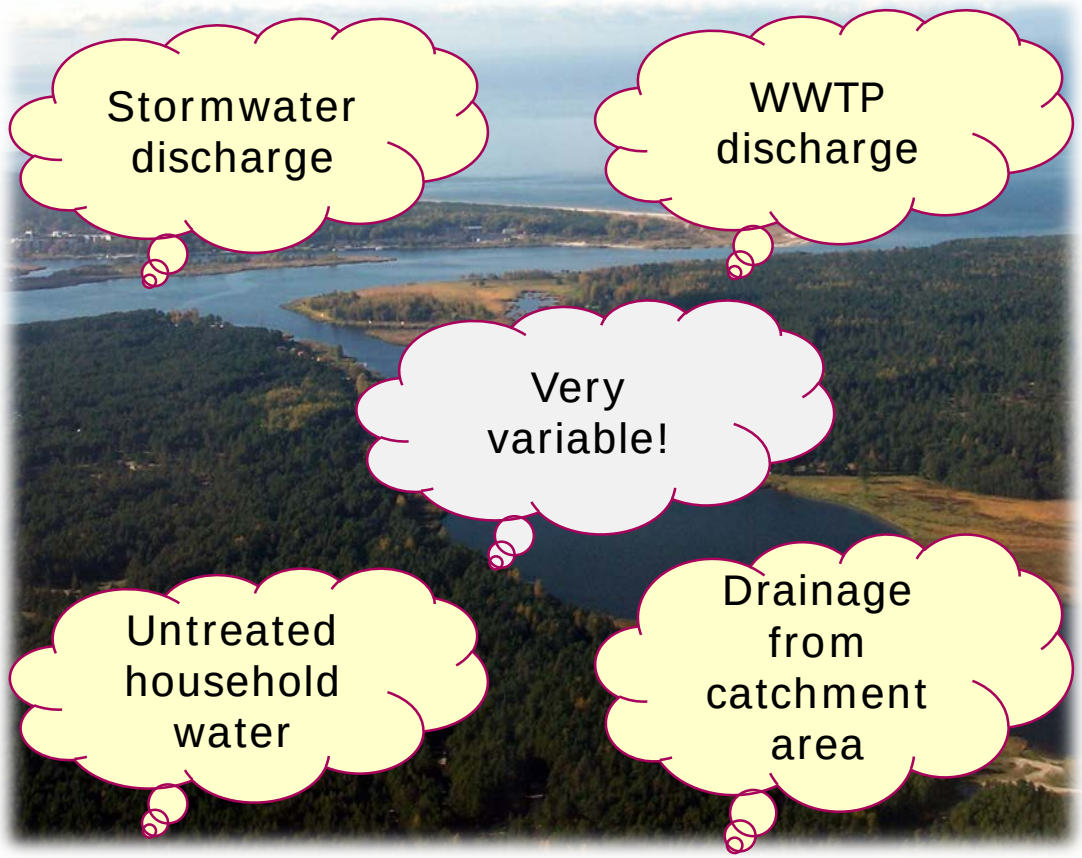

Tire plastic emission ~78 000 t/year (catchment)
Discharge to sea ???


~4 500 t/year released (countries)
~10 t/year released to water recipient

# PATHWAYS

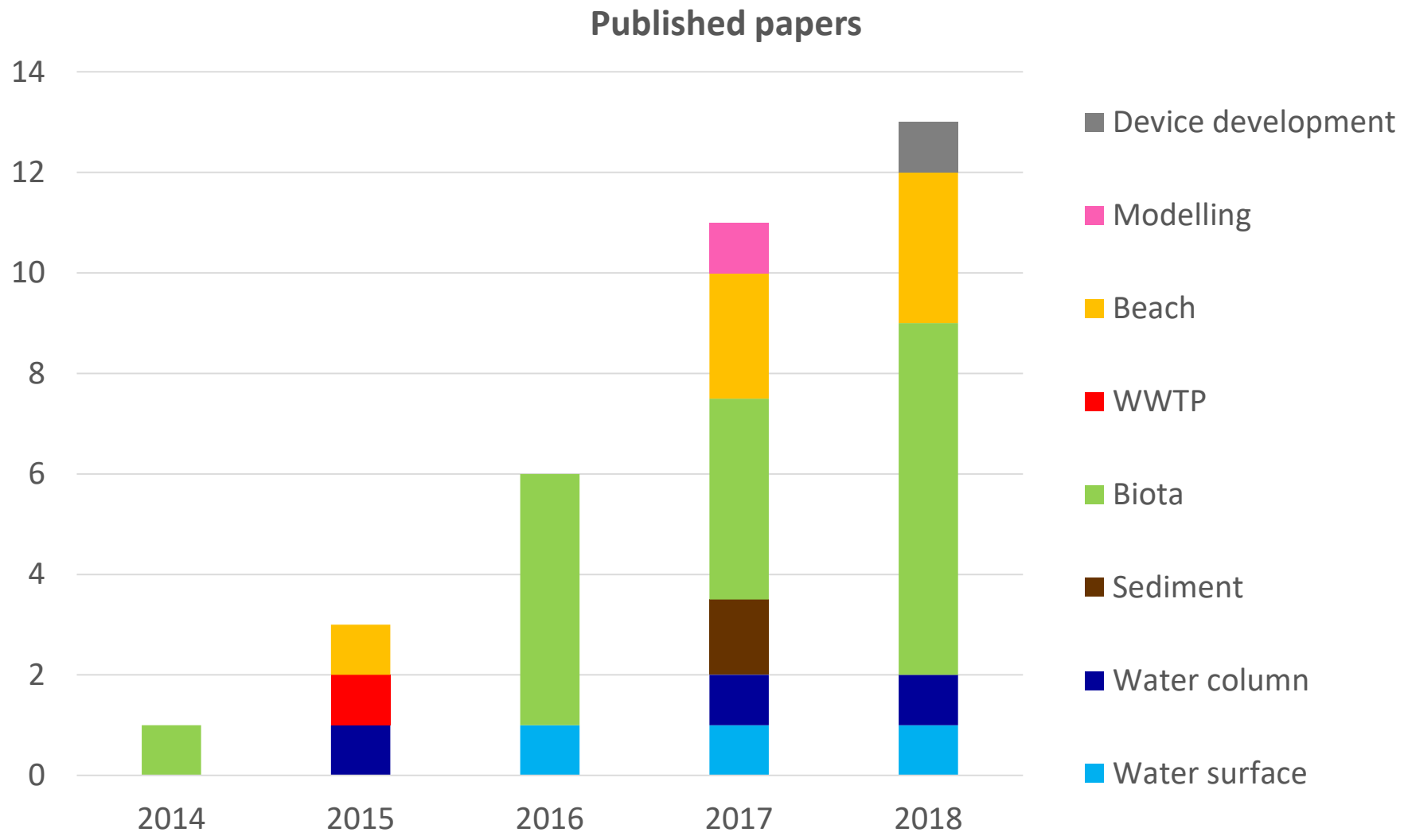







TAL TECH

# PUBLICATIONS

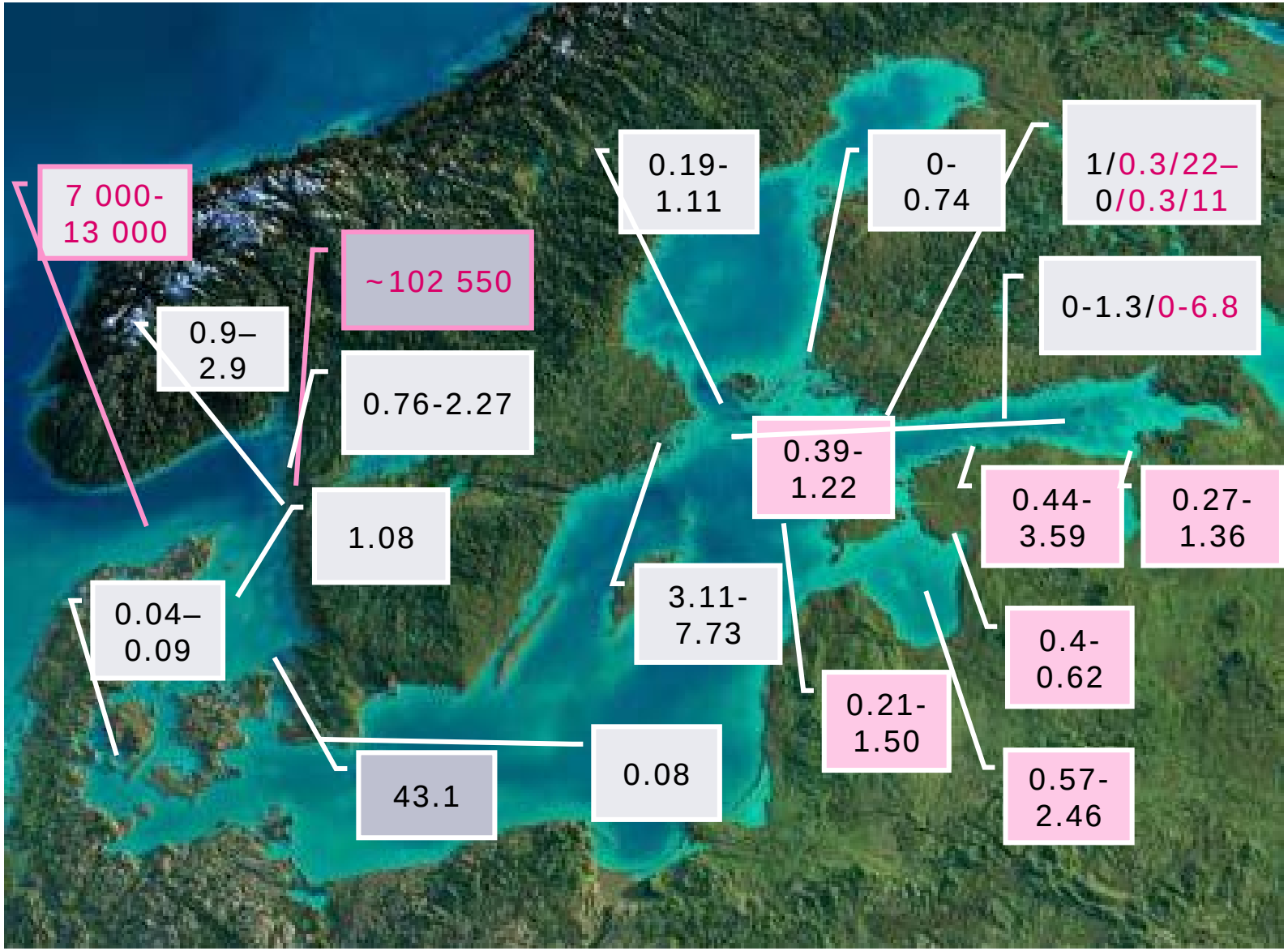


# MICROPLASTICS ON THE SEA SURFACE


Setälä et al., 2016


Setälä et al., 2016

MP/$m^{-3}$

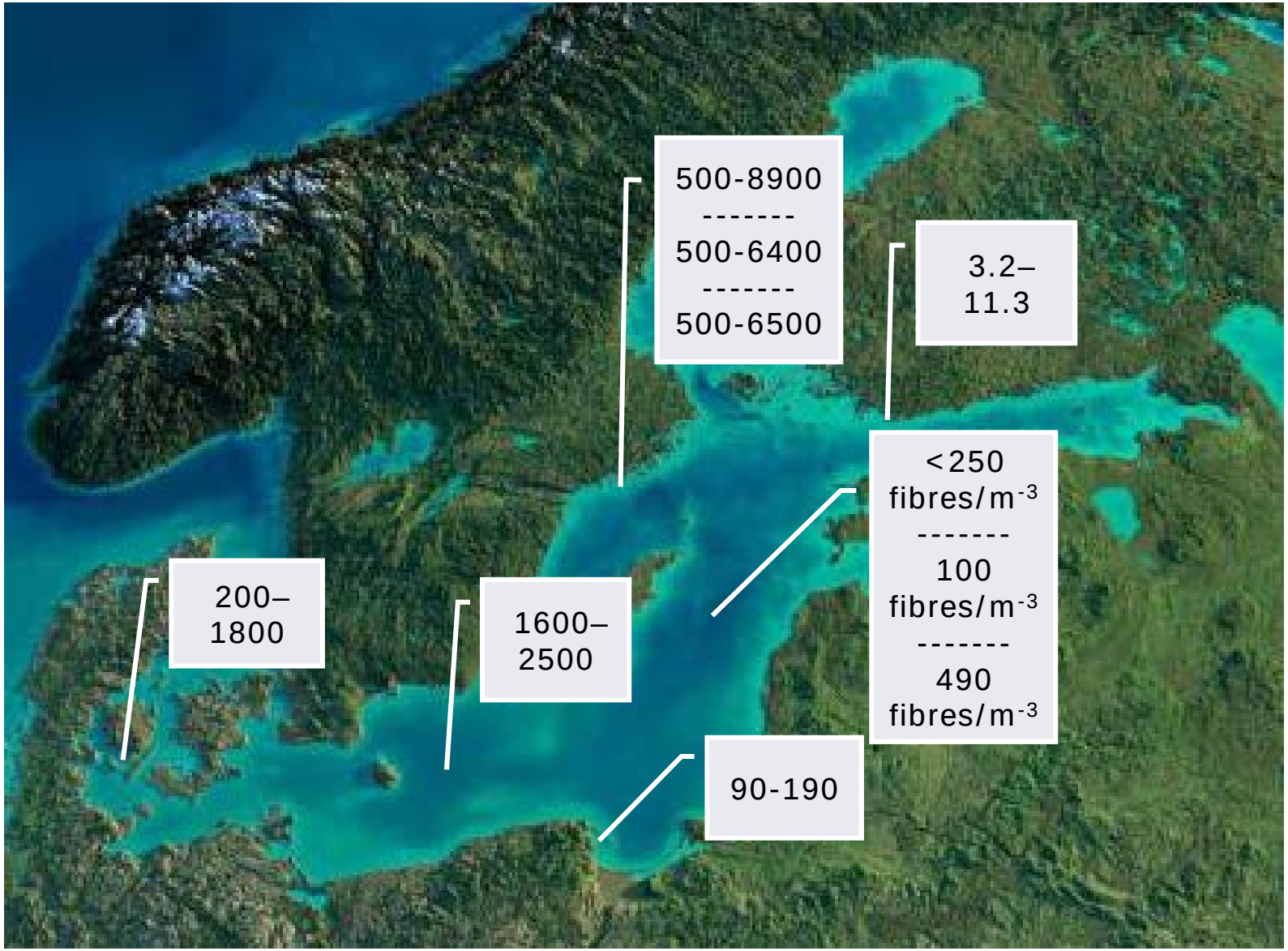


# MICROPLASTICS IN THE WATER COLUMN



TAL TECH

MP/$m^{-3}$

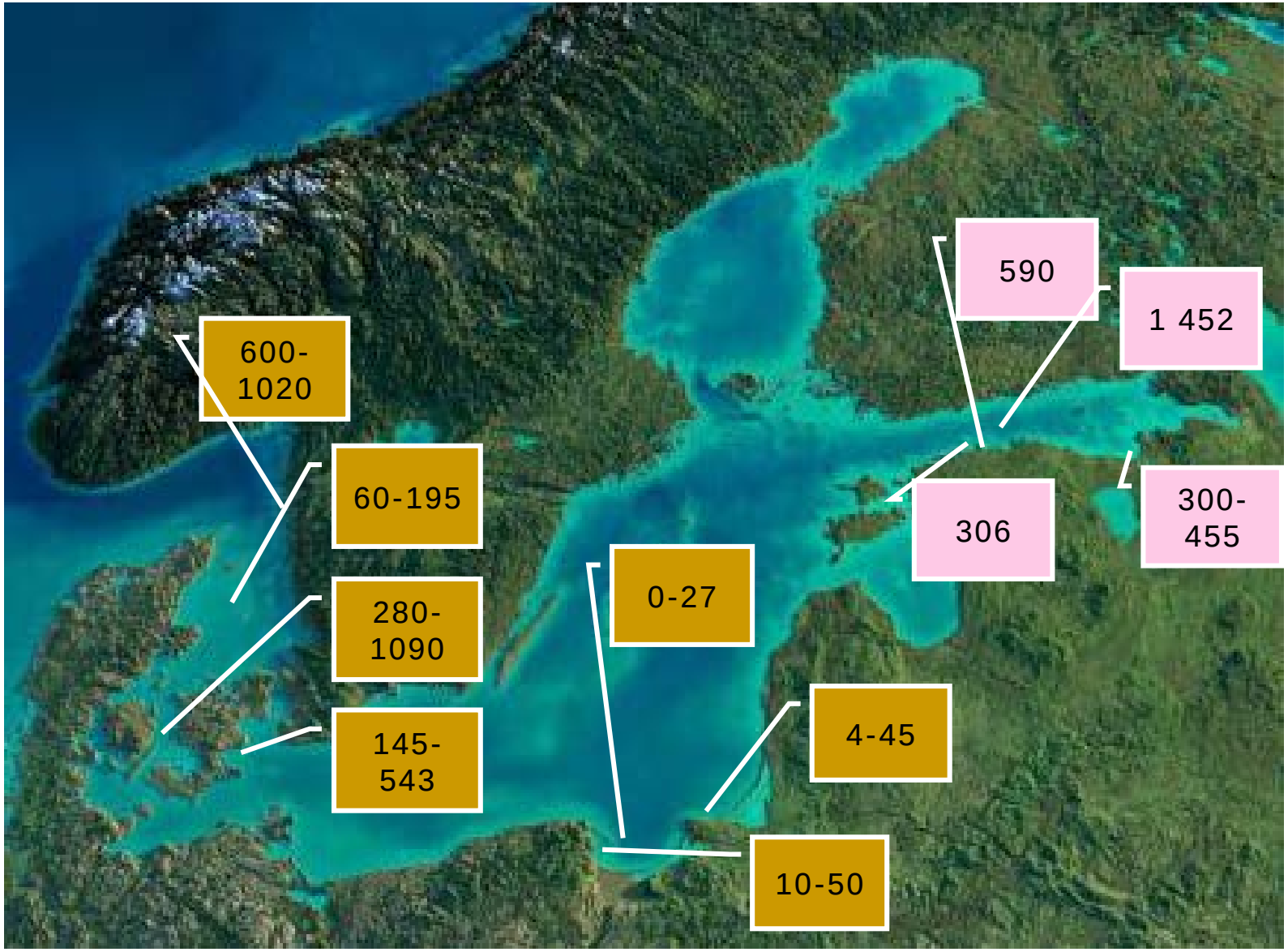


# MICROPLASTICS IN THE SEDIMENTS


Hydrobios


Boris Winterhalter

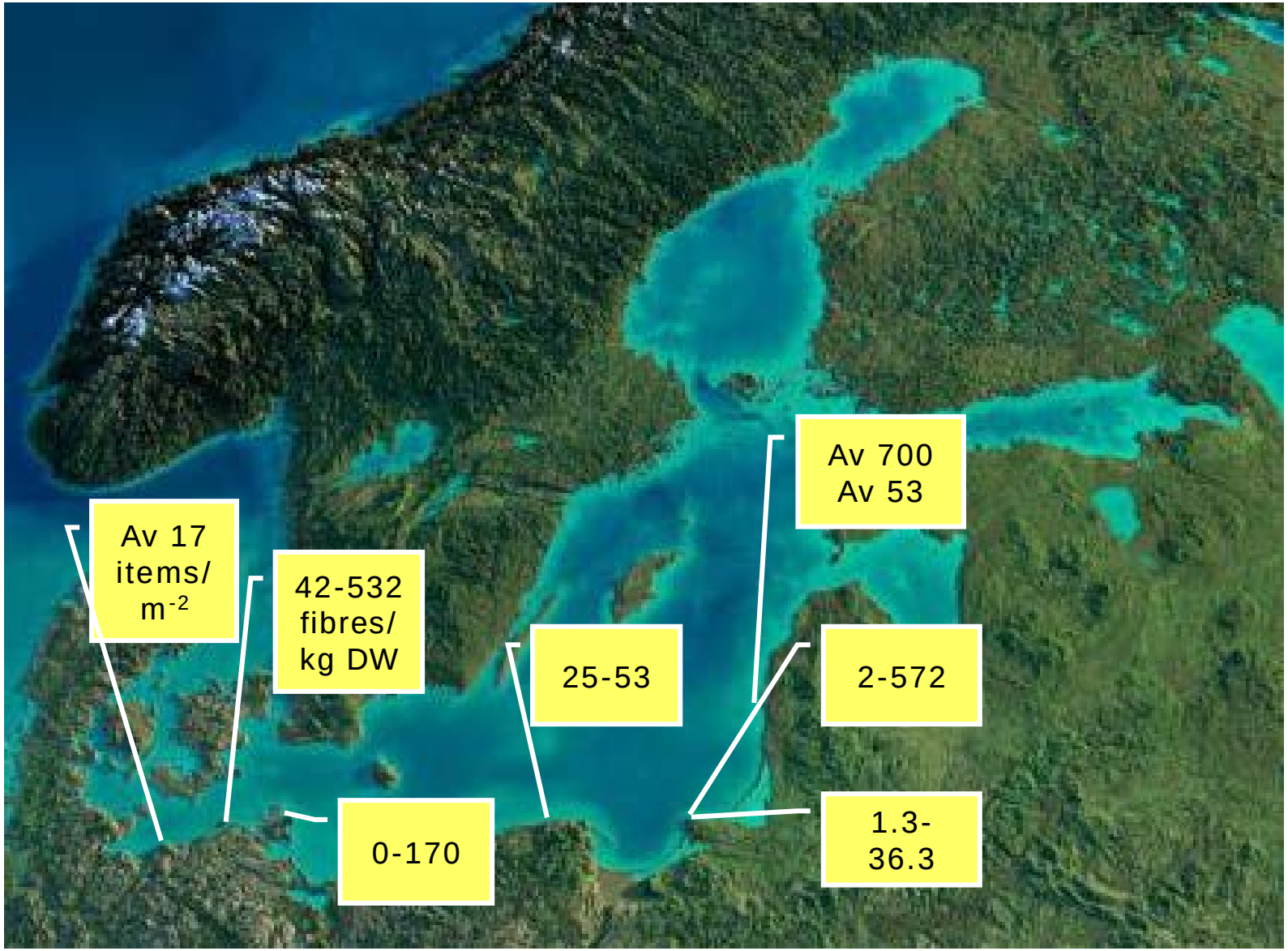
MP/kg DW



# MICROPLASTICS IN THE SANDY BEACHES



MP/kg DW



# MICROPLASTICS IN THE BIOTA

| Species | % individuals containing MP | Size of particles | Number of particles per individual | Region | Reference |
|---|---|---|---|---|---|
| **Pelagic fish** | | | | | |

Science of the Total Environment 621 (2018) 1272–1279

Contents lists available at ScienceDirect

Science of the Total Environment

journal homepage: www.elsevier.com/locate/scitotenv


## No increase in marine microplastic concentration over the last three decades – A case study from the Baltic Sea

Sabrina Beer [a,b], Anders Garm [b], Bastian Huwer [a], Jan Dierking [c], Torkel Gissel Nielsen [a,*]

# MICROPLASTICS IN THE BIOTA

| Species | % individuals containing MP | Size of particles | Number of particles per individual | No per g tissue | Region | Reference |
|---|---|---|---|---|---|---|
| **Demersal fish** | | | | | | |
| European eelpout (*Zoarces viviparus*) | | | 1.5±0.8<br>0.3±0.3 | | | Agersnap, 2013 |
| Dab (*Limanda limanda*) | 0% (n=98) | | | | | Rummel et al., 2015 |
| | 4.5% (n=15) | >500 µm | Presence | | Southern BS | Rummel et al. 2016 |
| Flounder (*Platichthys flesus*) | 10% (n=299) | | | | | Rummel et al., 2015 |
| | 5.6% (n=20) | >500 µm | 0-1 | | Southern BS | Rummel et al. 2016 |

# MICROPLASTICS IN THE BIOTA

| Species | % individuals containing MP | Size of particles | Number of particles per individual | No per g tissue | Region | Reference |
|---|---|---|---|---|---|---|
| **Bottom animals** | | | | | | |
| Blue mussel (*Mytilus edulis*) | 66% (n=120) | ≥100 µm | 1.2–2.5 | 0.80± 0.20<br>6–1.5 | Gothenburg harbour<br>Gullmarfjord; Svanemøllen Strand; Kalvebod; Kattegat | Magnusson et al., 2016<br>Agersnap, 2013<br>Gustafsson, 2016 |
| | 66% | | 0.04 ± 0.19<br>0.1 ± 0.2 | 0.26 ± 1.3<br>0.4 ± 1.9 | Åland sea<br>Hanko | Railo et al., 2018 |
| Chinese mitten crab (*Eriocheir sinensis*) | 9% (n=208)<br>28 (n=50) | | | | | Wójcik-Fudalewska, 2016 |

# FUTURE PERSPECTIVES

## Size matters

Railo et al., 2018

- >20–100 µm: 11.1 ± 19.2
- >100–300 µm: 0.3 ± 0.6
- >300 µm: 0

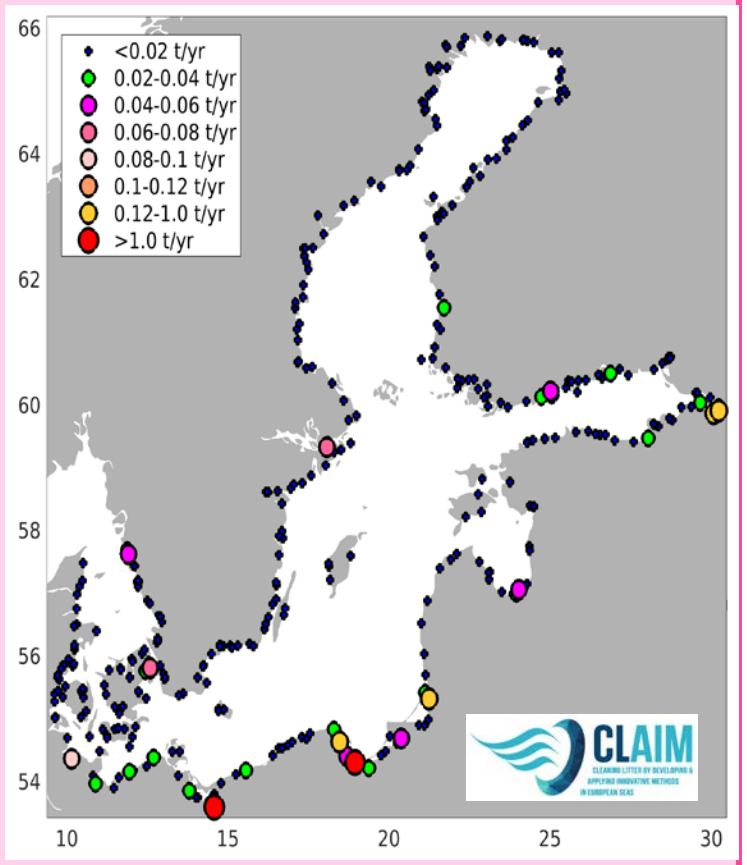
Norén et al., 2014

- >10 µm: 4 400 – 94 000
- >300 µm: 0-1.5

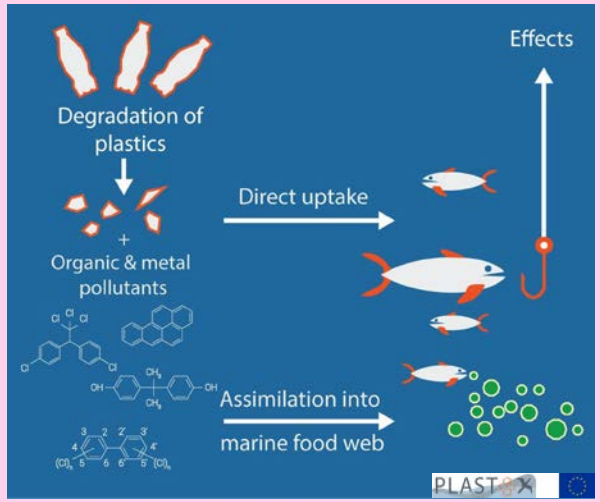
Dubaish and Liebezeit, 2013

- >1.2 µm: 64 000 (granular)
- >1.2 µm: 88 000 (fibre)

## Riverine input




## Impact




## INGA LIPS

Akadeemia Rd 15A, 12618 Tallinn, Estonia

**inga.lips@taltech.ee**