

# Presence of Microplastics in Potential Portuguese Areas for Aquaculture

## AQUIMAR Project Data

Division of Chemistry and Marine Pollution



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## Identification of the Portuguese coastal areas adequate for aquaculture:

### Study area:

Five coastal areas, from 30 m to 200 m bathymetry

Four estuarine areas (two lagoon-like systems and two single channel systems)

Characterization of oceanographic, physical, chemical, geologic and biologic conditions

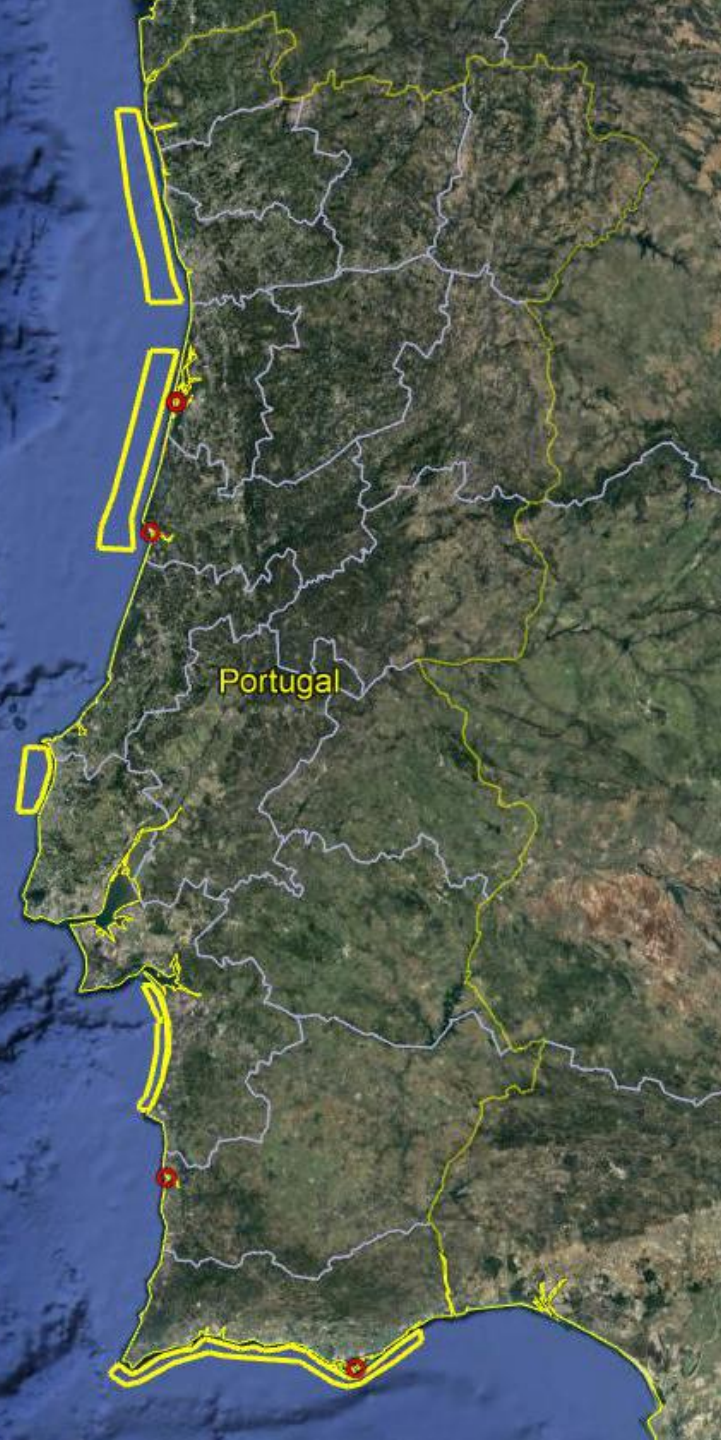
### Selection of the best areas:

Indication of the location of the aquaculture units;

Definition of the species to be grown

Optimization of the energetic efficiency of the species grown

**More: identification of microplastics.**





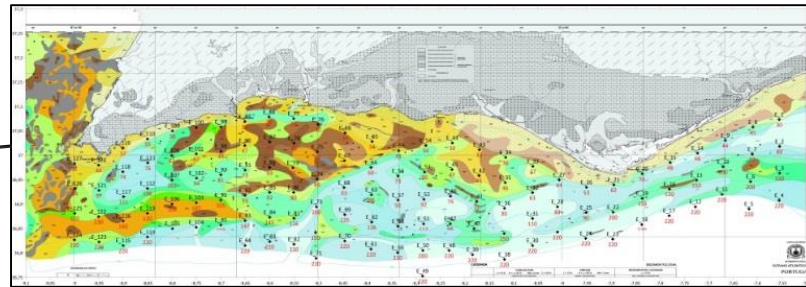
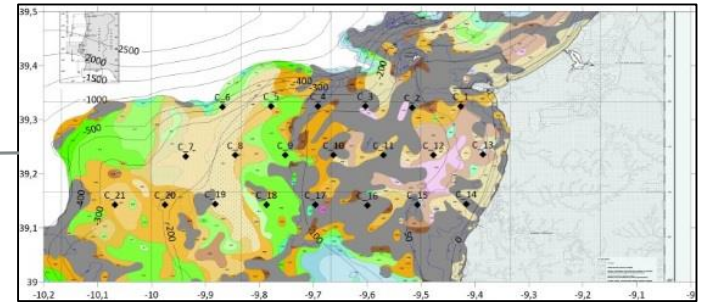
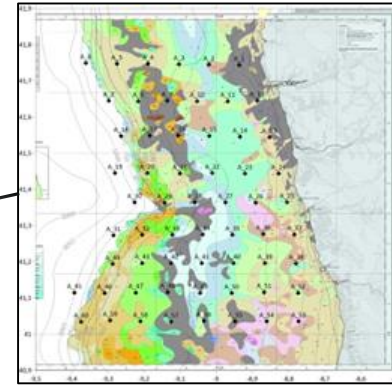
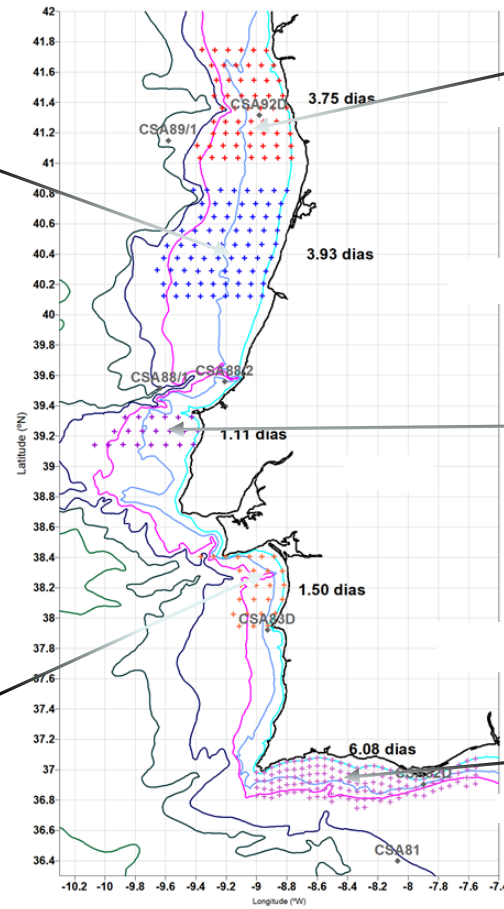
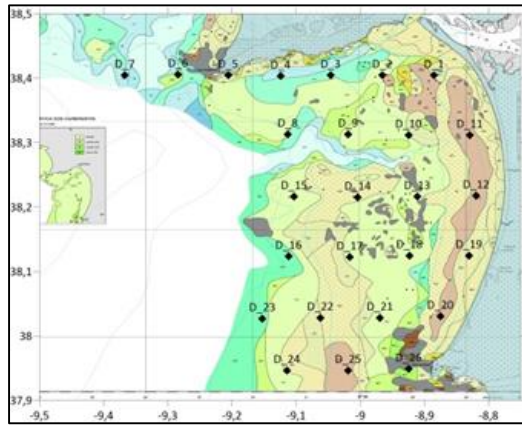
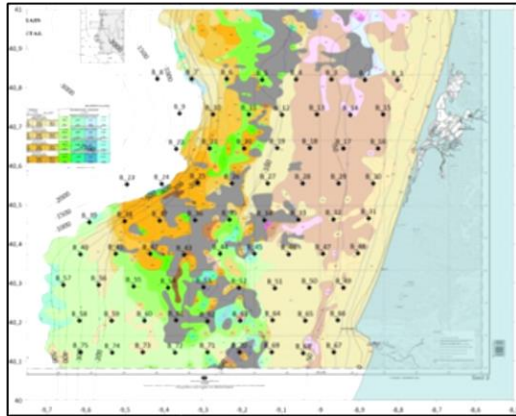
## More: identification of microplastics

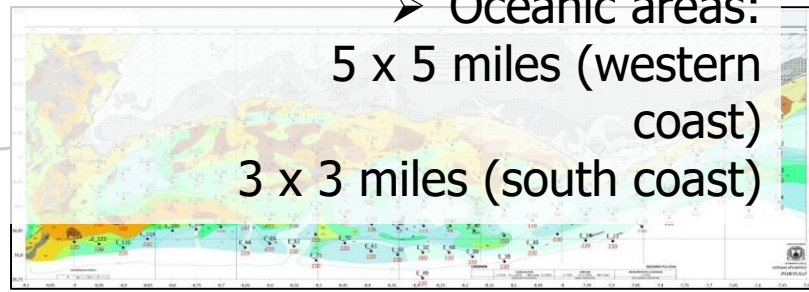
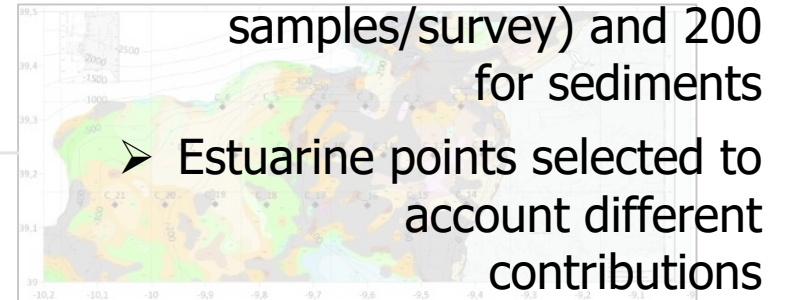
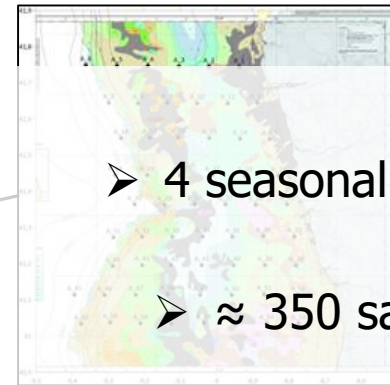
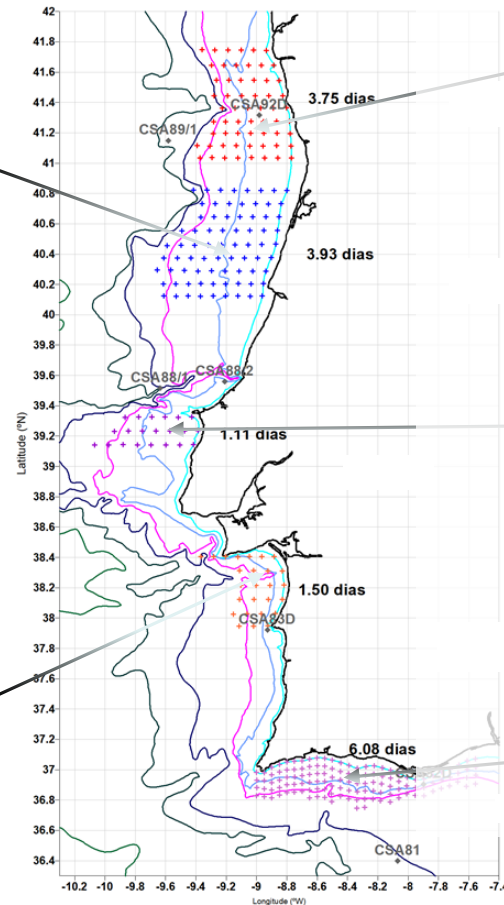
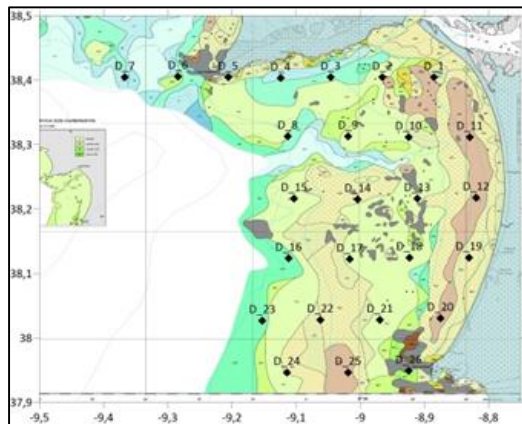
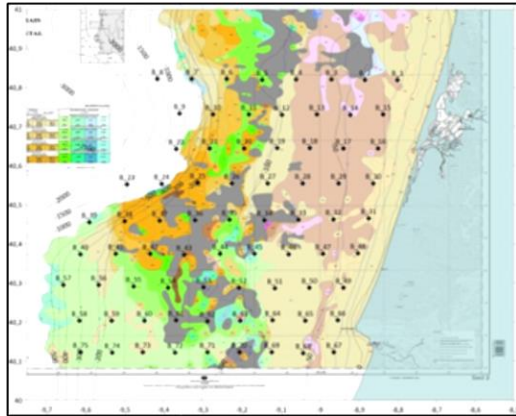
D10 Commission Decision (EU) 2017/848

“**D10C2 – Primary:** The composition, amount and spatial distribution of micro-litter on the coastline, in the surface layer of the water column, and in seabed sediment, are at levels that do not cause harm to the coastal and marine environment Member States shall establish threshold values for these levels through cooperation at Union level, taking into account regional or subregional specificities.”









## Sampling:

- 4 seasonal surveys (water & sediment)
- $\approx$  350 sampling points for water (900 samples/survey) and 200 for sediments
- Estuarine points selected to account different contributions
- Oceanic areas:  
5 x 5 miles (western coast)  
3 x 3 miles (south coast)



An underwater photograph showing a dense concentration of small, translucent, and brownish particles suspended in blue water, representing microplastics. A semi-transparent grey banner is overlaid across the middle of the image.

# WHAT ABOUT MICROPLASTICS?

Gregory & Andrady (2003)

Browne *et al.* (2007)

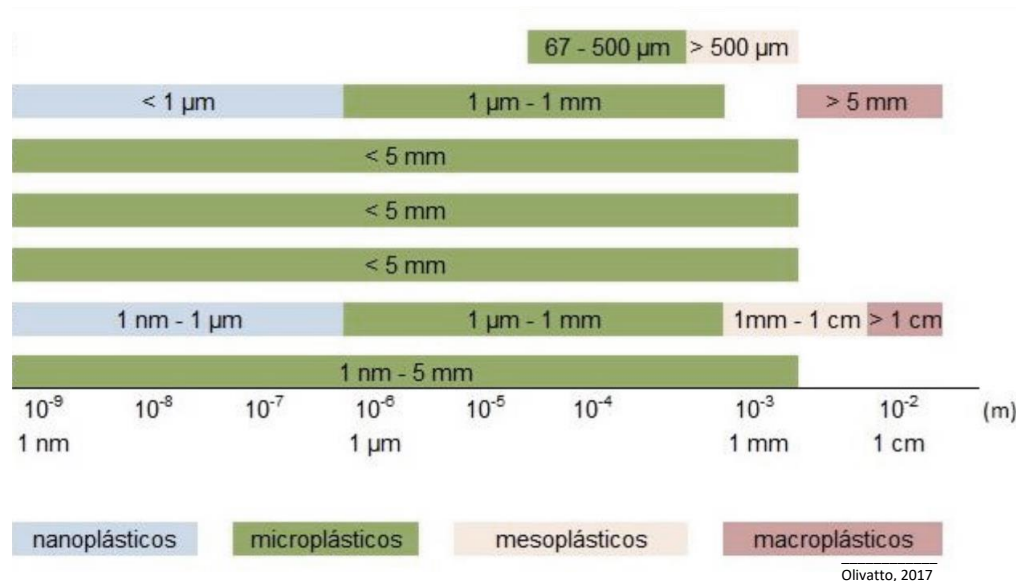
Arthur *et al.* (2009)

Hidalgo-Ruz *et al.* (2012)

Rocha-Santos (2015)

Hartmann *et al.* (2015)

GESAMP (2015)



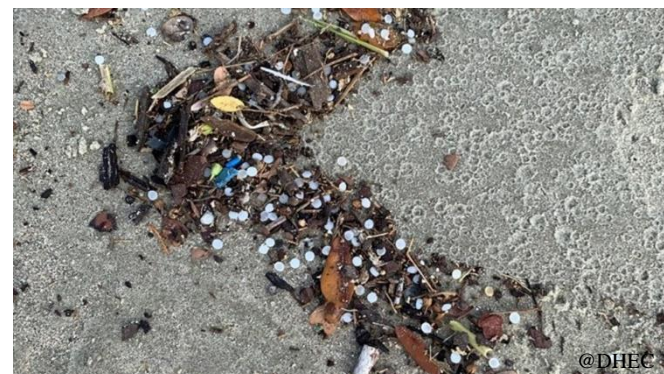
◆ Frias & Nash (2019)

*“Microplastics are any synthetic solid particle or polymeric matrix, with regular or irregular shape and with size ranging from 1  $\mu\text{m}$  to 5 mm, of either primary or secondary manufacturing origin, which are insoluble in water”.*

Frias & Nash, 2019



Small pieces of plastic that are purposefully manufactured: pellets, toothpaste microbeads, exfoliants and other cosmetics, plastic media air blasting technology.



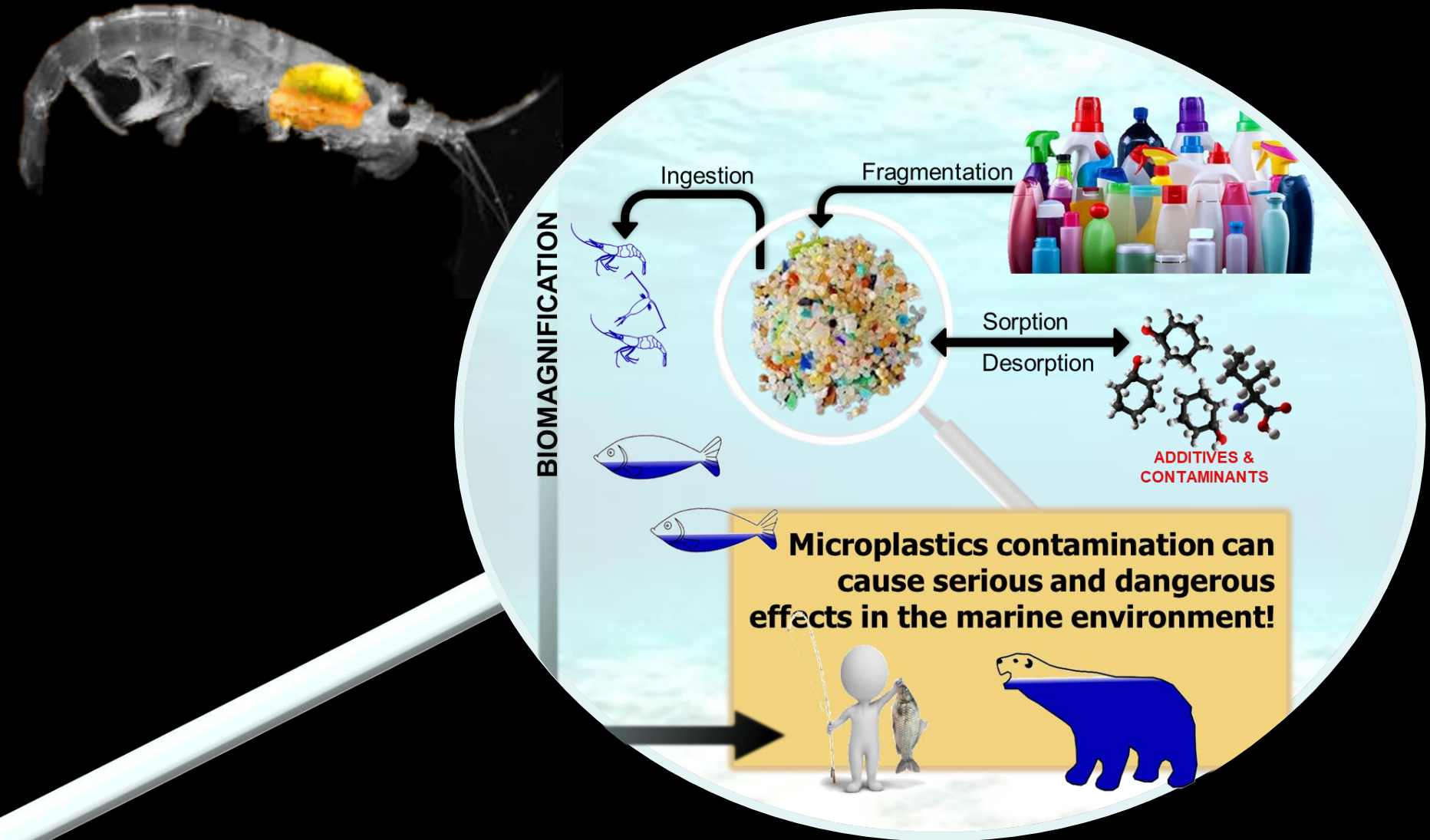




Small pieces of plastic derived from the breakdown of larger plastic debris (fragmentation).

- Culmination of physical, biological, and photodegradation.
- Reduction of the structural integrity of plastic debris.

# PROBLEM STATEMENT





## SEDIMENT



- River
- Beach
- Ocean
- Estuarine area

## WATER

- Superficial
- Column
- Bottom

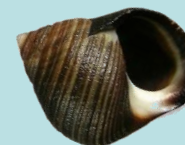
## BIOTA



*Mytilus edulis*



*Gobio gobio*



*Littorina littorea*

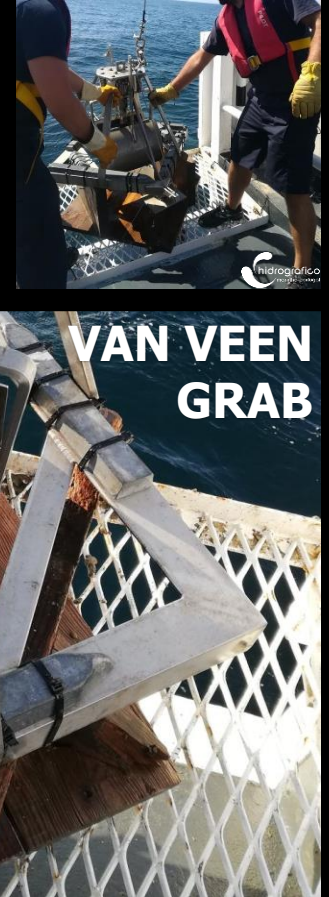


*Lepidochelys olivacea*





# SAMPLING EQUIPMENT AT IH



## 1 SIEVING

- ◆ Sample separation per size through a sieve.
- ◆ Usually sieves with a mesh size of  $\leq 5$  mm.
- ◆ Applied to both water and sediment samples.

## 2 SAMPLE DIGESTION

- ◆ Destruction of organic matter original from the sample matrix.  
**Organic matter causes interferences later on the analysis by FTIR**
- ◆ Liberation and/or clearance of microplastics from the sample matrix.

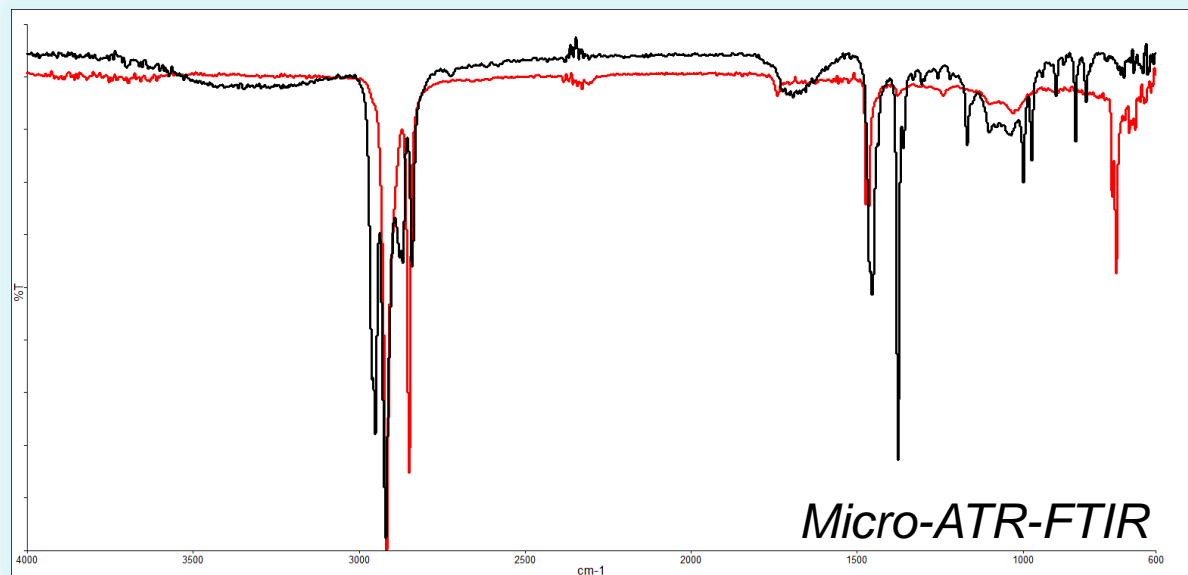
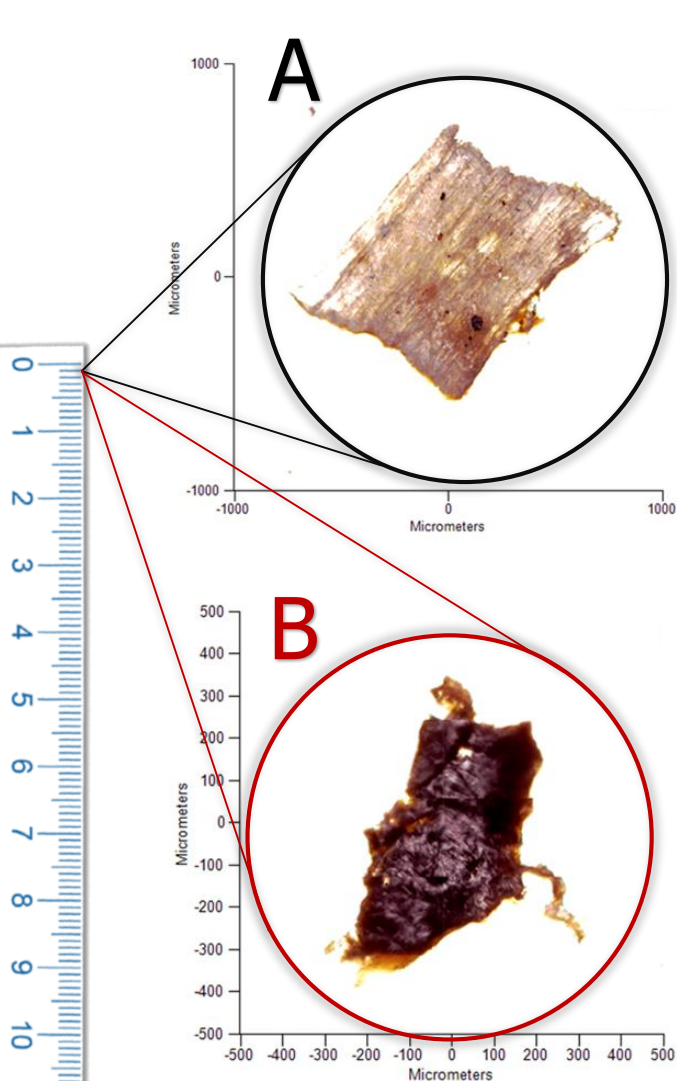
## 3 MICROPLASTICS FLOTATION

- ◆ Density separation between microplastics and the other (micro)particles.
- ◆ The difference of densities allows for microplastics buoyancy and the precipitation of remaining matter.  
NaCl saline solution was considered to perform this step.





- 🔍 Source
- 🔍 Physical properties
- 🔍 Chemical properties  
e.g. **POLYMER TYPE**
- 🔍 Erosion (if possible)



#  
SIZE

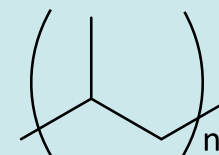
**A**

1.8 mm

**B**

800 μm

POLYMER



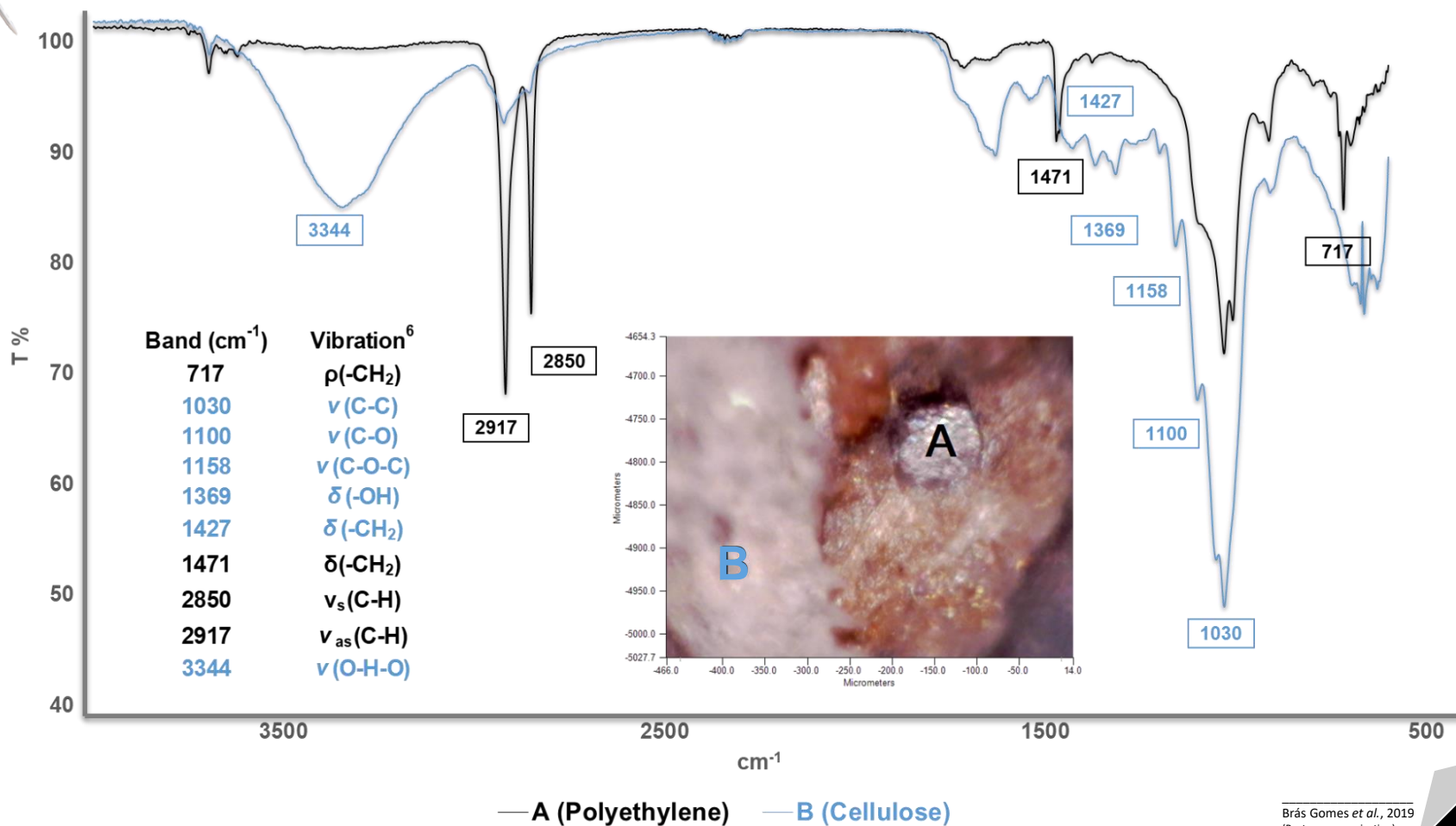
Polypropylene



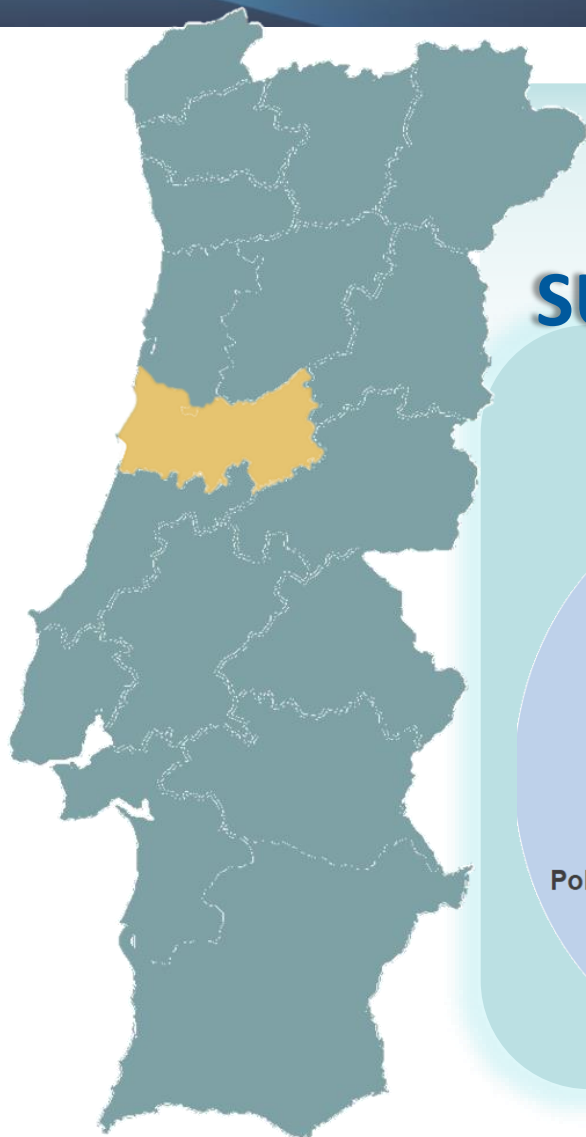
Polyethylene



# ONE PARTICLE, TWO SITES

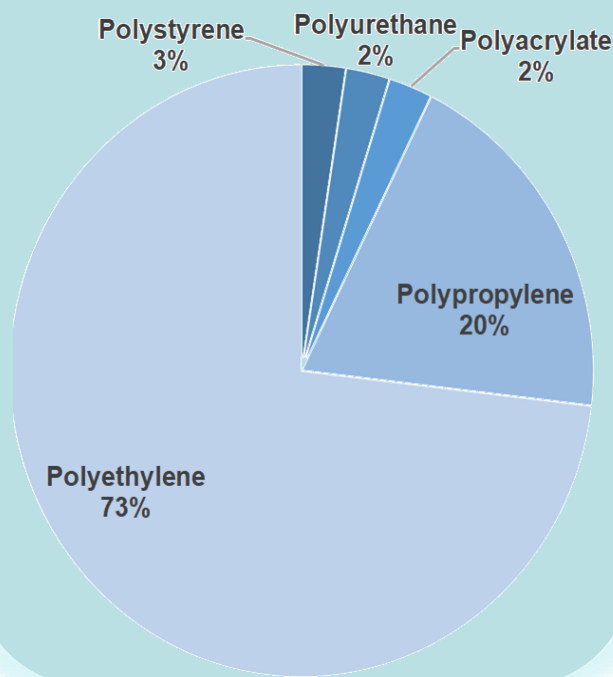


Brás Gomes *et al.*, 2019  
(Poster communication)

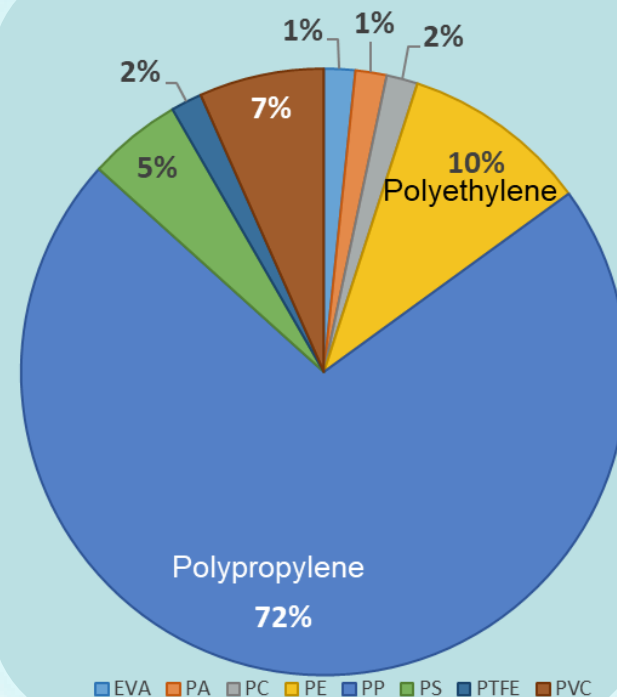


## MONDEGO RIVER

### SURFACE WATER



### SEDIMENT





# THANK YOU

