



The PB-MPAs Toolkit on marine litter monitoring: Sea-surface (macrolitter, microlitter)

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Regional Training on harmonized ML monitoring protocols – October 12-14, 2021



Project co-financed by the European
Regional Development Fund

Site selection

Simultaneous monitoring of Floating Micro- and Macro-litter

The methodologies for monitoring floating macro- and micro-litter have been developed both to be tailor-made according to the size of the different Marine Protected Areas

For **large MPAs**, comprising of pelagic areas:

- The number of transects should be adequate for a representative spatial coverage of the area.
- Daily sea surface currents forecast should be taken into consideration for the exact positioning of the transects and in order to include hotpost/coldspot areas

For **medium** and **small MPAs** confined to coastal waters around and in between small islands:

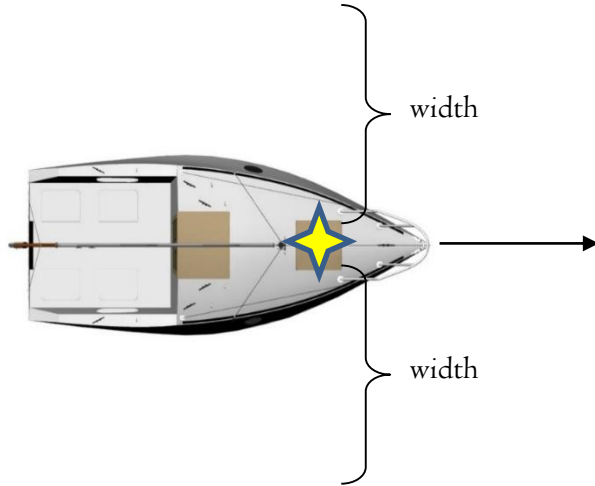
- An adequate number of sampling sites is first defined, based on the morphology and orientation of the island (shape, presence of inlets and gulfs, etc.) in order to cover all parts around the islands (N, S, E, W).
- Then, at each sampling site, three transects should be conducted from as close as possible to the coast and up to 2 to 3 nautical miles offshore depending on the size of the MPA.

At least two surveys, one in autumn and one in early spring should be carried out.

The proposed survey periods are:

- Autumn: mid-September to mid-October
- Spring: March-April.

Monitoring of Floating Macro-Litter (FMML)



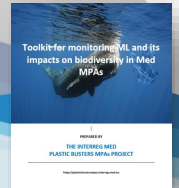
Visual observation from the bow
 Fixed Width Strip Transect method
MEDSEALITTER
 Strip width: 6 m
 Time: 30 minutes

Floating MACROLITTER

ID CODE:		Floating MICROLITTER code:	
Sampling date:			
Observer Name			
VESSEL CHARACTERISTICS			
Vessel name		Name of the vessel	
Type of vessel		Type e.g. research, fishing, hired, regular ferry etc.	
Vessel length and weight		Length of the vessel (m) (optional) Gross weight of the vessel (tonnes) (optional)	
VISUAL SURVEY TRANSECT DETAILS			
Latitude/longitude start		Recorded as 000.0000 degrees at the start of the sample unit	
Latitude/longitude end		Recorded as 000.0000 degrees at the end of the sample unit	
Time start		Recorded as 00:00:00 at the start of the sample unit	
Time end		Recorded as 00:00:00 at the start of the sample unit	
Coordinates system		Datum and coordinate system employed	
Vessel speed		Average ship speed in knots	
Observation height		Observation elevation above the sea	
Observation ZONE			
Distance covered		Total distance covered by the transect (m)	
Time start/end		Time over which the survey took place	
Surface covered		Area covered by the vessel (km ²)	
ENVIRONMENTAL PARAMETERS - OBSERVATION DETAILS			
Wind speed		Recorded in (Beaufort)	
Wind direction		Tick more than one boxes e.g. for SE wind <input type="checkbox"/> N <input type="checkbox"/> E <input type="checkbox"/> S <input type="checkbox"/> W	
Sea surface salinity		Expressed in ‰/‰ when reporting	
Viewing quality		Good/Moderate/Poor; in the latter two case state cause (e.g. fog)	
Sea state		Expressed in accordance with the Douglas Sea Scale (0-9)	
NOTES			



Code	Description	TYPE OF MATERIAL		
		ARTIFICIAL POLYMER MATERIALS	RUBBER	CLOTH/TEXTILE
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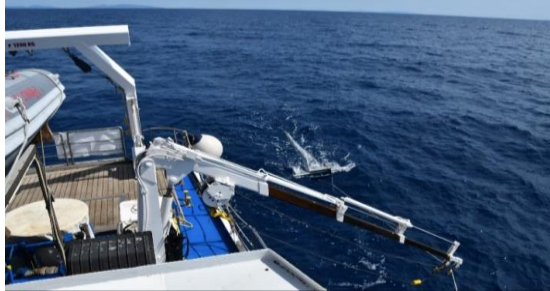


Note and remarks:

FMML



Monitoring of Floating Microplastics



Manta trawl equipped with a flowmeter

Mouth opening: **60 x 15 cm**


Mesh size: **330 µm**

Time: **30 minutes** (1.5 - 2 knots)

Sampling carried out using small vessels at low wind conditions (0-2 Beauforts) should be recorded by a portable anemometer or by ship's instruments.

Both start and end position should be recorded with GPS as well as the track.




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PLASTIC BUSTERS MPAs

Floating MICROLITTER

ID code:		Floating MACROLITTER code:		
Sampling date:				
<input type="checkbox"/> Surface waters (s)(Manta trawl)		<input type="checkbox"/> Water column (wc) (WP2 net)		
Sampling site:		Latitude	Longitude	Time
	Start			
	End			
Vessel speed:				
Duration of the trawl:				
Weather condition	Sea:	Sky:		
	Water temp.:	Wind:		
Bathymetry (m):				
Flowmeter	Start:	End:		
Depth reached (wc):				
Frozen sample	Contaminants			
Fixed sample	Ethanol _____ %			
	Volume			
Biota/Neuston	ID code :	N°. ind. pool:		

Manta sampling: floating microlitter



PLASTIC BUSTERS

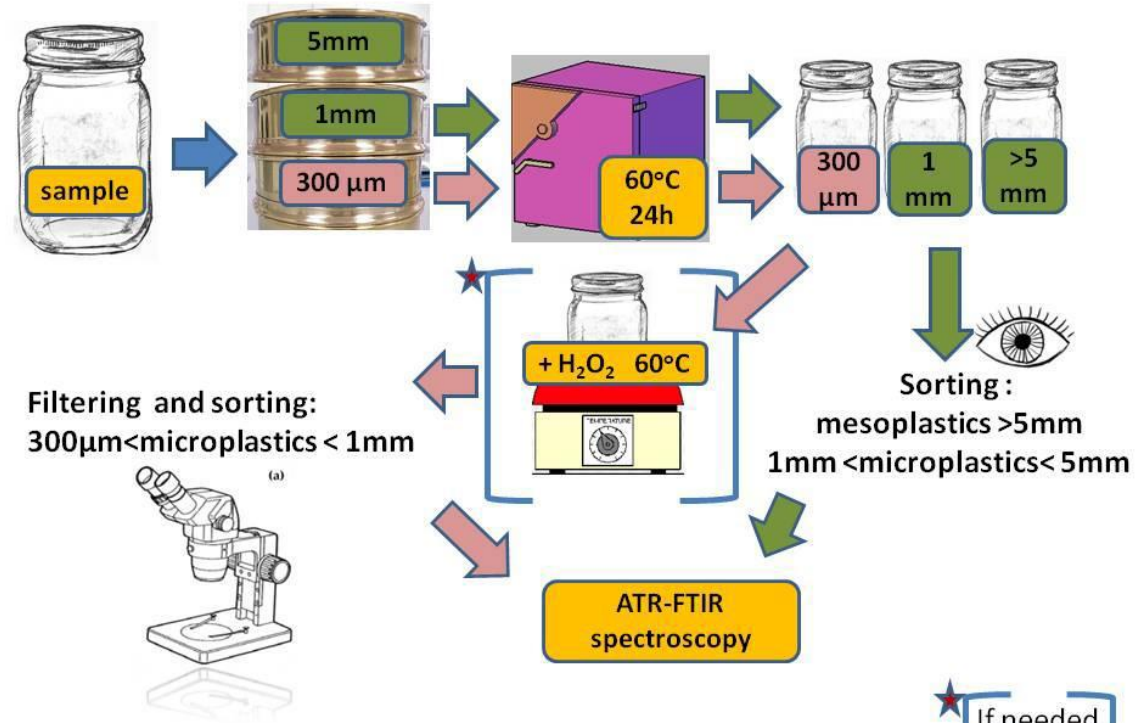
European

Sample processing and size classification

The sample collected in the cod-end should then be rinsed with seawater on a 300 μm metallic sieve and transferred in glass jars with seawater. Any natural debris items, such as leaves, twigs, seaweed etc., should be rinsed separately above the sieve and removed from the sample.

Microlitter is classified in three size classes:

- Mesolitter (5 mm-25 mm)
- Large Microlitter LML (1mm-5mm)
- Small Microlitter SML (300 μm – 1mm)



Adapted from Adamopoulou et al., 2015

Expression of the results

Macrolitter

The unit in which macrolitter will be assessed on the sea surface will be 'number of items' and it will be expressed as counts of litter items per square kilometer (litter items/km²).

In order to compute the exact surveyed area, GPS coordinates must be recorded regularly (every min) to obtain an accurate measurement of the travelled transect. A handheld GPS unit might be handy in this respect.

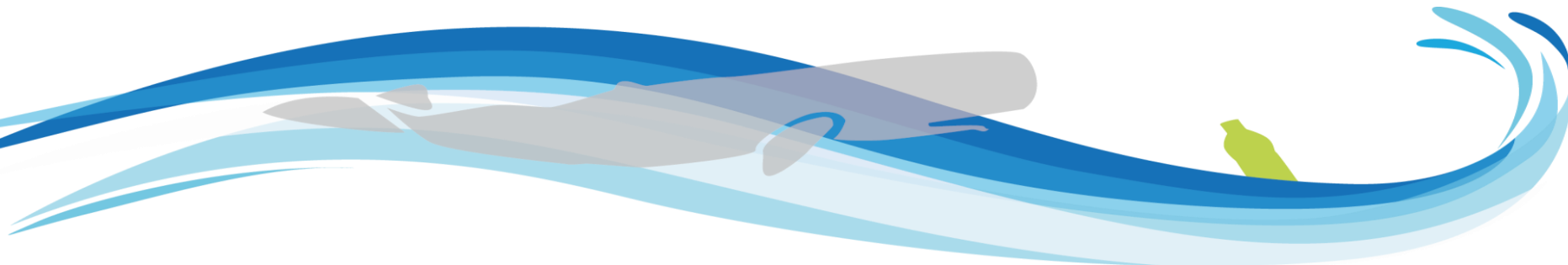
Microlitter

Microlitter counts (N) are reported as follows:

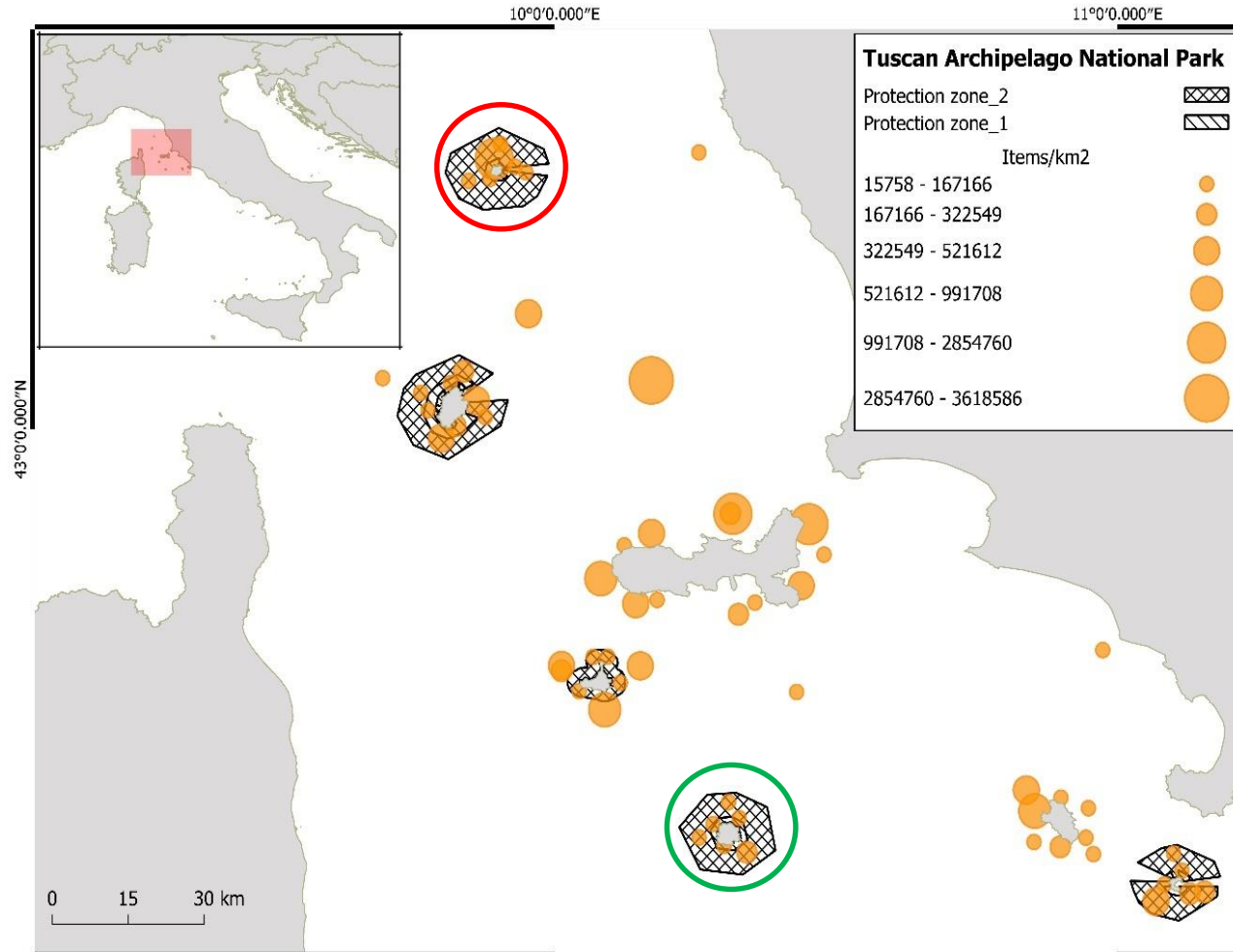
- N per km² or N per m², based on the start - end transect coordinates and the dimensions of the manta net mouth.
- N per Km³ or N per m³, based on flow meter indication and relevant formula.

Microlitter mass is reported as follows:

- g per km² or g per m²
- g per Km³ or g per m³



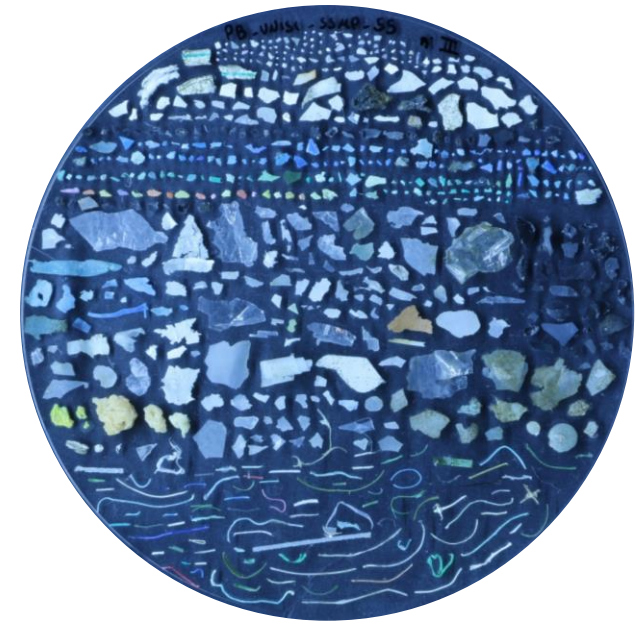
Example of an output: Sea surface Micro-Litter



N°. 71 samples

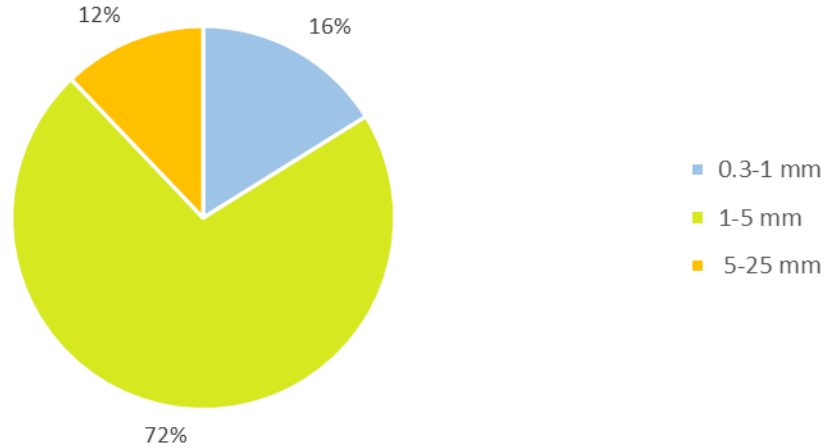
40,225 items isolated

Mean concentration: 298,750 items/km²

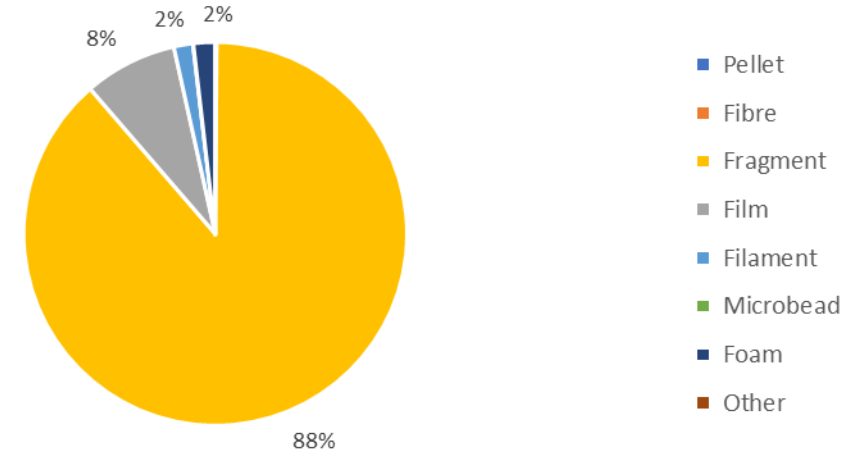


Example of an output: Micro-Litter shape, colours and dimension

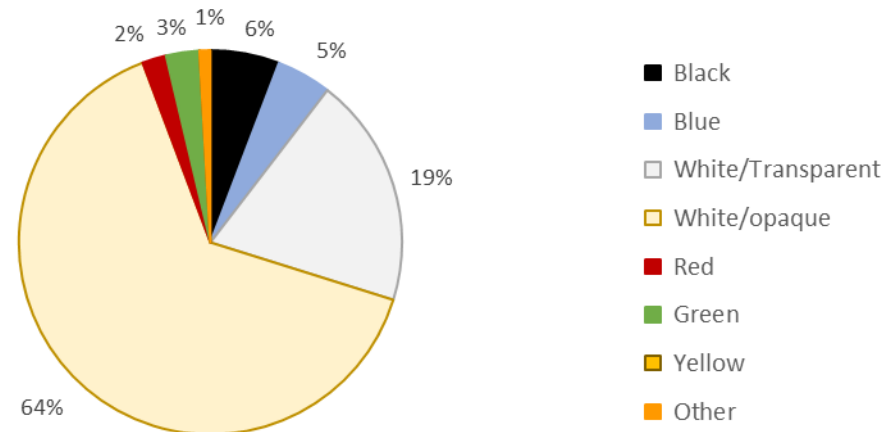
PNAT: floating meso and microlitter size classes



PNAT: floating microlitter types



PNAT: floating microlitter colors





Thank you!

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