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

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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.

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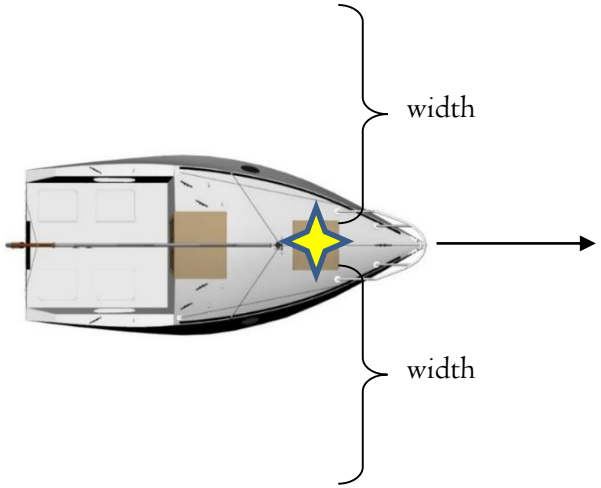
Monitoring of Floating Macro-Litter (FMML)



Visual observation from the bow

Fixed Width Strip Transect method

MEDSEALITTER

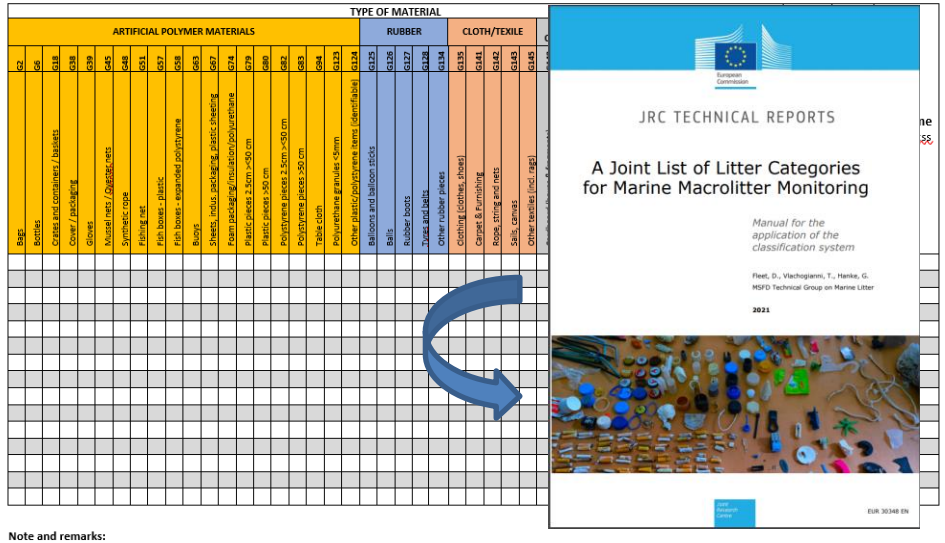
Strip width: **6 m**

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 (~~metres~~) Gross weight of the vessel (~~tonnes~~)*
VISUAL SURVEY TRANSECT DETAILS			
Latitude/longitude start			*Recorded as ~~deg minute~~ degrees at the start of the sample unit*
Latitude/longitude end			*Recorded as ~~deg minute~~ degrees at the end of the sample unit*
Time start			*Recorded as ~~hh:mm:ss~~ at the start of the sample unit*
Time end			*Recorded as ~~hh:mm:ss~~ 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 (km²)*
ENVIRONMENTAL PARAMETERS - OBSERVATION DETAILS			
Wind speed			*Recorded in (Beaufort)*
Wind direction	☐ N ☐ E ☐ S ☐ W		*Tick more than one boxes e.g. for SE wind*
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)*

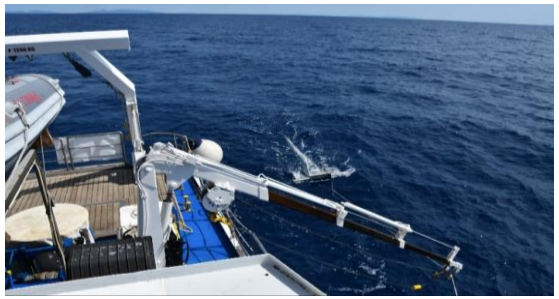
NOTES.....



Note and remarks:

FMML

Monitoring of Floating Microplastics




Manta trawl equipped with a flowmeter

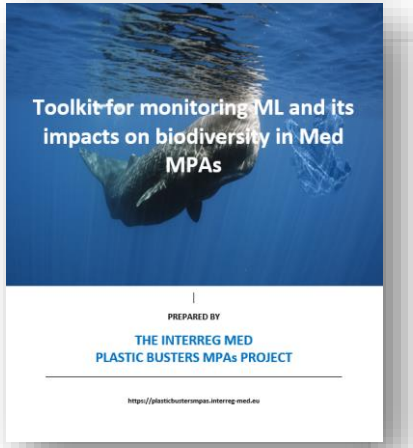
Mouth opening: **60 x 15 cm**

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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Floating MICROLITTER

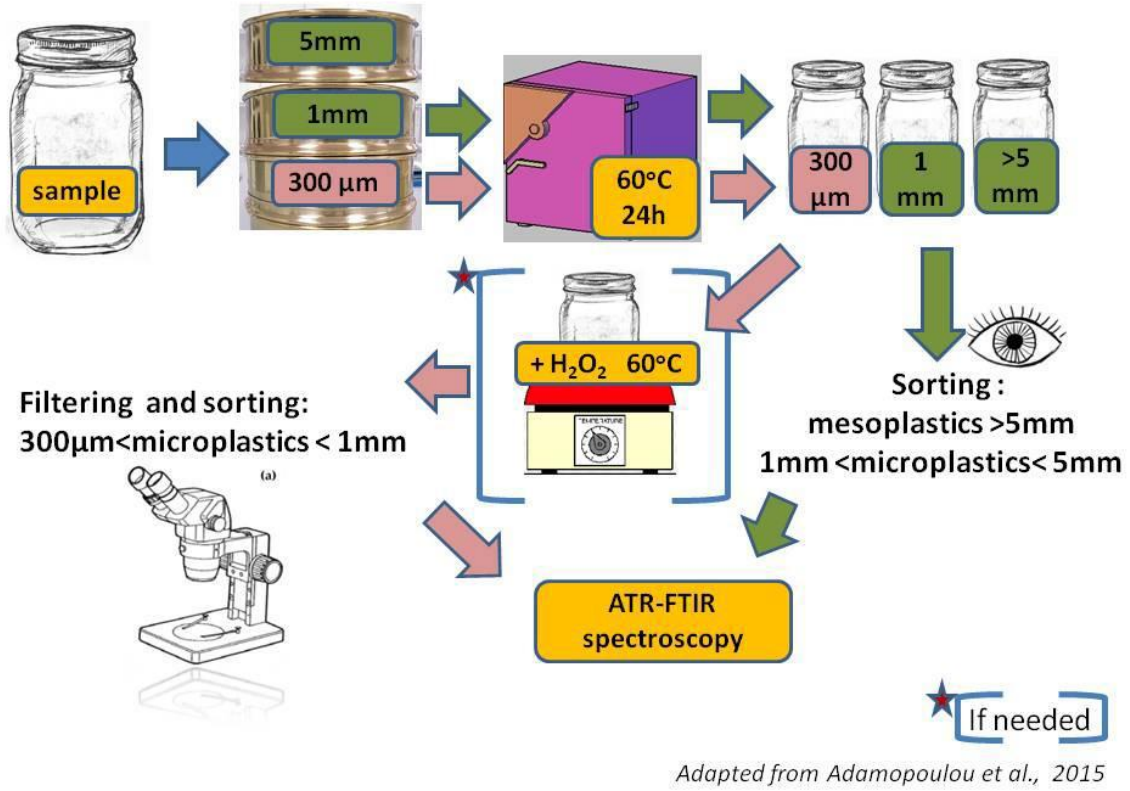
ID code:		**Floating MACROLITTER code:**	
Sampling date:			
☐ Surface waters (s)(Manta trawl)		☐ Water column (wc) (WP2 net)	
Sampling site:		**Latitude**	**Longitude**	**Time**
	Start			
	End			
Vessel speed:			
Duration of the trawl:			
Weather condition	**Sea:**	**Sky:**	
	Water temp.:	**Wind:**	
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

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 (300µm – 1mm)



Adapted from Adamopoulou et al., 2015

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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

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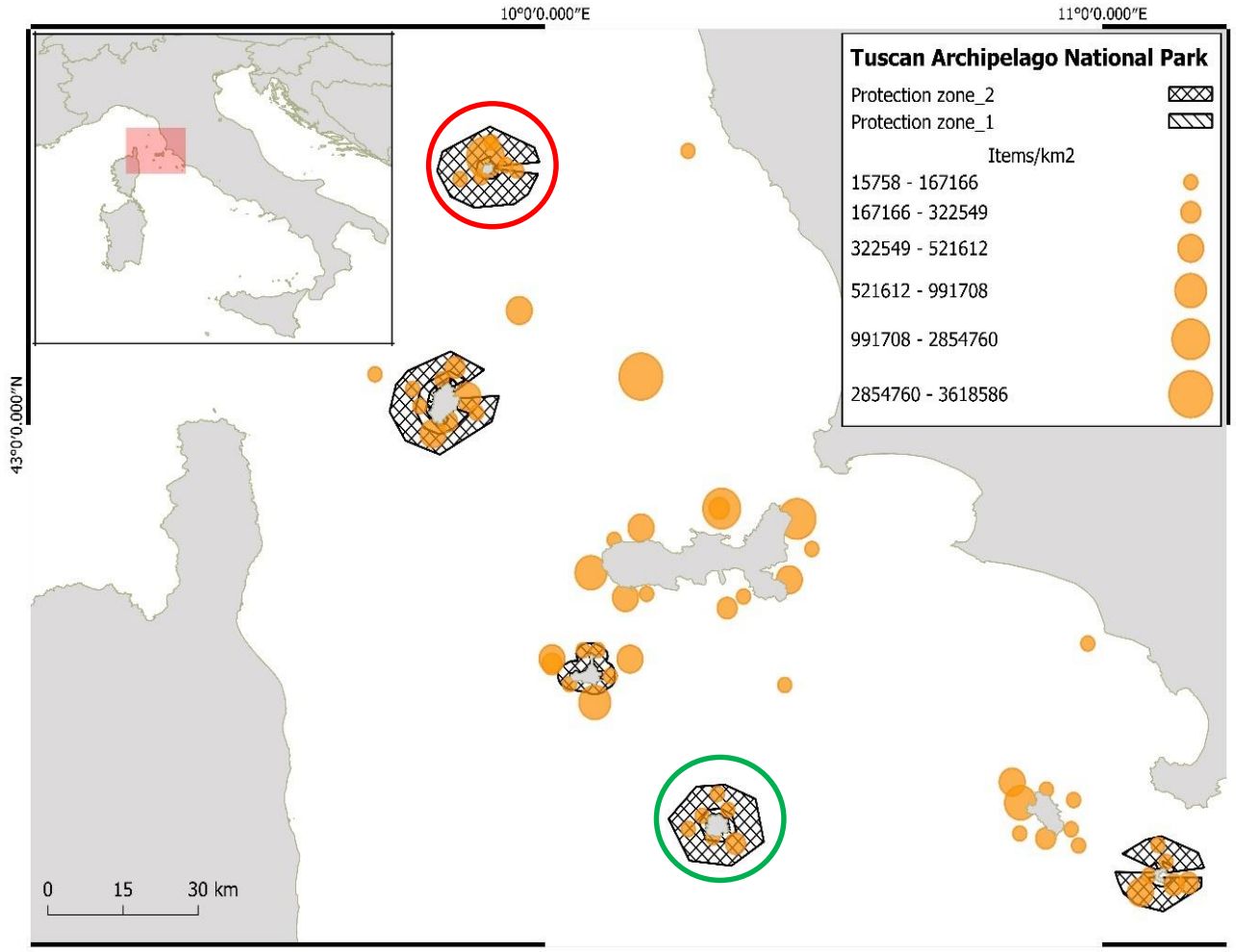
Example of an output: Sea surface Micro-Litter



N°. 71 samples

40,225 items **isolated**

Mean concentration: 298,750 items/km²

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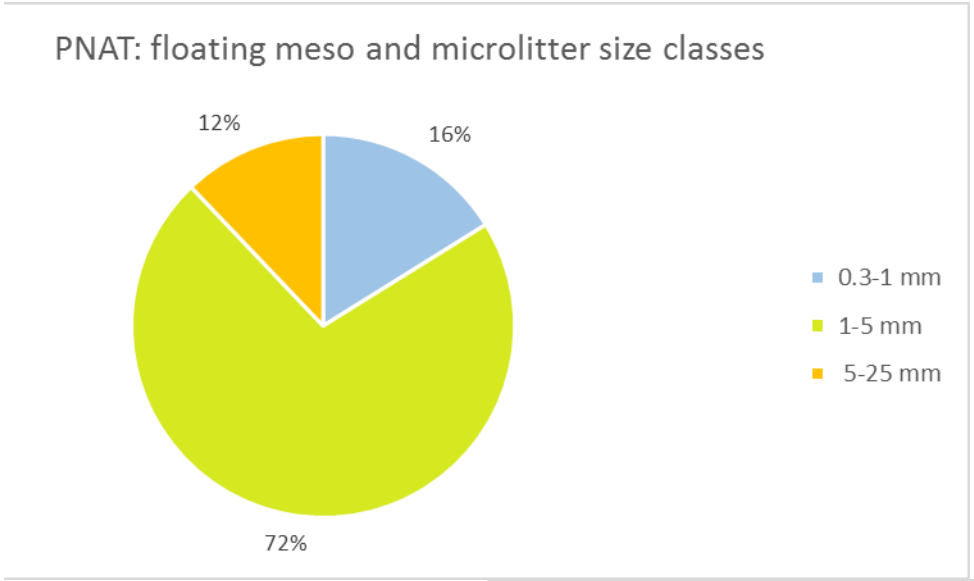
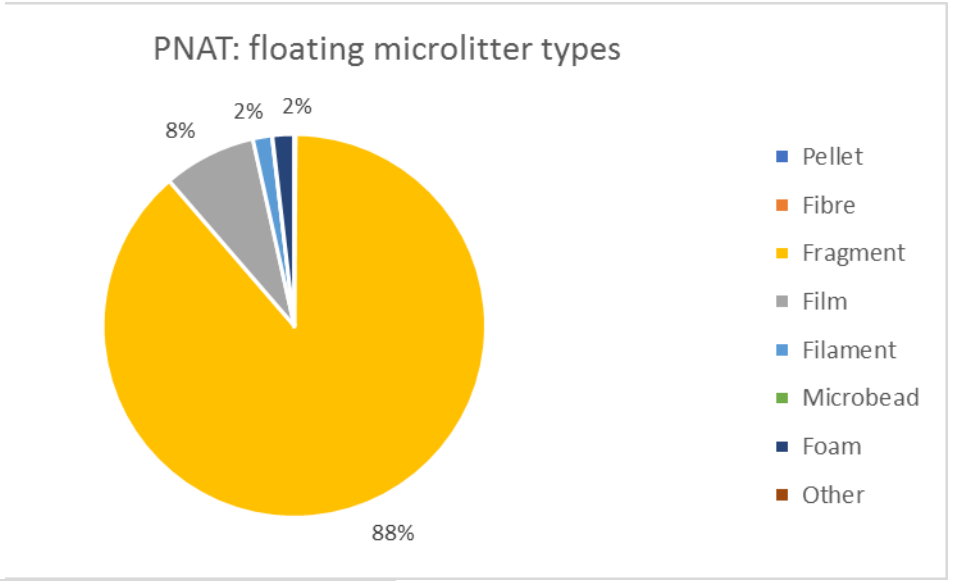
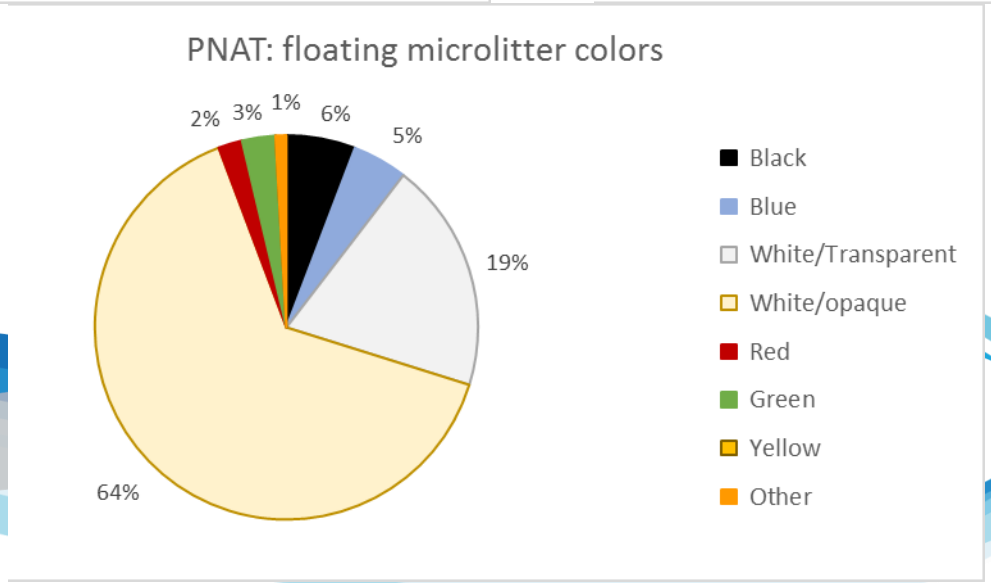
Example of an output: Micro-Litter shape, colours and dimension







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Thank you!

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