Monitoring the presence and effects of marine litter in Mediterranean MPAs: the Plastic Busters MPAs protocols

PREPARED BY

THE INTERREG MED
PLASTIC BUSTERS MPAs PROJECT

Interreg Mediterranean
EUROPEAN UNION
PLASTIC BUSTERS MPAs

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Document Information

This document (Deliverable 5.2.1) is a compilation of all the protocols that should be applied in order to elaborate a comprehensive diagnosis of the presence and effects of marine litter in Mediterranean MPAs.

Approvals

Date	Partner
20/4/2022	M.C. Fossi/UNISI (Project Scientific Coordinator, Task Leader)
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1. Introduction

1.1 Marine litter a lurking threat in Mediterranean MPAs

The Mediterranean Sea is one of the areas most affected by marine litter worldwide. Marine litter - any persistent, manufactured or processed solid material- is found lying on the shores, as well as floating anywhere from the surface to the bottom of the sea. Even in pristine environments of the Mediterranean, such as coastal and marine protected areas (MPAs), marine litter is building up, threatening habitats and species. Impacts vary from entanglement and ingestion, to bio-accumulation and bio-magnification of toxic substances released from litter items, facilitation of introduction of invasive species, damages to benthic habitats, etc. MPA managers stand at the forefront of this issue, and admittedly they lack the tools, knowledge, and often the resources to effectively tackle it. As a result, the achievement of the conservation goals set is hampered.

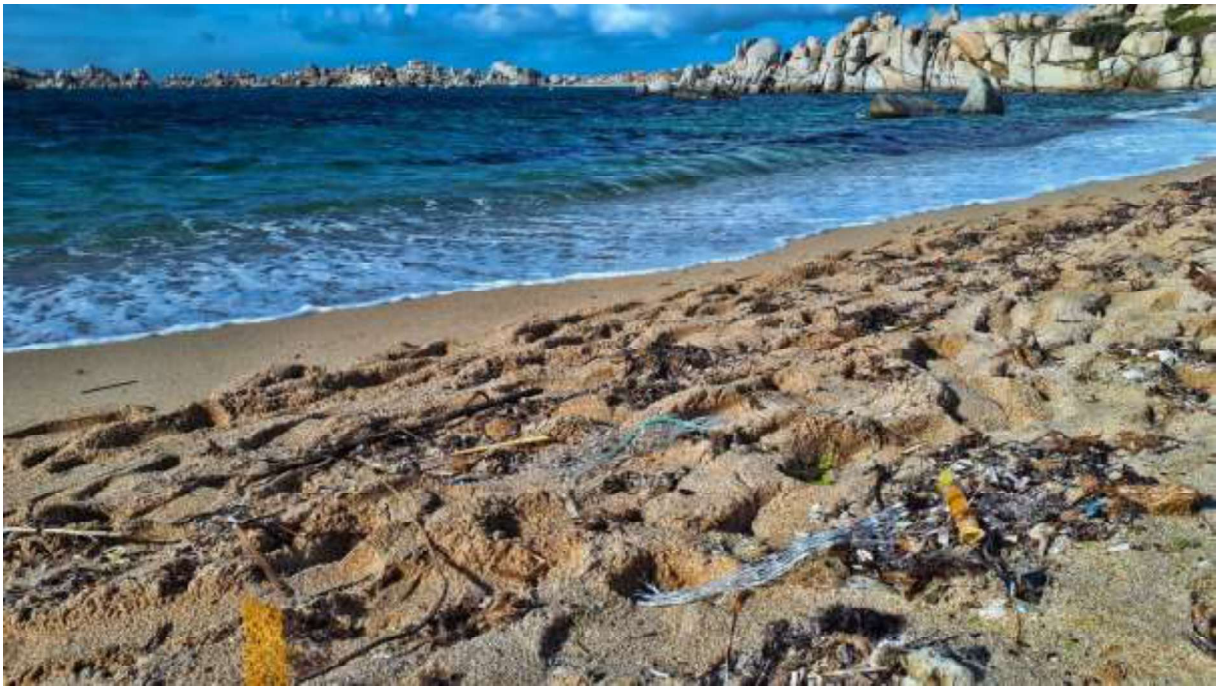

Figure 1-1. *Marine litter a lurking threat in Mediterranean MPAs (Photo © Th. Vlachogianni).*

1.2 The Plastic Busters MPAs project in a nutshell

The 4-year-long Interreg Med Plastic Busters MPAs project aimed at contributing to biodiversity protection and preservation of natural ecosystems in pelagic and coastal marine protected areas (MPAs), by defining and implementing a harmonized approach against marine litter. The project entailed actions that addressed the entire management cycle of marine litter, from monitoring and assessment to prevention and mitigation, as well as actions to strengthen networking between and among pelagic and coastal MPAs.

Plastic Busters MPAs consolidated Mediterranean efforts against marine litter by:

- Assessing the impacts of marine litter on biodiversity in MPAs and identifying marine litter 'hotspot' areas;
- Defining and testing tailor-made marine litter surveillance, prevention and mitigation measures in MPAs;
- Developing a common framework of marine litter actions for Interreg Mediterranean regions towards the conservation of biodiversity in Mediterranean MPAs.

The Plastic Busters MPAs project deployed the multidisciplinary strategy and common framework of action developed within the Plastic Busters initiative led by the University of Siena and the Sustainable Development Solutions Network Mediterranean (SDSN Med). This initiative frames the priority actions needed to tackle marine litter in the Mediterranean basin and was labelled under the Union for the Mediterranean (UfM) in 2016, gathering the political support of 43 Euro-Mediterranean countries.

Figure 1-2. *The Plastic Busters MPAs project in a nutshell.*

1.3 Definitions and policy context

Within this document, marine litter is defined as any persistent, manufactured or processed solid material discarded, disposed of, or abandoned in the marine and coastal environment. Marine litter can be classified in size classes as follows: macrolitter refers to items larger than 25 mm in the longest dimension, mesolitter to items between 5 mm to 25 mm, and microlitter to items ranging from 1 µm to 5 mm. This latter size class is sometime further broken down into large microlitter ranging from 1 mm to 5 mm and microplastic, from 1 µm to 1 mm in size.

The main legislative frameworks related to marine litter monitoring are the EU Marine Strategy Framework Directive – MSFD (2008/56/EC, 2010/477/EC, 2017/848/EC) and the Barcelona Convention Ecosystem Approach (COP19 IMAP Decision IG.22/7, UNEP/MED WG.450/3, June 2018) (see Box 1.1 and Box 1.2).

Box 1.1. *The Marine Litter Descriptor, criteria, and respective Indicators within the framework of the EU MSFD.*

Marine Litter within the EU MSFD

Descriptor 10: ***Properties and quantities of marine litter do not cause harm to the coastal and marine environment***

Criteria D10C1 - Primary: The composition, amount and spatial distribution of litter on the coastline, in the surface layer of the water column, and on the seabed are at levels that do not cause harm to the coastal and marine environment.

- amount of litter washed ashore and/or deposited on coastlines, including analysis of its composition, spatial distribution and, where possible, source (10.1.1)
- amount of litter in the water column (including floating at the surface) and deposited on the seafloor, including analysis of its composition, spatial distribution and, where possible, source (10.1.2)

Criteria 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.

- amount, distribution and, where possible, composition of microparticles (in particular microplastics) (10.1.3)

Criteria D10C3 - Secondary: The amount of litter and micro-litter ingested by marine animals is at a level that does not adversely affect the health of the species concerned.

- amount and composition of litter ingested by marine animals (10.2.1)

Criteria D10C4 - Secondary: The number of individuals of each species, which are adversely affected due to litter, such as by entanglement, other types of injury or mortality, or health effects.

Box 1.2. *The Marine Litter Operational Objectives and respective Indicators within the framework of the Barcelona Convention Ecosystem Approach and the Integrated Monitoring and Assessment Programme (IMAP).*

Marine Litter and the Barcelona Convention Ecosystem Approach

Ecological Objective 10 (EO10): Marine and coastal litter do not adversely affect the coastal and marine environment.

IMAP Common Indicator 22:

Trends in the amount of litter washed ashore and/or deposited on coastlines (including analysis of its composition, spatial distribution and, where possible, source).

IMAP Common Indicator 23:

Trends in the amount of litter in the water column including micro plastics and on the seafloor.

IMAP Candidate Indicator 24:

Trends in the amount of litter ingested by, or entangling marine organisms, focusing on selected mammals, marine birds, and marine turtles.

1.4 About this document

The overarching aim of this document is to provide an operational protocolfor implementing the Plastic Busters MPAs harmonized marine litter monitoring approach and assess the presence and effects of marine litter in pelagic and coastal Mediterranean MPAs with special emphasis on marine species, including endangered ones (cetaceans, sea turtles, birds, endangered sharks, etc.). In this respect, this document is a compilation of all the protocols that should be applied in order to elaborate a comprehensive diagnosis of the marine litter problem in Mediterranean MPAs.

This document takes stock of all recent advances made by the EU MSFD Technical Group on Marine Litter and the Barcelona Convention CORMON Group. Furthermore, this document capitalizes on the outcomes of relevant projects such as the IPA-Adriatic DeFishGear project, the EU-funded INDICIT project and the Interreg Med marine litter related projects, namely the MEDSEALITTER, AMARE and ACT4LITTER.

Photo © Th. Vlachogianni

7. Methodology for monitoring MACROLITTER on the seafloor with bottom trawl surveys

This document describes the methodological approach for monitoring macrolitter on the seafloor. It has been compiled based on the related methodology developed within the IPA-Adriatic DeFishGear and the 2022 MSFD TGML Updated Guidance on Monitoring of Marine Litter in European Seas, while taking into account the results from the Plastic Busters MPAs testing phase.

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7.1. Site selection

Sites should be selected to ensure that they:

- ✓ Comprise areas with uniform substrate (ideally sand/silt bottom);
- ✓ Consider areas that might accumulate litter;
- ✓ Avoid areas of risk (presence of munitions), sensitive or protected areas;
- ✓ Do not exert impacts on any endangered or protected species.

Sites should be chosen following a two-fold approach: (i) selecting sites that meet certain criteria (e.g. are close to ports, river mouths, cities, etc.); (ii) choosing randomly from a large number of sites.

7.2. Frequency and timing of surveys

The proposed survey periods are:

- ✓ Autumn: October
- ✓ Spring: April

Following the MEDITS protocol, the hauls should be ideally performed during daylight. The daylight period is defined as the time between 30 minutes after sunrise and 30 minutes before sunset.

7.3. Sampling unit and sample size

With regards to the sampling area, the MEDITS survey uses a depth stratified sampling scheme with random selection of trawling sites (same positions each year) within each stratum. Within this methodology, the following strata are proposed to be sampled: 10-50, 50-100, 100-200, 200-500 and 500-800 m. The size of the sampling area should be defined by each surveying team on the basis of the resources available for this task. The sampling density will be at least 2-3 stations (hauls) per 1000 km^2 in each stratum (average sampling density of the MEDITS survey) and/or 2-3 stations per sampling stratum.

7.4. Trawling operation

Given that surveys might be performed with otter trawl fishing fleets or research vessels which use different gear (unlike the MEDITS surveys which use GOV nets), with no acoustic equipment, etc., it is evident that handling operations and parameters (such as type of mesh, mesh size of cod end, etc.) during the surveys cannot be standardized among and between the teams performing them. Nevertheless, MEDITS survey protocol should be followed as close as possible as described below:

- **Haul position & orientation:** The hauls should be positioned following a stratified sampling design, including at least three strata: 20-50 m; 51-100 m; 101-200 m, wherever possible. The hauls should be made over the same position in each sampling survey. The depth variations during the haul should not exceed ± 5% relative to the initial depth. The discrepancies to this target should be recorded. As far as possible, the hauls should be rectilinear.
- **Haul speed & duration:** The vessel speed should be 3 knots during the haul. However, if the skipper indicates that a slightly different speed is appropriate for optimal gear operation (depends on net characteristics) the vessel speed can be altered accordingly. In any case, vessel speed, hauling depth and geographical position should be continuously monitored during the haul (e.g. every 5 min). The haul duration is fixed at 30 min.
- **Haul start and end definition:** The start of the haul is defined as the moment at which the trawl geometry (vertical and horizontal) is stabilized. In the absence of electronic equipment

(acoustic devices like SCANMAR, etc.) the actual start time will be indicated by the skipper. The end of the haul is defined as the moment at which warp hauling begins.

- **Gear characteristics:** Cod-end mesh size and head rope length should be recorded.

7.5. Litter size classes to be surveyed

The following size range classes will be reported for each recorded litter item:

A. < 5 cm*5 cm = 25 cm^2
B. < 10 cm*10 cm = 100 cm^2
C. < 20 cm*20 cm = 400 cm^2
D. < 50 cm*50 cm = 2500 cm^2
E. < 100 cm-100 cm = 10000 cm^2 = 1 m^2
F. > 100 cm-100 cm = 10000 cm^2 = 1 m^2

7.6. Litter classification and quantification

All items collected from the haul must be classified by type, according to the 'Joint List of Marine Litter Items Categories' prepared by the MSFD Technical Group on Marine Litter (MSFD TG ML) in close collaboration with EU Member States and the Regional Sea Conventions (Fleet et al., 2021). The manual for applying the Joint List classification system provides detailed information on how to classify litter items and a complementary photo guide helps the surveyors identify and categorise the litter items (Online Photo Catalogue of the Joint List of Litter Categories).

Unknown litter or items that are not on the survey sheet should be noted in the appropriate "other item" box. A short description of the item should then be included on the survey sheet. If possible, digital photos should be taken of unknown items so that they can be identified later and, if necessary, be added to the survey sheet.

The unit in which litter should be recorded is the number of items and it should be expressed as counts of litter items per square kilometer (litter items/km^2). The total weight of litter items per haul should be recorded, as well as the weight per each main litter category. In addition, the total weight of each haul should be recorded, as well as the weight of the commercial fish caught in it.

The estimation of litter items/km^2 requires the estimation of the "swept area". The latter is difficult to be monitored accurately during the haul because it requires the use of specialized equipment, like acoustic devices mounted on the trawl net. Such instruments might not be available during the samplings. However, the skipper, knowing by experience the geometry of the gear, can advise the surveying team on the effective mouth width and height of the net during each fishing operation.

Alternatively, the swept area can also be estimated following the method of Sparre and Venema (1998). The trawl sweeps a path, the area of which is the length of the path times the width of the trawl, called the "swept area" or the "effective path swept". The swept area (**a)** can be estimated by:

$$a = D * h * X \qquad \textit{where } D = V * t$$

Where:

***V** is the velocity of the trawl over the ground when trawling;*
***h** is the length of the head-rope;*
***D** is the cover of distance;*
***t** is the time spent trawling;*
***X** is that fraction of the head-rope length, which is equal to the width of the path swept by the trawl. The value of X varies from 0.4 to 0.66 for tropical waters and a value of X = 0.5 has been suggested as the best compromise value for the Mediterranean Sea (Sparre and Venema, 1992).*

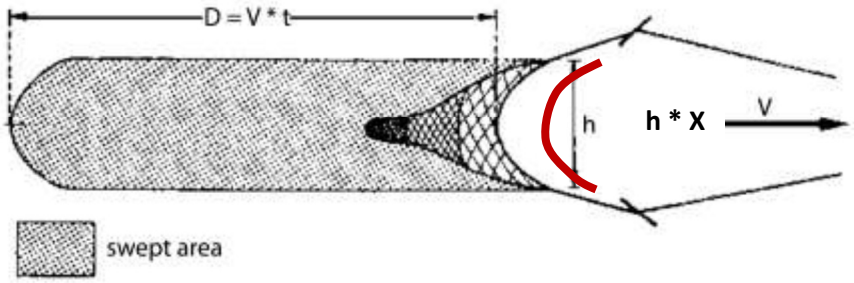

Figure 7-1. *Swept area (source: http://www.fao.org/docrep/w5449e/w5449e0f.htm)*

When exact positions of the start and the end of the haul are available the distance covered can be estimated in units of nautical miles (nm), by:

$$D = 60 * \sqrt{(Lat1 - Lat2)^2 + (Lon1 - Lon2)^2 * \cos^2(0.5 * (Lat1 + Lat2))} \ldots\ldots$$

Where:

Lat1 = latitude at start of haul (degrees)
Lat2 = latitude at end of haul (degrees)
Lon1 = longitude at start of haul (degrees)
Lon2 = longitude at end of haul (degrees)

7.7. Materials and equipment

The following items are necessary to carry out beach surveys:

- Bucket or box
- Tape measure
- Plastic bags to collect the litter
- Digital camera
- Hand-held GPS unit, including extra batteries
- Digital scales for weighing litter (ideally with a 1g precision)
- Clipboard for the surveyor and recording sheets
- Pencils or pens
- First aid kit (to include sunscreen, bug spray, drinking water).

Reference

Fleet, D., Vlachogianni, Th., Hanke, G., 2021. A Joint List of Litter Categories for Marine Macrolitter Monitoring. EUR 30348 EN, Publications Office of the European Union, Luxembourg, 2020, ISBN 978-92-76-21445-8, JRC121708. https://doi.org/10.2760/127473

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IPA-Adriatic DeFishGear, 2014. Methodology for monitoring marine litter on the Seafloor with bottom trawl surveys.

7.8. Recording sheets

Monitoring MACROLITTER on the Seafloor
Data Sheet

Location name	
Location ID	
Country	
Surveyor Name	
e-mail address	
Date of survey	

VESSEL CHARACTERISTICS			
Vessel name			*Name of the vessel*
Type of vessel			*Type e.g. research, fishing, hired, regular ferry etc.*
Vessel length and tonnage			*Length of the vessel (metres)* *Gross weight of the vessel (tonnes)*
Vessel engine power			*Vessel engine power (kilowatt)*

HAUL DETAILS			
Latitude/longitude start			*Recorded as nnn.nnnnn degrees at the start of the sample unit*
Latitude/longitude end			*Recorded as nnn.nnnnn degrees at the end of the sample unit*
Coordinates system			*Datum and coordinate system employed*
Vessel speed			*Average vessel speed in knots*

Start time/end time			*Time over which the survey (haul) took place*
Mouth horizontal/vertical opening			*Record the trawl mouth horizontal and vertical opening (mm)*
Haul position/depth			*Record the average haul position*
Cod end mesh size			*Record mesh size (mm)*
Cod end type			*Type of cod end e.g. diamond mesh, square mesh*
Head rope length			*Record the length of the head rope (m)*

ENVIRONMENTAL PARAMETERS - OBSERVATION DETAILS		
Wind speed		*Recorded in (Beaufort)*
Wind	☐ N ☐ E ☐ S ☐ W	*Tick more than one boxes e.g. for SE wind*
Sea state		*Expressed in accordance with the Douglas Sea Scale (0-9)*
NOTES		
SITE CHARACTERISTICS		
Nearest river name		*Name of nearest river*
Nearest river distance		*Distance to the nearest natural input (river or stream) (kilometers)*
Nearest river position	☐N ☐E ☐S ☐W	*Position of river mouth in relation to survey area*
Nearest major fishery		*Name of the nearest major fishery (named by type)*
Nearest major fishery distance		*Distance to the nearest major fishery (kilometers)*
Nearest major fishery position	☐N ☐E ☐S ☐W	*Position of the nearest major fishery in relation to survey area*
Nearest town		*Name of nearest town*
Nearest town distance		*Distance to the nearest town (kilometers)*
Nearest town position	☐N ☐E ☐S ☐W	*Position of the nearest town in relation to survey area*

Population size of this town			*No of inhabitants*
Additional features of the town	☐ Residential ☐ Tourist ☐ Residential & tourist	☐ Winter ☐ Spring ☐ Summer ☐ Autumn	*Indicate the main characteristic of the town, residential or touristic town; in case of the later indicate the high season peak*
Name of the nearest beach			*Name of the nearest beach*
Distance to nearest beach			*Distance to the closest coastline (kilometers)*
Position of the nearest coast	☐N ☐E☐S ☐W		*Position of the closest coastline in relation to survey area*
Nearest shipping lane distance			*Distance to the nearest shipping lane (kilometers)*
Estimated traffic density			*Recorded in number of ships/year*
Vessel type			*Indicate the type of vessels that mainly use it e.g. merchant ships, etc.*
Position of the shipping lane	☐N ☐E☐S ☐W		*Position of shipping lane in relation to survey area*
Name of the nearest harbor			*Name of nearest harbor*
Harbor position	☐N ☐E☐S ☐W		*Position of the nearest harbor in relation to survey area*
Type of harbor			*Based on the types of vessels visiting the harbor*
Size of harbor			*Record the number of ships that reach the harbor per year*
Nearest discharge of waste water distance			
Position of nearest discharge point	☐N ☐E☐S ☐W		*Position of nearest discharge points in relation to survey area*
NOTES ……			

Joint List of Marine Macrolitter Items

** To be recorded also if smaller than 2.5 cm*

J-CODE	SUP/FG	NAME	ITEMS COUNT
ARTIFICIAL POLYMER MATERIALS			
J220		plastic sheeting from greenhouses	
J221		plastic irrigation pipes	
J222		other plastic items from agriculture	
J90		plastic flower pots	
J223		trays for seedlings of foamed plastic	
J46	FG	plastic oyster trays	
J45	FG	plastic mussels/oyster mesh bags, net sack, socks	
J47	FG	plastic sheeting from mussel culture (Tahitians)	
J102		plastic flip-flops	
J136		footwear made of plastic - not flip flops	
J40		plastic gloves (household/dishwashing, gardening)	
J41		plastic gloves (industrial/professional applications)	
J252		single-use plastic gloves	
J69		plastic hard hats/helmets	
J256		foamed plastic insulation including spray foam	
J89		plastic construction waste (not foamed insulation)	
J8	SUP	plastic drink bottles >0.5 l	
J7	SUP	plastic drink bottles ≤ 0.5 l	
J224	SUP	plastic food containers made of foamed polystyrene	
J21*	SUP	plastic caps/lids drinks	
J225	SUP	plastic food containers made of hard non-foamed plastic	
J1	SUP	plastic 4/6-pack yokes & six-pack rings	
J226	SUP	cups and cup lids of foamed polystyrene	
J227	SUP	cups and lids of hard plastic	
J228	SUP	plastic cutlery	
J229	SUP	plastic plates and trays	
J230	SUP	plastic stirrers	
J231	SUP	plastic straws	
J30	SUP	plastic crisps packets/sweets wrappers	
J31	SUP	plastic lolly & ice-cream sticks	
J85	FG	plastic commercial salt packaging	
J58	FG	fish boxes - foamed polystyrene	
J57	FG	fish boxes - hard plastic	
J92	FG	plastic bait containers/packaging	
J60*	FG	plastic fishing light sticks / fishing glow sticks incl. packaging	
J62	FG	plastic floats for fishing nets	
J59	FG	plastic fishing line	
J54	FG	plastic nets and pieces of net > 50cm	
J53	FG	plastic nets and pieces of net 2.5 cm ≥ ≤ 50 cm	
J232	FG	plastic string and filaments exclusively from dolly ropes	
J233	FG	other plastic string and filaments exclusively from	

J-CODE	SUP/FG	NAME	ITEMS COUNT
		fishery	
J234	FG	plastic tangled nets and rope without dolly rope or mixed with dolly rope	
J235	FG	plastic tangled dolly rope	
J61	FG	other plastic fisheries related items not covered by other categories	
J42	FG	plastic crab/lobster traps (pots) and tops	
J44	FG	plastic octopus pots	
J70		plastic shotgun cartridges	
J11		plastic beach use related body care and cosmetic bottles and containers	
J12		plastic non-beach use related body care and cosmetic bottles and containers	
J95	SUP	plastic cotton bud sticks	
J29		plastic combs/hair brushes/sunglasses	
J98		plastic diapers/nappies	
J236		other plastic personal hygiene and care items	
J96	SUP	plastic sanitary towels/panty liners/backing strips	
J144	SUP	plastic tampons and tampon applicators	
J97		plastic toilet fresheners	
J237	SUP	plastic wet wipes	
J253		plastic single-use face-mask	
J211		other plastic medical items (swabs, bandaging, adhesive plasters etc.)	
J100*		plastic medical/ pharmaceuticals containers/tubes/ packaging	
J99		plastic syringes/needles	
J9		plastic bottles and containers of cleaning products	
J15		plastic engine oil bottles & containers >50cm	
J14		plastic engine oil bottles & containers 2.5 cm ≥ ≤ 50 cm	
J17		plastic injection gun containers/cartridges	
J16		plastic jerry cans	
J22*		plastic caps/lids chemicals, detergents (non-food)	
J23*		plastic caps/lids unidentified	
J24*		plastic rings from bottle caps/lids	
J13		other plastic bottles & containers (drums)	
J3	SUP	plastic shopping/carrier/grocery bags	
J101		plastic dog/pet faeces bag	
J5	SUP	the part that remains from tear-off plastic bags	
J36		other plastic heavy-duty sacks	
J238		plastic mesh bags for vegetable, fruit and other products	
J4	SUP	small plastic bags	
J91*		plastic biomass holder from sewage treatment plants and aquaculture	
J18		plastic crates, boxes, baskets	
J65		plastic buckets	
J93		plastic cable ties	

J-CODE	SUP/FG	NAME	ITEMS COUNT
J84		plastic CDs & DVDs	
J67		plastic sheets, industrial packaging, sheeting	
J64		plastic fenders	
J68		fibre glass items	
J63		plastic floats/buoys other source than fishing or not known	
J239		other foamed plastic items and fragments not made of foamed polystyrene	
J257*		foamed plastic packaging	
J83		fragments of foamed polystyrene > 50cm	
J82		fragments of foamed polystyrene 2.5 cm ≥ ≤ 50 cm	
J80		fragments of non-foamed plastic > 50cm	
J79		fragments of non-foamed plastic 2.5cm ≥ ≤ 50cm	
J240		other identifiable foamed plastic items	
J241		other identifiable non-foamed plastic items	
J166		plastic paint brushes	
J28		plastic pens and pen lids	
J49		plastic rope (diameter more than 1cm)	
J242		plastic string and cord (diameter less than 1cm) not from dolly ropes or unidentified	
J66		plastic strapping bands	
J43		plastic tags (fishing, shipping, farming and industry)	
J87		plastic masking/duct/packing tape	
J88		telephone	
J72		plastic traffic cones	
J86		plastic fin trees (from fins for scuba diving)	
J243		plastic remains of fireworks	
J32*		plastic toys and party poppers	
J27*	SUP	tobacco products with filters (cigarette butts with filters)	
J26		plastic cigarette lighters	
J25		plastic tobacco pouches / plastic cigarette packet packaging	
J19		plastic vehicle parts	
RUBBER			
J127		rubber boots	
J133		rubber condoms (incl. packaging)	
J131*		rubber band (small, for kitchen/household/post use)	
J248		rubber sheet	
J134		other rubber pieces	
J249		rubber belts	
J125*	SUP	rubber balloons	
J126		rubber balls	
J250		rubber inner-tubes	
J251		rubber tyres	
CLOTH/TEXTILE			
J137		clothing	
J138		shoes & sandals made of leather and/or textile	

J-CODE	SUP/FG	NAME	ITEMS COUNT
J141		cloth textile carpet & furnishing	
J140		hessian sacks/packaging	
J143		sails, canvas	
J145		other textiles	
J139		cloth textile backpacks & textile bags	
PAPER/CARDBOARD			
J150		paper cartons/Tetrapak milk	
J151		paper cartons/Tetrapak (non-milk)	
J244		paper cups	
J245		paper food trays, food wrappers, drink containers	
J246		paper cotton bud sticks	
J247		other paper containers	
J147		paper bags	
J148		cardboard boxes	
J156		paper fragments	
J154		paper newspapers & magazines	
J158		other paper items	
J155		paper tubes and other pieces of fireworks	
J152		paper cigarette packets	
PROCESSED/WORKED WOOD			
J159		wooden corks	
J165		wooden ice-cream sticks, chip forks, chopsticks, toothpicks	
J164		wooden fish boxes	
J163		wooden crab/lobster pots	
J162		wooden crates, boxes, baskets for packaging	
J172		other processed wooden items > 50cm	
J171		other processed wooden items 2.5 cm ≥ ≤ 50 cm	
J160		wooden pallets	
J167		wooden fireworks & matches	
METAL			
J194		metal cables	
J175		metal drinks cans	
J176		metal food cans	
J181		metal tableware (e.g. plates, cups & cutlery)	
J184		metal lobster/crab pots	
J182*		metal fisheries related weights/sinkers, and lures	
J180		metal appliances (refrigerators, washers, etc.)	
J187		metal drums & barrels	
J174		metal aerosol/spray cans	
J188		other metal cans	
J190		metal paint tins	
J178*		metal bottle caps, lids & pull tabs from cans	
J195*		metal household batteries	
J177		metal foil wrappers, aluminium foil	
J199		other metal pieces > 50cm	
J198		other metal pieces 2.5cm ≥ ≤ 50cm	

J-CODE	SUP/FG	NAME	ITEMS COUNT
J186		metal industrial scrap	
J191		wire, wire mesh, barbed wire	
J179		metal disposable BBQs	
J193		metal vehicle parts / batteries	
J130		wheels with metal hub	
GLASS/CERAMICS			
J204		glass ceramic construction materials (bricks, tiles, cement)	
J203		glass and ceramic tableware (plates/cups/glasses)	
J207		ceramic or glass octopus pots	
J200		glass bottles	
J201		glass jars	
J208		pieces of glass/ceramic (glass or ceramic fragments ≥ 2.5 cm)	
J205		glass fluorescent light tube	
J202		glass light bulbs	
J219		other ceramic items	
J210		other glass items	
CHEMICALS			
J216		unidentified generally dark-coloured oil-like chemicals	
J217		unidentified generally light-coloured paraffin-like chemicals	
J218		unidentified chemicals	
FOOD WASTE			
J215		organic food waste	

HAUL RESULTS		
Total weight of litter in the haul		*Record litter weight in Kg*
Total weight of artificial polymer materials		*Record litter weight in Kg*
Total No of items of artificial polymer materials		*Record number of items*
Total weight of rubber		*Record litter weight in Kg*
Total No of items of rubber		*Record number of items*
Total weight of cloth/textile		*Record litter weight in Kg*
Total No of items of cloth/textile		*Record number of items*
Total weight of paper/cardboard		*Record litter weight in Kg*
Total No of items of paper/cardboard		*Record number of items*
Total weight of processed/worked wood		*Record litter weight in Kg*
Total No of items of processed/worked wood		*Record number of items*
Total weight of metal		*Record litter weight in Kg*
Total No of items of metal		*Record number of items*
Total weight of glass/ceramics		*Record litter weight in Kg*
Total No of items of glass/ceramics		*Record number of items*

8. Methodology for monitoring MACROLITTER on the seafloor with visual surveys with scuba/snorkelling (shallow coastal waters, 0–30m)

This document describes the methodological approach for monitoring macrolitter on the seafloor. It has been compiled based on the related methodology developed within the IPA-Adriatic DeFishGear and the 2022 MSFD TGML Updated Guidance on Monitoring of Marine Litter in European Seas, while taking into account the results from the Plastic Busters MPAs testing phase.

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8.1. Site selection

Sites should be selected to ensure that they:

- Consider areas that might accumulate litter;
- Avoid areas of risk (presence of munitions and other hazardous waste), sensitive areas;
- Do not exert impacts on any endangered or protected species;
- Avoid areas with strong currents or waves;
- Avoid navigation routes of vessels that might put divers in danger.

Sites should be chosen following a two-fold approach: (i) selecting sites that meet certain criteria (e.g. are close to ports, river mouths, cities, etc.); (ii) choosing randomly from a large number of sites.

8.2. Frequency and timing of surveys

At least two survey campaigns, one in autumn and one in spring should be carried out. The proposed survey periods are:

- Autumn: October
- Spring: April

If surveys are also implemented in the summertime these should be carried out in July.

8.3. Sampling unit

The sampling unit is defined by the transect width and length. The line transects are defined with a nylon line, marked every 5 meters with resistant paints, that is deployed using a diving reel while SCUBA diving. Distances should be determined either by laying out a 100m tape measure or alternatively by laying a 100m length of weighted rope across the bottom. The start and end point of each transect should be identified with marker buoys and recorded using a GPS.

The length of the line transects could vary between 50m-100m and the width from 4m-8m, depending on the depth, the depth gradient, the turbidity, the habitat complexity and the litter density (see table below).

Table 8-1. *Suggested transect lengths and widths of the sampling unit based on environmental conditions and litter densities (Katsavenakis, 2009).*

Litter Density	Environmental Conditions	Sampling Unit (length x width)
0.1 – 1 items / m^2	Low turbidity & high habitat complexity	20 m x 4 m
0.1 – 1 items / m^2	High turbidity	20 m x 4 m
0.01 – 0.1 items / m^2	In every case	100 m x 8 m
< 0.01 items / m^2	In every case	200 m x 8 m

8.4. Litter size classes to be surveyed

The following size range classes should be reported for each recorded litter item:

A. < 5 cm*5 cm = 25 cm^2
B. < 10 cm*10 cm = 100 cm^2
C. < 20 cm*20 cm = 400 cm^2
D. < 50 cm*50 cm = 2500 cm^2
E. < 100 cm*100 cm = 10000 cm^2 = 1 m^2
F. > 100 cm*100 cm = 10000 cm^2 = 1 m^2

8.5. Litter classification and quantification

All items collected from the sampling unit must be classified by type, according to the 'Joint List of Marine Litter Items Categories' prepared by the MSFD Technical Group on Marine Litter (MSFD TG ML) in close collaboration with EU Member States and the Regional Sea Conventions (Fleet et al., 2021). The manual for applying the Joint List classification system provides detailed information on how to classify litter items and a complementary photo guide helps the surveyors identify and categorise the litter items (Online Photo Catalogue of the Joint List of Litter Categories).

When conducting underwater visual surveys with a self-contained underwater breathing apparatus (scuba), lighter litter items should be collected (while larger items should just be marked), brought ashore and entered in the related seafloor litter monitoring sheet. When conducting underwater visual surveys with snorkelling, digital photos should be taken for all items with an underwater camera and subsequently should be entered in the seafloor litter monitoring sheet once identified. Unknown litter, or items that are not on the survey sheet, should be noted in the appropriate "other item" box. A short description of the item should then be included on the survey sheet.

The unit in which litter should be recorded is number of items and it should be expressed as counts of litter items per square kilometre (litter items/km^2).

Figure 8-1. *Litter items collected during a seafloor survey (Photo © Th. Vlachogianni).*

8.6. Materials and equipment

The following items are necessary to carry out seafloor litter surveys:

- Scuba gear and equipment: diving suit, buoyancy control device, regulator, air tank, compass, pressure gauge, fins, gloves, knife, and boots, etc.;
- Supplies: mesh sack, rope, ruler, cutter, dive flag, dive slate, float tube, and pelican float;
- Underwater digital camera;
- Lift bag;
- Floating fence;
- GPS;
- Comprehensive first-aid kit;
- Recording sheets and pencils.

References

Fleet, D., Vlachogianni, Th., Hanke, G., 2021. A Joint List of Litter Categories for Marine Macrolitter Monitoring. EUR 30348 EN, Publications Office of the European Union, Luxembourg, 2020, ISBN 978-92-76-21445-8, JRC121708. https://doi.org/10.2760/127473

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IPA-Adriatic DeFishGear, 2014. Methodology for monitoring marine litter on the Seafloor-Visual surveys with SCUBA/snorkeling (Shallow coastal waters, 0–20m).

8.7. Sampling & recording sheets

Monitoring Marine Litter (Macro) on the Seafloor
Data Sheet

Location name	
Location ID	
Country	
Surveyor Name	
e-mail address	
Date of survey	

SITE DETAILS			
Latitude/longitude start			*Recorded as nnn.nnnnn degrees at the start of the sampling unit*
Latitude/longitude end			*Recorded as nnn.nnnnn degrees at the end of the samplin unit*
Length of sampling unit			*Record length in m*
Width of sampling unit			*Record width in m*
Depth			*Record depth in m*
Coordinates system			*Datum and coordinate system employed*
Start time/end time			*Time over which the survey took place*

ENVIRONMENTAL PARAMETERS - OBSERVATION DETAILS		
Underwater visibility	☐Low ☐Moderate ☐High	*Tick one box based on expert judgment*
Current velocity/turbidity	☐Low ☐Moderate ☐High	*Tick one box based on expert judgment*
Type of substrate	Rocky☐ Sandy☐ Mixed☐	*Tick one box based on expert judgment*
Substrate complexity	☐Low ☐Medium ☐High	*Tick one box based on expert judgment*
Wind speed		*Recorded in (Beaufort)*
Wind	☐ N ☐ E☐ S ☐ W	*Tick more than one boxes e.g. for SE wind*
Sea state		*Expressed in accordance with the Douglas Sea Scale (0-9)*

SITE CHARACTERISTICS			
Nearest river name			*Name of nearest river*
Nearest river distance			*Distance to the nearest natural input (river or stream) (kilometers)*
Nearest river position	☐N ☐E☐S ☐W		*Position of river mouth in relation to survey area*
Nearest major fishery			*Name of the nearest major fishery (named by type)*
Nearest major fishery distance			*Distance to the nearest major fishery (kilometers)*
Nearest major fishery position	☐N ☐E☐S ☐W		*Position of the nearest major fishery in relation to survey area*
Nearest town			*Name of nearest town*
Nearest town distance			*Distance to the nearest town (kilometers)*
Nearest town position	☐N ☐E☐S ☐W		*Position of the nearest town in relation to survey area*
Population size of this town			*No of inhabitants*
Additional features of the town	☐ Residential ☐ Tourist ☐ Residential & tourist	☐ Winter ☐ Spring ☐ Summer ☐ Autumn	*Indicate the main characteristic of the town, residential or touristic town; in case of the later indicate the high season peak*
Name of the nearest beach			*Name of the nearest beach*
Distance to nearest beach			*Distance to the closest coastline (kilometers)*
Position of the nearest coast	☐N ☐E☐S ☐W		*Position of the closest coastline in relation to survey area*
Nearest shipping lane distance			*Distance to the nearest shipping lane (kilometers)*
Estimated traffic density			*Recorded in number of ships/year*
Vessel type			*Indicate the type of vessels e.g. merchant ships, etc.*
Position of the shipping lane	☐N ☐E☐S ☐W		*Position of shipping lane in relation to survey area*
Name of the nearest harbor			*Name of nearest harbor*
Harbor position	☐N ☐E☐S ☐W		*Position of the nearest harbor in relation to survey area*
Type of harbor			*Based on the types of vessels visiting the harbor*
Size of harbor			*Record the number of ships that reach the harbor per year*
Nearest discharge of waste water distance			*Name nearest location if waste water discharge*
Position of nearest discharge point	☐N ☐E☐S ☐W		*Position of nearest discharge points in relation to survey area*

Joint List of Marine Macrolitter Items

** To be recorded also if smaller than 2.5 cm*

J-CODE	SUP/FG	NAME	ITEMS COUNT
		ARTIFICIAL POLYMER MATERIALS	
J220		plastic sheeting from greenhouses	
J221		plastic irrigation pipes	
J222		other plastic items from agriculture	
J90		plastic flower pots	
J223		trays for seedlings of foamed plastic	
J46	FG	plastic oyster trays	
J45	FG	plastic mussels/oyster mesh bags, net sack, socks	
J47	FG	plastic sheeting from mussel culture (Tahitians)	
J102		plastic flip-flops	
J136		footwear made of plastic - not flip flops	
J40		plastic gloves (household/dishwashing, gardening)	
J41		plastic gloves (industrial/professional applications)	
J252		single-use plastic gloves	
J69		plastic hard hats/helmets	
J256		foamed plastic insulation including spray foam	
J89		plastic construction waste (not foamed insulation)	
J8	SUP	plastic drink bottles >0.5 l	
J7	SUP	plastic drink bottles ≤ 0.5 l	
J224	SUP	plastic food containers made of foamed polystyrene	
J21*	SUP	plastic caps/lids drinks	
J225	SUP	plastic food containers made of hard non-foamed plastic	
J1	SUP	plastic 4/6-pack yokes & six-pack rings	
J226	SUP	cups and cup lids of foamed polystyrene	
J227	SUP	cups and lids of hard plastic	
J228	SUP	plastic cutlery	
J229	SUP	plastic plates and trays	
J230	SUP	plastic stirrers	
J231	SUP	plastic straws	
J30	SUP	plastic crisps packets/sweets wrappers	
J31	SUP	plastic lolly & ice-cream sticks	
J85	FG	plastic commercial salt packaging	
J58	FG	fish boxes - foamed polystyrene	
J57	FG	fish boxes - hard plastic	
J92	FG	plastic bait containers/packaging	
J60*	FG	plastic fishing light sticks / fishing glow sticks incl. packaging	
J62	FG	plastic floats for fishing nets	
J59	FG	plastic fishing line	
J54	FG	plastic nets and pieces of net > 50cm	
J53	FG	plastic nets and pieces of net 2.5 cm ≥ ≤ 50 cm	
J232	FG	plastic string and filaments exclusively from dolly ropes	
J233	FG	other plastic string and filaments exclusively from	

J-CODE	SUP/FG	NAME	ITEMS COUNT
		fishery	
J234	FG	plastic tangled nets and rope without dolly rope or mixed with dolly rope	
J235	FG	plastic tangled dolly rope	
J61	FG	other plastic fisheries related items not covered by other categories	
J42	FG	plastic crab/lobster traps (pots) and tops	
J44	FG	plastic octopus pots	
J70		plastic shotgun cartridges	
J11		plastic beach use related body care and cosmetic bottles and containers	
J12		plastic non-beach use related body care and cosmetic bottles and containers	
J95	SUP	plastic cotton bud sticks	
J29		plastic combs/hair brushes/sunglasses	
J98		plastic diapers/nappies	
J236		other plastic personal hygiene and care items	
J96	SUP	plastic sanitary towels/panty liners/backing strips	
J144	SUP	plastic tampons and tampon applicators	
J97		plastic toilet fresheners	
J237	SUP	plastic wet wipes	
J253		plastic single-use face-mask	
J211		other plastic medical items (swabs, bandaging, adhesive plasters etc.)	
J100*		plastic medical/ pharmaceuticals containers/tubes/ packaging	
J99		plastic syringes/needles	
J9		plastic bottles and containers of cleaning products	
J15		plastic engine oil bottles & containers >50cm	
J14		plastic engine oil bottles & containers 2.5 cm ≥ ≤ 50 cm	
J17		plastic injection gun containers/cartridges	
J16		plastic jerry cans	
J22*		plastic caps/lids chemicals, detergents (non-food)	
J23*		plastic caps/lids unidentified	
J24*		plastic rings from bottle caps/lids	
J13		other plastic bottles & containers (drums)	
J3	SUP	plastic shopping/carrier/grocery bags	
J101		plastic dog/pet faeces bag	
J5	SUP	the part that remains from tear-off plastic bags	
J36		other plastic heavy-duty sacks	
J238		plastic mesh bags for vegetable, fruit and other products	
J4	SUP	small plastic bags	
J91*		plastic biomass holder from sewage treatment plants and aquaculture	
J18		plastic crates, boxes, baskets	
J65		plastic buckets	
J93		plastic cable ties	

J-CODE	SUP/FG	NAME	ITEMS COUNT
J84		plastic CDs & DVDs	
J67		plastic sheets, industrial packaging, sheeting	
J64		plastic fenders	
J68		fibre glass items	
J63		plastic floats/buoys other source than fishing or not known	
J239		other foamed plastic items and fragments not made of foamed polystyrene	
J257*		foamed plastic packaging	
J83		fragments of foamed polystyrene > 50cm	
J82		fragments of foamed polystyrene 2.5 cm ≥ ≤ 50 cm	
J80		fragments of non-foamed plastic > 50cm	
J79		fragments of non-foamed plastic 2.5cm ≥ ≤ 50cm	
J240		other identifiable foamed plastic items	
J241		other identifiable non-foamed plastic items	
J166		plastic paint brushes	
J28		plastic pens and pen lids	
J49		plastic rope (diameter more than 1cm)	
J242		plastic string and cord (diameter less than 1cm) not from dolly ropes or unidentified	
J66		plastic strapping bands	
J43		plastic tags (fishing, shipping, farming and industry)	
J87		plastic masking/duct/packing tape	
J88		telephone	
J72		plastic traffic cones	
J86		plastic fin trees (from fins for scuba diving)	
J243		plastic remains of fireworks	
J32*		plastic toys and party poppers	
J27*	SUP	tobacco products with filters (cigarette butts with filters)	
J26		plastic cigarette lighters	
J25		plastic tobacco pouches / plastic cigarette packet packaging	
J19		plastic vehicle parts	
RUBBER			
J127		rubber boots	
J133		rubber condoms (incl. packaging)	
J131*		rubber band (small, for kitchen/household/post use)	
J248		rubber sheet	
J134		other rubber pieces	
J249		rubber belts	
J125*	SUP	rubber balloons	
J126		rubber balls	
J250		rubber inner-tubes	
J251		rubber tyres	
CLOTH/TEXTILE			
J137		clothing	
J138		shoes & sandals made of leather and/or textile	

J-CODE	SUP/FG	NAME	ITEMS COUNT
J141		cloth textile carpet & furnishing	
J140		hessian sacks/packaging	
J143		sails, canvas	
J145		other textiles	
J139		cloth textile backpacks & textile bags	

PAPER/CARDBOARD			
J150		paper cartons/Tetrapak milk	
J151		paper cartons/Tetrapak (non-milk)	
J244		paper cups	
J245		paper food trays, food wrappers, drink containers	
J246		paper cotton bud sticks	
J247		other paper containers	
J147		paper bags	
J148		cardboard boxes	
J156		paper fragments	
J154		paper newspapers & magazines	
J158		other paper items	
J155		paper tubes and other pieces of fireworks	
J152		paper cigarette packets	
PROCESSED/WORKED WOOD			
J159		wooden corks	
J165		wooden ice-cream sticks, chip forks, chopsticks, toothpicks	
J164		wooden fish boxes	
J163		wooden crab/lobster pots	
J162		wooden crates, boxes, baskets for packaging	
J172		other processed wooden items > 50cm	
J171		other processed wooden items 2.5 cm ≥ ≤ 50 cm	
J160		wooden pallets	
J167		wooden fireworks & matches	
METAL			
J194		metal cables	
J175		metal drinks cans	
J176		metal food cans	
J181		metal tableware (e.g. plates, cups & cutlery)	
J184		metal lobster/crab pots	
J182*		metal fisheries related weights/sinkers, and lures	
J180		metal appliances (refrigerators, washers, etc.)	
J187		metal drums & barrels	
J174		metal aerosol/spray cans	
J188		other metal cans	
J190		metal paint tins	
J178*		metal bottle caps, lids & pull tabs from cans	
J195*		metal household batteries	
J177		metal foil wrappers, aluminium foil	

J199		other metal pieces > 50cm	
J198		other metal pieces 2.5cm ≥ ≤ 50cm	
J186		metal industrial scrap	
J191		wire, wire mesh, barbed wire	
J179		metal disposable BBQs	
J193		metal vehicle parts / batteries	
J130		wheels with metal hub	
GLASS/CERAMICS			
J204		glass ceramic construction materials (bricks, tiles, cement)	
J203		glass and ceramic tableware (plates/cups/glasses)	
J207		ceramic or glass octopus pots	
J200		glass bottles	
J201		glass jars	
J208		pieces of glass/ceramic (glass or ceramic fragments ≥ 2.5 cm)	
J205		glass fluorescent light tube	
J202		glass light bulbs	
J219		other ceramic items	
J210		other glass items	
CHEMICALS			
J216		unidentified generally dark-coloured oil-like chemicals	
J217		unidentified generally light-coloured paraffin-like chemicals	
J218		unidentified chemicals	
FOOD WASTE			
J215		organic food waste	

9. Methodology for monitoring MACROLITTER on the seafloor with ROV – Deep sea

This document describes the methodological approach for monitoring macrolitter on the seafloor via the use of ROV. It has been compiled based on the related methodology developed by ISPRA and the Ministry for the Environment, Land and Sea of Italy and it has been adapted within the framework of the Interreg Med PlasticBusters MPAs project to address the recent advances in the field.

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9.1. Site selection

Sites should be selected to ensure that they:

- Consider areas that might accumulate litter;
- Avoid areas of risk (i.e. presence of munitions).

Sites should be chosen following a two-fold approach: (i) selecting sites that meet certain criteria (e.g. are close to ports, river mouths, cities, etc.); (ii) choosing randomly from a large number of sites.

9.2. Frequency and timing of surveys

At least two surveys, one in autumn and one in spring should be carried out. The proposed survey periods are:

- Autumn: October
- Spring: April

9.3. Sampling unit

The sampling unit is defined by the ROV transect width and length. The surveyed area is calculated by multiplying the transect length with the visual field (width) of the ROV video. The visual field is estimated by the laser pointers scale in the video images or from the ROV altitude.

9.4. ROV operation

Given that surveys might be performed with different ROVs, with different equipment, it is important to record any ROV characteristic and instrumentation. The ROV surveys protocol should be followed as close as possible as described below:

- **Transect position & orientation:** Transects start at a minimum depth of 40-50 m and should be at least 100 m long. Three replicates should be performed. These may be performed seamlessly: starting from 40-50 m depth, the ROV is to descend along the bottom making the first transect, then it rises up again to the aforementioned bathymetry and descends again. The path should therefore have a zig-zag shape and be composed of three transects that should be divided during data processing.
- **Speed & duration:** The ROV should move along linear tracks, in a continuous recording mode, at constant low speed (< 0.3 m/s) and at a constant height from the bottom (< 1.5 m).
- **Transect start and end definition:** The start of the dive is defined as the moment at which the ROV dived in the seawater. The end of the dive is defined as the moment that the ROV is at sea surface / on the deck. The start of the transect is defined as the moment that the ROV is at the seafloor, and the end of the transect is defined as the moment that the ROV leaves the seafloor (off the seafloor).
- **ROV characteristics:** The ROV characteristics and equipment should be recorded.

9.5. Litter size classes to be surveyed

The following size range classes will be reported for each recorded litter item:

A. < 5cm*5cm = 25cm^2
B. < 10cm*10cm = 100cm^2

C. < 20cm*20cm = 400cm^2
D. < 50cm*50cm = 2500cm^2
E. < 100cm*100cm = 10000cm^2 = 1m^2
F. > 100cm*100cm = 10000cm^2 = 1m^2

9.6. Litter classification and quantification

All items observed from each video transect must be classified by type, according to the 'Joint List of Marine Litter Items Categories' prepared by the MSFD Technical Group on Marine Litter (MSFD TG ML) in close collaboration with EU Member States and the Regional Sea Conventions (Fleet et al., 2021). The manual for applying the Joint List classification system provides detailed information on how to classify litter items and a complementary photo guide helps the surveyors identify and categorise the litter items (Online Photo Catalogue of the Joint List of Litter Categories).

All litter items observed from each video transect should be entered on the related seafloor litter monitoring sheet. Unknown litter or items that are not on the survey sheet should be noted in the appropriate "other item" box. A short description of the item should then be included on the survey sheet.

The unit in which marine litter should be recorded is the number of items and it should be expressed as counts of litter items per square kilometre (litter items/km^2). When it is not possible to estimate the surveyed area size (e.g. when lasers are not available), the unit in which marine litter could be expressed is items per 100 meters (items/100 m).

9.7. Materials and equipment

It is necessary to equip the ROV with the following items in order to carry out the ROV surveys:

- Underwater acoustic tracking position system (USBL), to provide a detailed geographical and depth position of ROV along the transects
- automatic depth system (auto depth)
- Compass
- HD Video camera (at least 1920 x 1080 pixel)
- HD Digital camera (optional)
- Laser beams at known distance, to use as a metric scale (at least two lasers).

References

Fleet, D., Vlachogianni, Th., Hanke, G., 2021. A Joint List of Litter Categories for Marine Macrolitter Monitoring. EUR 30348 EN, Publications Office of the European Union, Luxembourg, 2020, ISBN 978-92-76-21445-8, JRC121708. https://doi.org/10.2760/127473

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Galgani et al., 2013. Guidance on Monitoring of Marine Litter in European Seas. Scientific and Technical Research series, Report EUR 26113 EN.

Monitoring MACROLITTER on the Seafloor with ROV
Data Sheet

Monitoring Marine Litter, Entanglement and Colonization on the Seafloor

Surveyor Name:_____ | Location name:_____ | Country:_____

Dive:_____ | Latitude/longitude end:_____

Start time:_____ | notes:

Obs #	Time	Lat	Long	Depth (m)	n. of debris items	Litter types		no interaction	Litter-fauna interaction							Litter size class			Litter disposition		Impacted species	N of impacted organisms or colonies	Habitat		Litter colonization		Substrate		
						Non ALDFG litter (insert value choosing from MSFD Joint list, group G)	ALDFG (insert value choosing from MSFD Joint list, group G)		impact -coverage	impact-entanglement				colonization	adaptive behaviour	Class 1 (< 1 m^2)	Class 2 (1 - 10 m^2)	Class 3 (> 10 m^2)	rolled	outstretched			Biocenosis	facies association	epibiontic species	degree of colonization	rocky	soft	mixed
										damage	mortality/ necropsis	decreased mobility	other (specify)																

***Litter-fauna interaction**:*

- ***no interaction (no impact):** when there is no contact between litter and organism*
- ***interaction (impact):** when there is a contact between litter and organism*
- ***coverage:** when organisms are covered by litter*
- ***entanglement:** when organisms are entangled with ALDFG or other marine litter items*
- ***type of damage:** abrasions, wounds, broken branches (corals), epibionts, decreased mobility, mortality, etc.*

Litter disposition

- ***rolled:** when fishing gear are all tangled up*
- ***outstretched:** when fishing gear is under tension (absolutely straight) or loosely lying on the seafloor with some little meandering.*

Litter colonization/coverage:

- *< 50%*
- *> 50%*