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Table 1 Temporal Trend Monitoring required in Sediments

Strategy

This monitoring is completed to fulfil the requirements of the following JAMP issues:

JAMP Issue 1.2 What are the concentrations and fluxes of Mercury, Cadmium and Lead in sediment and biota?

JAMP Issue 1.7 Do high concentrations of PCBs pose a risk to the marine ecosystem?

JAMP Issue 1.10 What are the concentrations of PAHs in the maritime area?

JAMP Issue 1.17 Where do pollutants cause deleterious effects?

The following guidelines are relevant to this part of the programme:

JAMP Guidelines for Monitoring Contaminants in Sediments.

JAMP Eutrophication Monitoring Guidelines: Benthos.

JAMP Guidelines for General Biological Effects Monitoring.

This part of the programme also meets some of the requirements of the standstill clause of the EC Dangerous Substances Directive.

It is anticipated that the metals programme will at worst have 90% power to detect a 5% per year change over a period of between 15 and 20 years.

Sediment samples will be collected at the designated sampling point within each strata (on a random or fixed basis) and the exact location of each sample recorded. Replicates will be collected for chemistry, benthic analysis and biological effects, as required (see appropriate Appendix). Samples will be collected between February and June. In order to minimise the effects of seasonal variability in the macrobenthic communities, sampling should be undertaken within a narrow time window within the broader window of February to June. It is recommended that sampling is undertaken +/- 3 weeks of the original sampling date in 1999 or 2000. If sampling is undertaken during May or June then +/- 2 weeks is recommended.

Sampling and sample storage

Information on sampling method and sample storage are required for submission of the data to ICES. Relevant codes and field sheets for recording this information are provided in Appendix 3. Sediments should be analysed for contaminants, macrofauna and biological effects on separate grabs collected from the same location on the same sampling occasion. Details of sample preparation and analysis record requirements are given in Appendix 6,7,8,9, and 10. Parameters to be monitored are detailed in spreadsheet param_uomval.xls and sites to be monitored are listed in STATN.csv.

Contaminant record

This record requires information on the method of preparation and analysis information for the parameters measured (Table 1.1). Samples for trace metal analysis should be sieved to <63 µm however, existing sample preparation methodologies may be maintained where a time series exists. The sieve size used must be noted in the data returns to the CSEMP database. Parameter codes and reporting units for sediments are listed in the spreadsheet param_uomval.xls. Analytical methods should be designed to achieve QUASIMEME performance targets.

Table 1.1. Contaminants in sediments	ICES Code	Status	Units	Targets	
				LOD	P%
Aluminium	AL	M	%	0.1	25
Cadmium	CD	M	µg/kg	200	25
Mercury	HG	M	µg/kg	10	25
Copper	CU	M	mg/kg	1	25
Lead	PB	M	mg/kg	2	25
Nickel	NI	M	mg/kg	1	25
Zinc	ZN	M	mg/kg	2.5	25
Arsenic	AS	M	mg/kg	1	25
Chromium	CR	M	mg/kg	2	25
Lithium	LI	M	mg/kg	0.1	25
Iron	FE	M	%	0.1	25
Manganese	MN	M	mg/kg	0.1	25
TBT	TBTIN	M	µg/kg	1	25
PCB 28	CB28	M	µg/kg	0.1	25
PCB 52	CB52	M	µg/kg	0.1	25
PCB 101	CB101	M	µg/kg	0.1	25
PCB 118	CB118	M	µg/kg	0.1	25
PCB 138	CB138	M	µg/kg	0.1	25
PCB 153	CB153	M	µg/kg	0.1	25
PCB 180	CB180	M	µg/kg	0.1	25
Naphthalene	NAP	M	µg/kg	10	25
Phenanthrene	PA	M	µg/kg	10	25
Anthracene	ANT	M	µg/kg	2	25
Fluoranthene	FLU	M	µg/kg	2	25
Pyrene	PYR	M	µg/kg	2	25
Benzo[a]anthracene	BAA	M	µg/kg	2	25
Chrysene/Triphenylene	CHRTR	M	µg/kg	2	25
Benzo[a]pyrene	BAP	M	µg/kg	2	25
Benzo[ghi]perylene	BGHIP	M	µg/kg	10	25
Indeno[123-cd]pyrene	ICDP	M	µg/kg	10	25
Acenaphthene	ACNE		µg/kg	2	25
Acenaphthylene	ACNLE		µg/kg	2	25
Dibenzothiophene	DBT		µg/kg	10	25
C1-dibenzothiophenes	DBTC1		µg/kg	10	25
C2-dibenzothiophenes	DBTC2		µg/kg	10	25
C3-dibenzothiophenes	DBTC3		µg/kg	10	25
Fluorene	FLE		µg/kg	10	25
1-methylnaphthalene	NAP1M		µg/kg	10	25
2-methylnaphthalene	NAP2M		µg/kg	10	25
C1-naphthalenes	NAPC1		µg/kg	10	25
C2-naphthalenes	NAPC2		µg/kg	10	25
C3-naphthalenes	NAPC3		µg/kg	10	25
Benzo[e]pyrene	BEP		µg/kg	10	25
Dibenz[a,h]anthracene	DBAHA		µg/kg	5	25
Perylene	PER		µg/kg	10	25
Triphenylene	TRI		µg/kg	20	25
C1-phenanthrenes	PAC1		µg/kg	10	25
C2-phenanthrenes	PAC2		µg/kg	10	25
C3-phenanthrenes	PAC3		µg/kg	10	25
Benzo[c]phenanthrene	PABC		µg/kg	10	25
Benzo[b]anthracene	BBA		µg/kg	10	25
Benzo[b+j+k]fluoranthene	BBKF		µg/kg	10	25
Organic carbon	CORG	M	%		25
Hexabromocyclododecane	HBCD	M	µg/kg	0.1	25
2,4,4'-tribromodiphenyl ether (PBDE28)	BDE28	M	µg/kg	0.1	25
2,2',4,4'-tetrabromodiphenyl ether (PBDE47)	BDE47	M	µg/kg	0.1	25
2,3',4,4'-tetrabromodiphenyl ether (PBDE66)	BDE66	M	µg/kg	0.1	25
2,2',3,4,4'-pentabromodiphenyl ether (PBDE85)	BDE85	M	µg/kg	0.1	

			µg/kg		25
2,2',4,4',5-pentabromodiphenyl ether (PBDE99)	BDE99	M	µg/kg	0.1	25
2,2',4,4',6-pentabromodiphenyl ether (PBDE100)	BDE100	M	µg/kg	0.1	25
2,2',4,4',5,5'-hexabromodiphenyl ether (PBDE153)	BDE153	M	µg/kg	0.1	25
2,2',4,4',5,6'-hexabromodiphenyl ether (PBDE154)	BDE154	M	µg/kg	0.1	25
2,2',3,4,4',5',6'-heptabromodiphenyl ether (PBDE183)	BDE183	M	µg/kg	0.1	25
Decabromodiphenyl ether (PBDE209)	BDE209	M	µg/kg	0.1	25

Particle Size Analysis

Sediment structure as determined by particle size analysis is used to support benthic community analysis and contaminants. The sample used to support benthic community analysis should be a representative collected from a separate grab. The full range of parameters detailed in Table 1.1 should be determined on this sample. A separate sample should be collected for particle size analysis to support the contaminants data. The fraction less than 63µm should be determined on this sample.

Table 1.2 – sediment grain size parameters.

Code	Description	Interpretation	Unit
GSKURT	Grain size kurtosis	Statistical summary	Scale
GSMEA	Grain size mean	Statistical summary	mm
GSSKEW	Grain size skewness	Statistical summary	Scale
GSSORT	Grain size sorting	Statistical summary	Scale
GSMED	Grain size median	Statistical summary	mm
GSMF>8000	Grain Size Mass Fraction >8000	Phi class which may also be used to derive broader classes (% sand, gravel etc)	%
GSMF>4000<8000	Grain Size Mass Fraction >4000<8000	See above	%
GSMF>2000<4000	Grain Size Mass Fraction >2000<4000	See above	%
GSMF>1000<2000	Grain Size Mass Fraction >1000<2000	See above	%
GSMF>500<1000	Grain Size Mass Fraction >500<1000 µm	See above	%
GSMF>250<500	Grain Size Mass Fraction >250<500 µm	See above	%
GSMF>125<250	Grain Size Mass Fraction >125<250 µm	See above	%
GSMF>63<125	Grain Size Mass Fraction >63<125 µm	See above	%
GSMF63	Grain Size Mass Fraction <63 µm	See above	%
GSMF20	Grain Size Mass Fraction <20 µm	Used for chemistry interpretation	%

Benthic community analysis record

Guidelines for the analysis of macrobenthic samples are given in Appendix 10. Macrobenthic species data should be submitted in conjunction in the coding system used (RUBIN or other agreed list) and information on biological community parameters i.e. biomass and abundance. Information on sediment particle size should also be submitted with macrobenthic species data (see Table 1.1).

Table 1.3 Benthic Macrofauna	CODE
Latin name of species (or aggregated genus/family)	
Reference code list used for species ID	ITLN
Abundance number	ABUNDNR
Biomass-wet weight	BMWETWT
Biomass –dry weight	BMDRYWT
Biomass –ash free dry weight	BMAFDWT

Where toxic effects are observed, toxicity-directed analysis of interstitial water fractions should be carried out.

Biological Effects – Sediments

Participating organisations will apply whole sediment bioassays at estuarine sites. Relevant biological effects techniques to be applied to sediments are outlined in Appendix 2 and ICES reporting codes are given in Table 1.4. Biological effects should be associated with contaminant monitoring data.

TABLE 1.4 BIOLOGICAL EFFECTS	CODE	UNIT
<i>Corophium</i> mortality (10 day)	MORT%	%
<i>Arenicola</i> mortality and feeding rate (10 day)	MORT%	%
<i>Tisbe</i> mortality pore water (2 day)	MORT%	%
Redox*	REDOX	mV
Temperature*	TEMP	degC
Ammonia**	AMON	uM
Hydrogen Sulphide**	HSUL	mg/l

* At the time of sample collection

** During the whole sediment bioassay test

Table 1.5 SEDIMENT SAMPLING STATIONS – see STATN.csv

Table 2 - Monitoring required in Shellfish

Strategy

This monitoring is completed to fulfil the requirements of the following JAMP Issues:

JAMP Issue 1.2 What are the concentrations and fluxes of Mercury, Cadmium and Lead in sediment and biota?

JAMP Issue 1.3 To what extent do biological effects occur in the vicinity of major shipping routes, offshore installations, marinas and shipyards?

JAMP Issue 1.7 Do high concentrations of PCBs pose a risk to the marine ecosystem?

JAMP Issue 1.10 What are the concentrations of PAHs in the maritime area?

JAMP Issue 1.11 Do PAHs affect fish and shellfish?

JAMP Issue 1.17 Where do pollutants cause deleterious effects?

The following guidelines are relevant to this part of the Programme:

JAMP Guidelines for Monitoring Contaminants in Biota.

JAMP Guidelines for Contaminant Specific Biological Effects Monitoring.

This part of the programme also meets some of the requirements of the standstill clause of the EC Dangerous Substances Directive, the Shellfish Growing Waters Directive and the Shellfish Hygiene Directive. Analysis of organochlorine residues are only required at selected sites in relation to EC Directive monitoring. The JAMP only requires monitoring for PCBs.

Contaminant monitoring

To minimise duplication of effort, Shellfish Growing Waters or Shellfish Hygiene Directive sites should be used for CSEMP purposes where possible. It is anticipated that this programme will have 90% power to detect at least a 10% per year change in metal concentrations and a 20% per year change in organics concentrations over a 20 year period.

The common blue mussel (*Mytilus edulis*) should be used. Where this species is not available brown seaweed (*Fucus vesiculosus* or *Fucus spiralis*) may be used. The same species should be used henceforth for temporal trend monitoring and should be collected at the same time of year on all sampling occasions.

Samples should be collected from the shore at locations avoiding the influence of point source discharges. Samples should be collected between February / March to avoid the spawning period. Sufficient individual mussels in the size range 3-6 cm should be collected to provide sufficient soft tissue for each analysis. To minimise the effects of natural size related variability, the length range of individuals within this broad band should be minimised as much as possible to, for example, 5 mm. This narrower length band should then be fixed from year to year. In selecting the sample, care should be taken that it is representative of the population and that it can be obtained annually. Average data should be reported with supporting data on species used, mean, maximum and minimum length, % moisture content and % total lipid (wet weight basis).

Appendix 5 details sampling, sample storage and sample preparation procedures and lists appropriate ICES codes. This information must be provided with the data. The Foppes

Smedes procedure is recommended for measurement of total lipid. Contaminants to be monitored are detailed in Table 2.1 together with required analytical targets.

Table 2.1 Contaminants in biota	ICES Code	Status	Units	Analytical Targets	
				LOD	P%
Mercury	HG	M	µg/kg wet weight	20 (mussels) 3 (<i>Fucus</i>)	25
Cadmium	CD	M	µg/kg wet weight	50	25
Copper	CU	M	µg/kg wet weight	100	25
Lead	PB	M	µg/kg wet weight	50	25
Nickel	NI	M	µg/kg wet weight	50	25
Zinc	ZN	M	µg/kg wet weight	2000	25
Arsenic	AS	M	µg/kg wet weight	300	25
Chromium	CR	M	µg/kg wet weight	50	25
Silver	AG	M	µg/kg wet weight	10	25
Selenium	SE	M	µg/kg wet weight	10	25
PCB 28	CB28	M	µg/kg wet weight	0.1	25
PCB 52	CB52	M	µg/kg wet weight	0.1	25
PCB 101	CB101	M	µg/kg wet weight	0.1	25
PCB 118	CB118	M	µg/kg wet weight	0.1	25
PCB 138	CB138	M	µg/kg wet weight	0.1	25
PCB 153	CB153	M	µg/kg wet weight	0.1	25
PCB 180	CB180	M	µg/kg wet weight	0.1	25
HCH - alpha	HCHA		µg/kg wet weight	0.1	25
HCH β beta	HCHB		µg/kg wet weight	0.1	25
HCH - gamma	HCHG		µg/kg wet weight	0.1	25
HCH - delta	HCHD		µg/kg wet weight	0.1	25
op-DDT	DDTOP		µg/kg wet weight	0.1	25
pp-DDT	DDTTP		µg/kg wet weight	0.1	25
pp-TDE	TDEPP		µg/kg wet weight	0.1	25
pp-DDE	DDEPP		µg/kg wet weight	0.1	25
Dieldrin	DIELD		µg/kg wet weight	0.1	25
Aldrin	ALD		µg/kg wet weight	0.1	25
Endrin	END		µg/kg wet weight	0.1	25
Isodrin	ISOD		µg/kg wet weight	0.1	25
HCB	HCB		µg/kg wet weight	0.1	25
HCBD	HCBD		µg/kg wet weight	0.1	25
Naphthalene	NAP	M	µg/kg wet weight	1	25
Phenanthrene	PA	M	µg/kg wet weight	1	25
Anthracene	ANT	M	µg/kg wet weight	0.5	25
Fluoranthene	FLU	M	µg/kg wet weight	0.5	25
Pyrene	PYR	M	µg/kg wet weight	0.5	25
Benzo[a]anthracene	BAA	M	µg/kg wet weight	0.5	25
Chrysene	CHRTR	M	µg/kg wet weight	0.5	25
Benzo[a]pyrene	BAP		µg/kg wet weight	0.5	25
Benzo[ghi]perylene	BGHIP		µg/kg wet weight	0.5	25
Indeno[123-cd]pyrene	ICDP		µg/kg wet weight	0.5	25
Acenaphthene	ACNE		µg/kg wet weight	0.5	25
Acenaphthylene	ACNLE		µg/kg wet weight	0.5	25
Dibenzothiophene	DBT		µg/kg wet weight	0.5	25
C1-dibenzothiophenes	DBTC1		µg/kg wet weight	0.5	25
C2-dibenzothiophenes	DBTC2		µg/kg wet weight	0.5	25
C3-dibenzothiophenes	DBTC3		µg/kg wet weight	0.5	25
Fluorene	FLE		µg/kg wet weight	0.5	25
1-methylnaphthalene	NAP1M		µg/kg wet weight	0.5	25
2-methylnaphthalene	NAP2M		µg/kg wet weight	0.5	25
C3-naphthalenes	NAPC3		µg/kg wet weight	0.5	25
Benzo[e]pyrene	BEP		µg/kg wet weight	0.5	25
Dibenz[a,h]anthracene	DBAHA		µg/kg wet weight	0.5	25
Perylene	PER		µg/kg wet weight	0.5	25
Triphenylene	TRI		µg/kg wet weight	0.5	25
C1-phenanthrenes	PAC1		µg/kg wet weight	0.5	25
C2-phenanthrenes	PAC2		µg/kg wet weight	0.5	25
C3-phenanthrenes	PAC3		µg/kg wet weight	0.5	25

Table 2.1 Contaminants in biota	ICES Code	Status	Units	Analytical Targets	
Benzo[c]phenanthrene	PABC		µg/kg wet weight	0.5	25
Benzo[b]anthracene	BBA		µg/kg wet weight	0.5	25
Benzo[b+j,k]flouranthene	BBKF		µg/kg wet weight	0.5	25
C1-naphthalenes	NAPC1		µg/kg wet weight	0.5	25
C2- naphthalenes	NAPC2		µg/kg wet weight	0.5	25
Total lipid	LIPIDWT	M	% wet weight	0.1	25
Dry Weight	DRYWT	M	%		
Tributyl tin (for imposex only)	TBTIN		µg/kg wet weight	20	25
Hexabromocyclododecane	HBCD	M	µg/kg	0.1	25
2,4,4'-tribromodiphenyl ether (PBDE28)	BDE28	M	µg/kg	0.1	25
2,2',4,4'-tetrabromodiphenyl ether (PBDE47)	BDE47	M	µg/kg	0.1	25
2,3',4,4'-tetrabromodiphenyl ether (PBDE66)	BDE66	M	µg/kg	0.1	25
2,2',3,4,4'-pentabromodiphenyl ether (PBDE85)	BDE85	M	µg/kg	0.1	25
2,2',4,4',5-pentabromodiphenyl ether (PBDE99)	BDE99	M	µg/kg	0.1	25
2,2',4,4',6-pentabromodiphenyl ether (PBDE100)	BDE100	M	µg/kg	0.1	25
2,2',4,4',5,5'-hexabromodiphenyl ether (PBDE153)	BDE153	M	µg/kg	0.1	25
2,2',4,4',5,6'-hexabromodiphenyl ether (PBDE154)	BDE154	M	µg/kg	0.1	25
2,2',3,4,4',5',6'-heptabromodiphenyl ether (PBDE183)	BDE183	M	µg/kg	0.1	25

TABLE 2.1 contd. SUPPORTING DATA			
	CODE	Status	UNITS
length (max) (in combination with matrix)	LNMEA	M	mm
length (mean or individual) (in combination with matrix)	LNMAX	M	mm
length (min) (in combination with matrix)	LNMIN	M	mm
Moisture Content	MOCON		%
Dry weight percent	DRYWT		%
weight (max) (in combination with matrix)	WTMAX		g
weight (mean or individual) (in combination with matrix)	WTMEA		g
weight (min) (in combination with matrix)	WTMIN		g
No. Of individuals per batch	NUM	M	
Extractable Lipids	EXLIP		%
Total lipid	LIPIDWT		%
Species identity	SPECI	M	Full Latin name, (e.g. <i>Mytilus edulis</i>)

Table 2.2 SHELLFISH SAMPLING STATIONS (see STATN.csv)

Biological Effects – Shellfish

Imposex/intersex and TBT Methodology

Sampling should be designed in accordance with the revised OSPAR guidelines on TBT effects monitoring (OSPAR, 2002). The guidelines recommended the use of the common dog whelk (*Nucella lapillus*) for the determination of imposex. In areas where dogwhelks are not present in sufficient numbers, other species can be used (Table 2.3). Imposex in whelks (*Buccinum undatum* and *Neptunea antiqua*) can be determined at offshore sites. Samples should be collected from sites at increasing distances away from point sources (i.e. marinas, ship yards and harbours) to determine gradients of effect. Imposex and intersex data should be supported by analysis of TBT in tissue, where appropriate. Samples should be collected once every three years from designated sites. For sampling requirements and analytical protocols, see Appendix 2.

Laboratories must participate in the QUASIMEME interlaboratory proficiency test exercise for Imposex and report their results to ICES.

The parameters listed in Table 2.3 should be measured and reported to ICES using the units and codes listed in param_uomval.xls.

Table 2.3: Imposex/Imposex parameters required for reporting to ICES

Parameter	Nucella	Buccinum	Neptunea	Littorina
Proportion of females displaying imposex or intersex	1	1	1	1
Vas deferens sequence index (VDSI)	1	1	1	
Proportion of sterile females	1			1
Relative Penis size index (RPSI)	1			
Relative Penis length index (RPLI)				
Intersex index (INTSI)				1
Average length of prostate gland in females (FPrL)				1
Penis classification index (PCI)		1		

Table 3 – Monitoring required in fish**Strategy**

This monitoring is undertaken to fulfil the requirements of the following JAMP Issues.

JAMP Issue 1.2 What are the concentrations and fluxes of Mercury, Cadmium and Lead in sediment and biota?

JAMP Issue 1.3 To what extent to biological effects occur in the vicinity of major shipping routes, offshore installations, marinas and shipyards?

JAMP Issue 1.7 Do high concentrations of PCBs pose a risk to the marine ecosystem?

JAMP Issue 1.8 Do high concentrations of non-ortho and mono-ortho CBs in seafood pose a risk to human health?

JAMP Issue 1.10 What are the concentrations of PAHs in the maritime area?

JAMP Issue 1.11 Do PAHs affect fish and shellfish?

JAMP Issue 1.17 Where do pollutants cause deleterious effects?

The following guidelines are relevant to this part of the Programme:

JAMP Guidelines for Monitoring Contaminants in Biota.

JAMP Guidelines for Contaminant Specific Biological Effects Monitoring.

This part of the programme also meets some of the requirements of the EC Fishery Products Directive.

It is anticipated that this programme will have 90% power to detect a 2-10% per year change in metal concentrations in fish muscle over a 20 year period. It is anticipated that the programme for monitoring contaminants in fish liver will have 90% power to detect a 3-10% change per year in both metals and organics over a 20 year period.

Preferred species are dab (*Limanda limanda*) or flounder (*Platichthys flesus*). Other acceptable species include plaice, cod and whiting. Whichever species is chosen it must be analysed throughout the time series dataset, in a consistent strategy, outside the breeding season.

Ideally, about 25 (22 to 28) fish in the size range 18-30 cm (dab), 15-35 cm (flounder), 20-30cm (plaice), 30-45cm (cod) and 20-35cm (whiting) should be collected at a site. Length stratified data are needed from 5 batches of at least 5 fish. If five fish yield insufficient liver tissue for analysis more than five fish may be collected from one or more catches of the 5 fixed length strata. A minimum of 4 batches are required from the 5 fixed length strata. The number of fish pooled in each batch must be the same each year. Visibly damaged fish should not be included. Each batch should correspond to one of the 5 fixed length strata. Data should be reported with supporting data on mean length, % lipid and % wet weight. Analyses should be carried out on both the muscle and the liver. Samples should be collected outside the spawning period and at the same time of the year in each year.

Where there is an insufficient range of fish at a site eg < 10 cm, the sampling strategy may be revised as follows:

Modification 1 Length range 5-10 cm with the fixed length range

Split the length range close to the log mid-point into small and large. Collect a minimum of twenty fish to provide 2 equal replicates of each size group with a minimum of five fish per replicate. Fish should be allocated to replicates before homogenising the tissue.

Modification 2 length range < 5 cm

Collect a random sample of a minimum of twenty fish and randomly allocate them equally to 4 replicates of at least five fish. Again fish should be allocated to replicates before homogenising the tissue.

An alternative to length stratified sampling may be to minimise natural variability. At least 12 single sex fish, preferably female, age 2-3 years should be caught in a narrow length range (i.e. 26-30cm, 31-35cm etc). The length of the individuals collected should be constant from year to year at each station or should at least fall within a very narrow range, such as within 5cm. In selecting the sample, care should be taken that it is representative of the population and that it can be obtained annually (see JAMP guidelines for more detail on length stratified sampling).

Methodology

Fish should be sampled outside the spawning season and contaminants should be measured on the same samples collected for biological effects. Details of sample location and gear used for trawling should be recorded. Samples should be prepared for analysis as soon as possible after collection (see Appendix 4).

Table 3.1: Determinand	Status	ICES Code	Matrix	Units	NMCAQC target	
					LOD	P%
ANALYSES IN MUSCLE (FM)						
Mercury		HG	MU	µg/kg wet weight	20	25
Arsenic		AS	MU	µg/kg wet weight	300	25
ANALYSES IN LIVER (FL)						
Cadmium		CD	LI	µg/kg wet weight	2	25
Lead		PB	LI	µg/kg wet weight	10	25
PCB 28		CB28	LI	µg/kg wet weight	0.1	25
PCB 52		CB52	LI	µg/kg wet weight	0.1	25
PCB 101		CB101	LI	µg/kg wet weight	0.1	25
PCB 118		CB118	LI	µg/kg wet weight	0.1	25
PCB 138		CB138	LI	µg/kg wet weight	0.1	25
PCB 153		CB153	LI	µg/kg wet weight	0.1	25
PCB 180		CB180	LI	µg/kg wet weight	0.1	25
SUPPORTING DETERMINANDS						
Moisture content	M	MOCON	MU	% wet weight		
Dry weight	M	DRYWT	MU	% dry weight		
Total lipid	M	LIPIDWT	LI	%		
Length (mean)	M	LNMEA	WO	mm		
Length (min)		LNMAX	WO	mm		
Length (max)		LNMIN	WO	mm		
Mean weight		WTMEA	WO	g		
Min weight		WTMIN	WO	g		
Max weight		WTMAX	WO	g		
Species identity	M	SPECI		Full Latin name (e.g. dab is <i>Limanda limanda</i> -)		
Sex		SEXCO		(M, F, X=mixed, I=immature)		
Liver weight		WTMEA	LI	g		
Number in Batch	M	NUM				
Extractable Lipids		EXLIP		%		
Total lipid	M	LIPIDWT		%		

The analysis of arsenic in fish flesh is only required where data is to be reported for the Fisheries Product Directive. Total lipid should be analysed by the Foppes Smedes method.

Biological Effects – Fish

PAHs

The flatfish in estuaries will be flounder, and those offshore will be either plaice or dab. The suite of techniques for analysis includes EROD, bile metabolites and DNA adducts, and these should be augmented by the analysis of PCBs in fish liver and PAHs in sediments. Fish monitoring sites are indicated in STATN.csv. The relevant parameters listed in param_uomval.xls and summarised in Table 3.2 will be reported and the procedures for sampling and analysis are shown in Appendix 2.

Table 3.2 PAH measurements in fish

Description	Code	Units
EROD	EROD	pmol/min/mgprotein
1-hydroxy pyrene	PYR1OH	ng/g
1-hydroxy pyrene equivalent	PYR1OHEQ	ng/g
1-hydroxy phenanthrene	PA1OH	ng/g
3-hydroxy benzo(a)pyrene	BAP3OH	ng/g
2-hydroxy naphthalene	NAP2H	ng/g
Hydroxy-pyrene normaliser at absorbance 380 nm	PYROH-380	ng/g
DNA adducts	DNAAD	nr/1 E+8 UN

Fish Disease

CEFAS will undertake surveys of fish disease in flatfish once per annum as indicated in Appendix 7. Target species will be dab and flounder, although commercial species will be examined where sufficient numbers are caught. Protocol for examination of external disease and gross liver pathology will be according to ICES (1996). Samples will also be taken for the assessment of liver pathology using guidelines according to ICES (1997).

Surveys of fish disease involve FRS work in May-June at St Abbs, Bell Rock, the Beatrice Field and the JONSIS line. The ICES (1997) protocol for dabs will apply. The diseases and parasites detailed in Table 3.3 should be noted.

Table 3.3 Gross disease and parasites noted in fish.

Code	Description	Units
ACAN THO	Acanthochondria sp	afnr (affected number of individuals)
CRYP COT	Cryptocotyle sp	afnr
CLAV ELL	Clavella sp	afnr
EPID PAP	Epidermal hyperplasia/papilloma	afnr
GLUG STE	Glugea sp	afnr
ICHT SPP	Ichthyophonus sp.	afnr
LERN AEO	Lernaeocera sp.	afnr
LYMP CYS	Lymphocystis	afnr
LIVE NOD	Liver disease – nodule/tumour	afnr
LEPE OPH	Lepeophtheirus sp.	afnr
PSEU TUM	Pseudobranchial swelling	afnr
SKEL DEF	Skeletal deformity	afnr
STEP STO	Stephanostomum sp.	afnr
SKIN ULC	Skin ulcer (acute/healing ulcers)	afnr
VISC GRA	Visceral granuloma	afnr
XGIL LES	X-cell gill lesions	afnr
HPIGM	Hyperpigmentation	afnr
M74	M74	afnr
FROT	Fin rot/erosion (acute/healing)	afnr

Other Biomarkers

Development work is being carried out on vitellogenin and AChE (acetyl cholinesterase) . See Appendix 2 for details.

Table 3.4 FISH SAMPLING STATIONS (see STATN.csv)

Table 4 – Eutrophication monitoring requirements**Strategy**

Monitoring to determine the eutrophic status of UK marine waters is required by:

The OSPAR Strategy to Combat Eutrophication
 The Urban Waste Water Treatment Directive (91/271/EEC):
 The Nitrates Directive (91/676/EEC):
 The Water Framework Directive (2000/60/EEC):
 The Habitats Directive (92/43/EEC):
 Marine Strategy Framework Directive (2008/56/EC)

Eutrophication is defined as:

The enrichment of water by nutrients causing an accelerated growth of algae and higher forms of plant life to produce an undesirable disturbance to the balance of organisms present in the water and the quality of water concerned.

Monitoring is designed to determine the presence of:

- Nutrient (nitrogen and phosphorus) enrichment
- Accelerated growth of algae (estimates of biomass)
- An undesirable disturbance (organic enrichment leading to oxygen depletion)

Table 4.1. lists the determinands to be monitored under the Clean Seas programme to provide evidence for eutrophication.

Table 4.1: Determinand	Units	ICES	NMCAQC Targets	
			LOD	P%
Ammonia	μ M	AMON	0.5	12
Nitrate	μ M	NTRA	0.5	12
Nitrite	μ M	NTRI	0.05	12
Total oxidised nitrogen	μ M	NTRZ		
Phosphate	μ M	PHOS	0.05	12
Silicate	μ M	SLCA	0.5	12
Chlorophyll-a	μg/l	CPHL	0.1	25
Dissolved oxygen	mg/l	DOXY		
SUPPORTING DETERMINANDS				
Salinity	PSU	PSAL	0.5	
Temperature	degC	TEMP		
Secchi depth	m	SECCI		

Nutrient enrichment

Plant growth is limited by the least abundant nutrient i.e. nitrogen or phosphorus. In coastal waters growth is usually limited by the availability of dissolved inorganic nitrogen (nitrate + nitrite + ammonia) however phosphate should also be measured so that the N:P ratio can be determined to confirm this. Silicate may also be determined as this limits the growth of diatoms which have a siliceous cell wall.

Nutrients are removed from the water column by plant growth during the growing season so monitoring is limited to Winter (November – March) to obtain a maximum value and allow interannual comparison.

The concentration and ratio of N:P in estuaries changes as nutrient rich river water mixes with seawater. Salinity is used to determine the impact of freshwater inputs in estuaries and regions of freshwater influence in coastal waters.

Accelerated Growth

Spring/ Summer (April - September) chlorophyll concentrations should be determined as an indicator of phytoplankton biomass. Ideally continuous data should be collected as concentrations vary temporally and spatially in response to climatic and physical variables.

The depth of the photic zone should also be determined by measuring the secchi disc depth. This gives an indication of whether phytoplankton growth is inhibited by availability of light.

Undesirable Disturbance

Dissolved oxygen is consumed by the decay of senescent algae at the end of the growing season. The extent of oxygen removal depends on the biomass of algae and flushing rate. Removal of oxygen by organic enrichment is a concern when low oxygen concentrations impact on the fauna. Dissolved oxygen should be measured in bottom waters during the autumn.

Methodology

Procedural guidelines for nutrient and chlorophyll sampling and sample preparation are given in Appendix 12 and 13.

It is recognised that spot water samples for inherently variable determinands such as nutrients, dissolved oxygen and chlorophyll *a* and are of limited value in long term trend monitoring. Continuous monitoring is preferable and should be used in areas of concern if possible.

Data Submission

Winter nutrient, summer chlorophyll and supporting data should be submitted to the MERMAN database. MERMAN can accept data from both fixed and opportunistic sites however there is currently no mechanism for collecting continuous in situ monitoring data. Quality Control data (both internal and proficiency test data) must be submitted with the environmental data.

Table 5 – Compliance Monitoring of Contaminants in Water**Strategy**

Monitoring for trace metals and organic compounds in water is undertaken to comply with the requirements of the Water Framework Directive (2000/60/EC – “the WFD”) and its daughter Directive specifying Environmental Quality Standards (2008/105/EC). Monitoring is required to determine compliance against national and international Environmental Quality Standards which are usually specified as annual average concentrations (see Table 5.2 below). Monitoring frequencies are determined for different contaminants by the WFD, but quarterly monitoring is regarded as the minimum frequency to assess compliance on an annual average basis. Organisations need only submit data collected for their statutory monitoring requirements where there is a known contaminant source. All samples from the water column are to be taken approximately 1 metre below the surface. Sampling should be undertaken at taken at a tidal state, allowing for practicality and safety, which is likely to indicate a worst case contaminant concentration. Every effort should be made thereafter to sample under similar tidal conditions at each site. Biological effects samples for Oyster Embryo Bioassay should be collected in conjunction with contaminants samples at estuarine sites.

Methodology

Care should be taken to avoid contamination of the sample during sampling and sample preparation. Trace metals samples should be filtered to <0.45 µm to allow an assessment of compliance with the EQS values for dissolved metals. Salinity and suspended solids samples should also be collected to provide supporting information. Sampling and sample preparation procedures are outlined in Appendix 13.

Metals

Table 5.1: Determinands	Units	ICES	Target	
DISSOLVED METALS			LOD	P%
LIST I				
Mercury (WFD PHS)	µg/l	HG	0.003	25
Cadmium (WFD PHS)	µg/l	CD	0.04	25
LIST II				
Copper	µg/l	CU	0.2	25
Lead (WFD PS)	µg/l	PB	0.04	25
Nickel (WFD PS)	µg/l	NI	0.25	25
Zinc	µg/l	ZN	0.4	25
Iron	µg/l	FE	100	25
Boron	µg/l	B	700	25
Arsenic	µg/l	AS	2.5	25
Chromium	µg/l	CR	1.5	25
Vanadium	µg/l	V	10	25
SUPPORTING DETERMINANDS				
Salinity	PSU	PSAL	0.5	
Suspended solids	mg/l	SUSP	2	

Organics

Organics are to be monitored for WFD purposes. The analysis should be of unfiltered samples. Data must be submitted with supporting salinity and suspended solids data.

						NMCAQC Target	
Table 5.2: Determinand		Units	ICES Code				
ORGANICS						LOD	P%
PHS *	Name of substance WFD priority and priority hazardous substances (PS and PHS)			AA-EQS	MAC-EQS		
	Alachlor	µg/l		0.3	0.7	0.09	25
*	Anthracene	µg/l	ANT	0.1	0.4	0.03	25
	Atrazine	µg/l	ATRZ	0.6	2.0	0.1	25
	Benzene	µg/l	BENZ	8.0	50.0	2.4	25
*	Penta BDE 1	µg/l		0.0002		0.00006	25
*	Cadmium and its compounds	µg/l	CD	0.2		0.04	25
*	chloroalkanes, C10-13	µg/l		0.4	1.4	0.12	25
	Chlorfenvinphos	µg/l	CHLOR	0.1	0.3	0.03	25
	Chlorpyrifos	µg/l		0.0	0.1	0.009	25
	1,2-dichloroethane	µg/l	DCE	10.0		1	25
	Dichloromethane	µg/l		20.0		6	25
	Di(2-ethylhexyl)phthalate (DEHP)	µg/l		1.3		0.4	25
	Diuron	µg/l		0.2	1.8	0.06	25
*	Endosulfan	µg/l	END	0.0005	0.004	0.0001	25
	Fluoranthene	µg/l	FLU	0.1	1.0	0.03	25
*	Hexachlorobenzene	µg/l	HCB	0.01	0.1	0.003	25
*	Hexachlorobutadiene	µg/l	HCBd	0.1	0.6	0.01	25
*	Hexachlorocyclohexane HCH 2	µg/l	HCH	0.002	0.02	0.0005	25
	Isoproturon	µg/l		0.3	1.0	0.09	25
	Lead and its compounds	µg/l	PB	7.2		0.04	25
*	Mercury and its compounds	µg/l	HG	0.05	0.1	0.003	25
	Naphthalene	µg/l	NAP	1.2		0.36	25
	Nickel and its compounds	µg/l	NI	20.0		0.25	25
*	Nonylphenol	µg/l		0.3	2.0	0.09	25
	Octylphenol	µg/l		0.0		0.003	25
*	Pentachlorobenzene	µg/l	QCB	0.0		0.00021	25
	Pentachlorophenol	µg/l	PCP	0.4	1.0	0.1	25
*	Benzo(a)pyrene	µg/l	BAP	0.05	0.1	0.015	25
*	Benzo(b)fluoranthene	µg/l	BBF	0.015 ³		0.005	25
*	Benzo(k)fluoranthene	µg/l	BKF	0.015		0.005	25
*	Benzo(g,h,i)perylene	µg/l	BGHIP	0.001 ⁴		0.0005	25

1 Nine PBDE congeners (BDE28, BDE47, BDE66, BDE100, BDE99, BDE85, BDE154, BDE153, BDE183) have been selected for monitoring by OSPAR, taking into account their occurrence in the environment and their toxicity, to be routinely determined as part of the CEMP (OSPAR Commission, 2007).

For the group of priority substances covered by brominated diphenylethers under the WFD and listed in Decision No 2455/2001/EC, an EQS is established only for (as the sum of) congener numbers 28, 47, 99, 100, 153 and 154.

Hexachlorocyclohexane includes the isomers α , β , γ , δ - to be determined to the LOD shown.

Trichlorobenzenes include 124, 123 and 135 isomers - to be determined to the LOD shown.

2 Hexachlorocyclohexane includes the isomers α , β , γ , δ - to be determined to the LOD shown.

3 The EQS for benzo b and k fluoranthene is defined as 0.03 µg/l the sum of the concentrations of the two substances.

4 The EQS for benzo ghi perylene and indeno 1,2,4-cd pyrene is defined as 0.002 µg/l the sum of the concentrations of the two substances.

*	Indeno(1,2,4-cd)pyrene	µg/l	ICDP	0.001		0.0005	25
	Simazine	µg/l	SIMZ	1.0	4.0	0.1	25
*	tributyltin compounds	µg/l	TBT	0.0002	0.0015	0.00005	25
*	trichlorobenzenes (all isomers) 5	µg/l		0.4		0.01	25
	Other substances listed in (2008/105/EC).						
	Trichloromethane	µg/l		2.5		0.1	25
	Trifluralin	µg/l	CHCL3	0.030		0.01	25
	DDT isomers	µg/l	TRF	0.025		0.001	25
	para-para-DDT	µg/l		0.01000		0.001	25
	Aldrin	µg/l	DDTPP	0.00125		0.0003	25
	Dieldrin	µg/l	ALD	0.00125		0.0003	25
	Endrin	µg/l	DIELD	0.00125		0.0003	25
	Isodrin	µg/l	END	0.00125		0.0003	25
	Carbontetrachloride	µg/l	ISOD	12.0		0.1	25
	Tetrachloroethylene	µg/l		10.0		0.1	25
	Specific Pollutants						
	2,4 – D (total ester)	µg/l	E240			0.1	25
	2,4 – D (non ester)	µg/l	240			4	25
	1,1,1 – trichloroethane	µg/l	TCE			10	25
	1,1,2 – trichloroethane	µg/l	2TCE			30	25
	Bentazone	µg/l	BENT			50	25
	Biphenyl	µg/l	BIPN			2.5	25
	4-chloro-2-nitrotoluene	µg/l	4C2N			0.2	25
	4-chloro-3-nitrotoluene	µg/l	4C3N			0.2	25
	2-chloro-4-nitrotoluene	µg/l	2C4N			0.2	25
	2-chloro-5-nitrotoluene	µg/l	2C5N			0.2	25
	2-chloro-6-nitrotoluene	µg/l	2C6N			0.2	25
	Demeton	µg/l	DEM			0	
	Demeton – o	µg/l	DEMO			0	
	Demeton – s	µg/l	DEMS			0	
	Oxydemeton – methyl	µg/l	ODM			0.01	25
	Demeton – s – methyl	µg/l	DSM			0.01	25
	Demeton – s – methyl sulphone	µg/l	DSME			0.01	25
	Dimethoate	µg/l	DMT			0.1	25
	Linuron	µg/l	LIN			2	25
	MCPA	µg/l	MCPA			0.2	25
	Mecoprop	µg/l	MECOP			2	25
	Toluene	µg/l	TOL			4	25
	Triazaphos	µg/l	TRIAZ			0.0005	25
	Dichlorvos	µg/l	DCV			0.004	25
	Azinphos – methyl	µg/l	AZM			0.001	25
	Fenitrothion	µg/l	FENT			0.001	25
	Malathion	µg/l	MAL			0.002	25
	Trifluralin	µg/l	TRF			0.01	25
	Triphenlytin	µg/l	TPTIN			0.0002	25
	Tributyltin	µg/l	TBTIN			0.0008	25
	Benzene	µg/l	BENZ			1	25
	O – xylene	µg/l	XYLO			1	25
	M – xylene	µg/l	XYLM			1	25
	P – xylene	µg/l	XYLP			1	25
	Diazinon	µg/l	DIAZ			0.001	25
	Chlorfenvinphos	µg/l	CHLOR			0.001	25

5 Trichlorobenzenes include 124, 123 and 135 isomers - to be determined to the LOD shown.

	Propetamphos	µg/l	PROPE			0.001	25
	4-chloro-3-methyl phenol	µg/l	CMP43			4	25
	2-chlorophenol	µg/l	2CP			5	25
	2,4-dichlorophenol	µg/l	DCP24			2	25
	PCSDs	µg/l	PCSO			0.005	25
	Cyfluthrin	µg/l	CYF			0.0001	25
	Sulcofuron	µg/l	SUL			2.5	25
	Flucofuron	µg/l	FLUCO			0.1	25
	Permethrin	µg/l	PERM			0.001	25

Biological Effects – Water

Oyster embryo bioassay is used to determine toxicity of waters in estuaries. In practice samples should be collected in conjunction with contaminant samples. For sampling procedures and design, see Appendix 2.

Methodology

The parameters in Table 5.3 should be reported.

Table 5.3 Oyster bioassay (*Crassostrea gigas*) parameters

Field	ICES Code	Units
Percent net response	PNR	%
No. Control replicates	NUMCR	
No. Sample replicates	NUMSR	
Source of reference water	SRCWT	A=artificial, L=local, O=offshore
Salinity*	PSAL	PSU

* Sample water at the time of collection

Table 5.4 WATER SAMPLING STATIONS (see STATN.csv)

Table 6. Analytical Quality Control Reporting Requirements

The maximum tolerable error associated with contaminant data submitted to the CSEMP is specified in Tables 1-5 in terms of a required limit of detection and a maximum percentage error. Data meeting these requirements are considered to be 'fit for purpose'. The NMCAG group has developed a data quality assessment protocol (the data filter) that is used to screen chemical monitoring data on a fitness for purpose basis. The data filter involves an examination of both within-laboratory and interlaboratory measures of analytical performance. Details of external (QUASIMEME) quality control performance are also required by ICES for their assessments. Internal quality control information (see Table 6) should be reported annually with the associated contaminant data. External (QUASIMEME) data should be submitted to the MERMAN database when it is received together with a note of the laboratory code. QUASIMEME has also agreed with ICES to provide laboratories with a disc containing their data for submission to ICES annually.

Laboratories are assigned a score based on the parameters in Table 6.1 and are required to meet a minimum target for the data to be considered fit for purpose. Quality control assessments that fail to satisfy minimum criteria are recorded and associated monitoring data are flagged and excluded from assessments.

Table 6.1. Quality Control Parameters

CODE	DESCRIPTION
CACCRED	Accreditation status of the laboratory for the specified determinand
METCX	Method of chemical extraction
METOA	Method of analysis of parameter/contaminant (user defined)
DETLI	Detection limit value (use reporting units)
CONCH	Control chart basis (CRM, IRM, LRM, SRM)
CRMCO	Control chart reference material code (QUASIMEME samples acceptable here)
CRMMB	Control chart RM mean value - basis
CRMEV	Control chart expected value
CRMMV	Control chart mean value
CRMNM	Control chart reference material - number of measurements
CRMPE	Control chart reference material - period
CRMSD	Control chart reference material - standard deviation

Table 7: Monitoring required for litter.

Strategy

The Marine Strategy Framework Directive (MSFD) requires EU Member States to put in place measures to achieve Good Environmental Status (GES) in their marine waters by 2020. By July 2012 Member States must determine the characteristics of GES for their marine waters and set appropriate targets and indicators to ensure these will be achieved. The MSFD has now been transposed into UK law and DEFRA is focussing on implementing the initial requirements.

In relation to marine litter, the definition of GES has not yet been finalised, but Defra has proposed as a draft that GES will be achieved when:

1. Litter and its degradation products currently present in, and entering into, UK waters is reduced over time and does not pose a significant risk to marine life at the population level, either as a result of direct mortality or by way of indirect impacts such as reduced fecundity and bioaccumulation within food chains.

2. Litter currently present in, and entering into, UK waters does not pose a direct or indirect unacceptable risk to human welfare and does not lead to significant detrimental economic impacts for industry and coastal communities. Marine litter is defined as any persistent, manufactured or processed solid material discarded, disposed of or abandoned in the marine and coastal environment, including materials transported into the marine environment from land by rivers, draining or sewage systems or winds.

To take forward the development of GES targets for litter a workshop was held on the 10th-12th October at Defra, Nobel House, London. The workshop conclusions are shown in the table below:

Commission Criteria	Possible Options for UK Targets
<p>10.1 Characteristics of litter in the marine and coastal environment</p>	<p>[x%] overall reduction in the [volume/weight/number] of litter on coastlines from 2010 levels by 2020.</p> <p>[x%] reduction in [volume/weight/number] of plastic/fishing/sanitary litter items and sewage related viruses on coastlines from 2010 levels by 2020.</p> <p>Trend analysis shows a measurable reduction in the [volume/ weight/number] of litter on the seafloor by 2020.</p> <p>No increase/slow rate of increase of micro-plastics by 2020.</p>
<p>10.2 Impacts of litter on marine life</p>	<p>Less than 10% of northern fulmars (<i>Fulmarus glacialis</i>) having more than 0.1 g plastic particles in their stomach¹.</p> <p>Amount of (species) population with litter 'obstacles/entanglement' or scarring.</p> <p>No impact on cetaceans from marine litter at the population level by 2020.</p>

<http://www.defra.gov.uk/environment/marine/documents/interim2/201010-msfd-report.pdf>

The current state of litter monitoring activities in the UK (Jan 2010):

The MSFD is a significant new piece of legislation, to which the CMAs will have to respond in meeting the implementation requirements within the UK. In order to define GES, a UK marine litter monitoring programme will have to be instated. Currently the UK does not have a defined marine litter monitoring programme in place although different independent ad hoc surveys and research exist which will form the basis for a future defined strategy. These are defined below:

Organisation	Contact	Type of activity
MSS (CMA)	Marie Russell	Benthic trawl surveys
SEPA (CMA)	Judy Dobson	Benthic trawl surveys
NIEA (CMA)	Michael McAliskey / Matt Service	Benthic trawl surveys
EA (CMA)	Mike Best	Benthic trawl surveys
CEFAS (CMA)	Thomas Maes	Benthic Trawls: England and Wales (since 1992) Floating litter case study: England and Wales
MCS	Sue Kinsey	UK Beachwatch surveys (since 1994)
SAPHOS – PLYMOUTH UNIVERSITY	Richard Thompson	Microplastic distribution with Continuous Plankton Recorder (CPR)
IMARES in the Netherlands coordinate	Jan Andries Van Franeker	UK OSPAR EcoQO “Plastic in Fulmars”
ZSL	Rob Deaville	Turtle and cetaceans stranding programme

Contact addresses for each CMA organisation and MCA can be found in Appendix 18

Guidelines/ standardisation:

The current methodologies used can be found in Appendix 14 (Procedural guidelines for sampling and analysis of litter: beach, water column and seabed, and include:

Beach litter monitoring with MCS – 14a

Sea surface monitoring – 14b

Water column monitoring -14c

Strandings/ingestion data

Collection of fulmars for the monitoring of the OSPAR EcoQO on plastic particles in seabird stomachs is undertaken by BTO for analysis by IMARES (Netherlands). Further details of the methodology are given in the OSPAR EcoQO Handbook (2009).

It should be noted that these are likely to change as international standards and quality control procedures are further developed and agreed over the next few years.

Data record and storage:

Beach litter – standard procedure and data record templates are provided by the beachwatch programme and all data is held by MCS on main litter database; see MCS web site <http://www.mcsuk.org>).

Water column and seabed litter data is currently held by CSEMP CMAs.

Additional useful information.

Main Drivers

United Nations Convention on the Law of the Sea (UNCLOS) and General Assembly (GA) Resolutions: Sets out the legal framework within which all activities in the oceans and seas must be carried out.

DIRECTIVE 2008/56/EC – (Marine Strategy Framework Directive) - Descriptor 10 states that " Properties and quantities of marine litter do not cause harm to the coastal and marine environment"

International Convention for the Prevention of Pollution from Ships ([MARPOL 73/78](#)) - Annex V (garbage)

The Merchant Shipping (Prevention of Pollution by Garbage) Regulations 1998

The Merchant Shipping (Port Waste Reception Facilities) Regulations (2003).

There is no national legislation addressing marine litter in the European countries. There are general statutory orders, regulations, bylaws and acts governing mainly waste handling and port reception facilities. Many countries report general legislations to be insufficient and some of the present regulations to be too vague or difficult to understand in practice.

The 11 Regional Seas around the world are organizing and implementing regional activities on marine litter. These include: North-East Atlantic Region (OSPAR Convention), Baltic Sea (HELCOM Convention), Black Sea and the Mediterranean Sea.

References and Useful links

-[Global Programme of Action for the Protection of the Marine Environment from Land-based Activities](#) (UNEP, regional seas program): (<http://www.gpa.unep.org/>)

- Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection (GESAMP): (<http://gesamp.net/page.php?page=1>)

- International Coastal Cleanup (ICC): ICC is the largest coastal cleanup campaign (http://www.oceanconservancy.org/site/PageServer?pagename=press_icc)

Clean Up the World: Clean Up the World is a community based environmental. (<http://www.cleanuptheworld.org/en/>)

Beachwatch – UK beach litter monitoring scheme run by Marine Conservation Society since 1994 - (<http://www.mcsuk.org>)

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