OSPAR COMMISSION

Levels and trends in marine contaminants and their biological effects – CEMP Assessment report 2022

Monitoring and Assessment Series

2022

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Acknowledgements

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OSPAR Convention

The Convention for the Protection of the Marine Environment of the North-East Atlantic (the "OSPAR Convention") was opened for signature at the Ministerial Meeting of the former Oslo and Paris Commissions in Paris on 22 September 1992. The Convention entered into force on 25 March 1998. The Contracting Parties are Belgium, Denmark, the European Union, Finland, France, Germany, Iceland, Ireland, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom

Convention OSPAR

La Convention pour la protection du milieu marin de l'Atlantique du Nord-Est, dite Convention OSPAR, a été ouverte à la signature à la réunion ministérielle des anciennes Commissions d'Oslo et de Paris, à Paris le 22 septembre 1992. La Convention est entrée en vigueur le 25 mars 1998. Les Parties contractantes sont l'Allemagne, la Belgique, le Danemark, l'Espagne, la Finlande, la France, l'Irlande, l'Islande, le Luxembourg, la Norvège, les Pays‑Bas, le Portugal, le Royaume‑Uni de Grande Bretagne et d'Irlande du Nord, la Suède, la Suisse et l'Union européenne.

Executive Summary

This report summarises the 2022 annual CEMP assessment of levels and trends of contaminants and their biological effects. The full assessment is available online in the OSPAR Hazardous Substances Assessment Tool (OHAT): https://dome.ices.dk/ohat/?assessmentperiod=2022.

There were 15022 time series (of three years or more) in biota, of which 9875 were assessed for trends and 9899 for environmental status and 2813 for human health status; 6560 time series in sediment, of which 3332 were assessed for trends and 4957 for status; and 1402 time series in water, of which 1009 were assessed for trends and 494 for status.

Récapitulatif

Ce rapport résume l'évaluation annuelle 2022 du CEMP des niveaux et tendances des contaminants et de leurs effets biologiques. L'évaluation complète est disponible en ligne dans l'outil OSPAR d'évaluation des substances dangereuses (OHAT) : https://dome.ices.dk/ohat/?assessmentperiod=2022.

Il y avait 15022 séries temporelles (de trois ans ou plus) dans le biote, dont 9875 ont été évaluées pour les tendances et 9899 pour l'état environnemental et 2813 pour l'état de santé humaine ; 6560 séries temporelles dans les sédiments, dont 3332 ont été évaluées pour les tendances et 4957 pour l'état ; et 1402 séries temporelles dans l'eau, dont 1009 ont été évaluées pour les tendances et 494 pour l'état.

The 2022 annual CEMP assessment can be viewed on the OSPAR Hazardous Substances Assessment Tool (OHAT). It assessed 15022 time series (of three years or more) in biota, of which 9875 were assessed for trends and 9893 for environmental status and 2813 for human health status; 6560 time series in sediment, of which 3332 were assessed for trends and 4957 for status; and 1402 time series in water, of which 1009 were assessed for trends and 494 for status.

A breakdown of trends and status by region and determinand is given in Tables 1-7. The assessment methodology is described in the help files on the OHAT.

Regional trends and environmental status were assessed for metals, polycyclic aromatic hydrocarbons, polychlorinated biphenyls, and polybrominated diphenyl ethers in biota and sediment, polycyclic aromatic hydrocarbon metabolites (PYR1OH) in fish, organotins in sediment, and imposex (VDS) in whelks. For biota, time series from mammals and birds were included in the regional trend assessments, but not in the regional status assessments as the comparability of thresholds for mammals and birds against those for fish and shellfish needs further investigation. The results of the regional assessments are summarised in Tables 8-9, with full details available on the OHAT. Regional trends and health status were assessed for metals, polycyclic aromatic hydrocarbons, polychlorinated biphenyls and polybrominated diphenyl ethers in biota. The results are summarised in Table 10.

The major change since the 2021 CEMP assessment concerns the regional assessment of status of mercury against the Quality Standard (secondary poisoning), where mercury concentrations in bivalves are now adjusted to ‘fish equivalents’ to account for the difference in trophic level. Details of the adjustment can be found on the OHAT. In the 2021 assessment, when there was no adjustment, the regional environmental status of mercury was ‘acceptable’ in the Greenland-Scotland Ridge but ‘unacceptable’ (i.e. above the QS) in all other MIME subregions (with sufficient coverage). In the 2022 assessment, all MIME subregions have ‘unacceptable’ environmental status for mercury.

*Table 1: Summary of trends in contaminants and biological effects in biota. Note that for some biological effects (indicated by *) an upward trend indicates an improving situation.*

	Region I			**Region II**			**Region III**			**Region IV**		
	total	down	up	total	down	up	total	down	up	total	down	up
Metals												
Arsenic	23	5	1	96	6	12	81	20	5	23	12	0
Cadmium	29	4	4	148	24	42	100	24	13	70	7	14
Chromium	14	0	1	94	17	17	85	8	6	34	0	6
Cobalt	12	0	1	45	2	5	31	6	2			
Copper	23	3	0	168	23	24	121	6	16	61	1	25
Lead	20	4	1	147	27	32	107	18	11	70	12	10
Mercury	43	4	11	180	15	49	95	11	15	66	9	15
Nickel	14	2	1	110	15	13	90	9	8	38	1	9
Selenium	15	0	0	23	3	6	41	3	1			
Silver	10	2	2	62	7	4	62	13	2	34	1	3
Tin	8	0	0	10	0	2						
Zinc	23	4	3	161	19	33	120	10	13	61	6	11
Organotins												
MBSN+				11	5	0	2	1	0			
DBSN+				14	10	0	3	1	0	3	3	0
TBSN+	1	1	0	40	27	0	3	1	0	12	9	0
PAH parent compounds												
NAP				52	6	1	9	0	0	19	3	1
ACNLE				14	2	0	31	5	2	2	0	0
ACNE				36	4	2	34	6	4	9	1	0
FLE	1	0	0	35	4	1	42	6	0	17	0	0
PA	4	0	0	67	9	1	57	5	7	46	2	7
ANT	2	1	0	36	4	9	43	9	0	33	7	4
DBT				1	0	0	1	0	0			
FLU	6	0	0	67	13	4	57	4	6	49	12	0
PYR	3	0	0	66	19	5	56	7	6	49	15	0
BAA	3	1	0	53	15	10	51	12	3	46	10	0
CHR	1	0	0	45	8	6	54	8	13	46	15	1
BAP	3	1	1	38	4	3	42	2	5	43	7	1
BEP				19	6	1	3	1	0	19	6	0
BBKF	4	0	1	47	10	3	40	5	0	45	17	0
DBAHA				23	2	0	28	3	1	16	4	0
PER				8	2	0	3	2	0			
BGHIP	2	0	0	48	11	1	57	6	9	36	9	0
ICDP	2	0	1	38	6	3	48	4	3	41	14	0
PAH alkylated compounds												
NAPC2				1	0	0	1	1	0			
NAPC3				1	0	0	1	1	0			
DBTC1				1	0	0	1	0	0			

	Region I			Region II			Region III			Region IV		
DBTC2							1	1	0			
DBTC3							1	1	0			
PAH metabolites												
PA1OH				4	3	0						
PYR1OH				31	3	2	16	0	1			
BAP3OH				3	2	0						
Polybrominated diphenyl ethers												
BDE28	4	2	0	37	11	0	17	7	1	24	0	1
BDE47	11	4	0	69	25	1	62	40	0	47	3	4
BDE66				3	0	0	6	5	0	19	0	0
BDE85				2	0	0				1	0	0
BDE99	6	2	0	50	16	2	51	23	1	47	10	0
BD100	9	5	0	61	19	1	50	27	0	47	6	0
BD153	1	0	0									
BD154	3	1	0	38	5	1	23	13	0	38	2	0
BD183	4	2	1	44	4	0	29	13	2	44	1	2
SBDE6	7	2	0	56	18	0	64	34	1	47	3	2
Other organobromines												
HBCD	7	4	0	23	9	1						
HBCDA	7	4	0	13	5	0						
HBCDB				1	1	0						
HBCDG	3	1	0	4	1	0						
Organofluorines												
PFOA				5	1	0						
PFNA				3	0	0						
PFDA				5	0	0						
PFUNDA				9	0	1						
PFDOA				5	1	0						
PFHXS				5	4	0						
PFOS	3	3	0	16	10	0						
PFOA	3	1	0	5	4	0						
Polychlorinated biphenyls												
CB28	10	7	0	73	38	0	75	23	0	46	18	0
CB52	17	11	0	88	30	0	72	26	0	47	15	1
CB101	19	11	1	117	40	8	88	31	4	55	16	0
CB105	10	6	1	43	11	2	67	10	4	46	11	2
CB118	23	12	1	126	43	9	89	36	1	54	9	5
CB126				19	2	0	1	0	0	2	0	0
CB138	22	10	1	124	43	6	86	23	3	55	18	0
CB153	23	9	2	130	26	10	90	17	4	55	20	1
CB156	5	3	0	40	8	1	51	4	2	39	12	0
CB169				19	0	1	1	0	0	1	0	0

	Region I			Region II			Region III			Region IV		
CB180	14	7	0	99	26	5	78	20	0	51	16	0
SCB6	23	12	1	111	26	8	84	34	1	55	22	0
SCB7	23	12	4	112	26	13	84	34	0	54	20	0
Dioxins												
CDF2T				11	1	0	1	1	0	1	0	0
CDD1N				5	0	1	1	0	0	1	0	0
TCDD				6	0	0	1	1	0	1	0	0
TEQDFP				2	0	0						
Other organochlorines												
DDEPP	15	6	0	58	18	4	60	11	2	45	6	1
DDTOP	4	1	0	1	0	0	9	1	1	2	0	0
DDTPP	7	4	0	33	7	1	30	3	1	8	2	0
TDEPP	12	7	0	43	18	1	43	9	4	31	11	0
HCB	15	4	0	42	11	2	46	4	2	7	2	0
HCBD							20	1	3			
HCHA	11	9	0	10	9	0	23	6	1	17	1	0
HCHB	4	1	0	4	2	0	8	1	0			
HCHG	9	7	0	30	17	2	24	10	1	29	10	0
HCH	9	7	0	6	3	0	22	2	0			
MCCP	7	2	1	13	8	0						
SCCP	7	3	1	13	6	0						
ALD										2	0	0
DIELD				4	1	0	13	7	0			
OCDAN	4	3	0	0	0	0	5	0	0			
Imposex												
INTS				7	0	0						
VDS	2	1	0	77	38	1	41	20	0	47	20	0
Other biological effects												
ACHE*				2	0	0						
ALAD*				3	0	0						
%DNATAIL				1	0	0						
EROD				37	4	0	23	13	0			
GST*				2	1	0						
NRR*				1	0	0						
SFG*										21	8	0
SURVT*				1	0	1						

Table 2: Summary of trends in contaminants in sediment

	Region II			Region III			Region IV		
	Total	**down**	**up**	**total**	**down**	**up**	**total**	**down**	**up**
Metals									
Arsenic	69	7	6	21	0	2	2	0	0
Cadmium	76	28	3	19	1	2	2	0	0
Chromium	79	12	2	21	2	3	2	0	0
Copper	78	31	3	21	3	0	2	0	0
Lead	80	21	1	21	5	1	2	0	0
Mercury	74	33	0	20	5	0	2	0	0
Nickel	80	16	1	21	1	2	2	0	0
Zinc	75	24	1	21	2	1	2	1	0
Organotins									
MBSN+	32	6	1						
DBSN+	29	19	0						
TBSN+	31	25	0	1	0	0			
TPSN+	2	0	0						
PAH parent compounds									
NAP	53	7	5	23	6	1			
ACNLE	25	3	0	16	5	0			
ACNE	41	5	2	19	1	0			
FLE	53	8	4	19	3	0			
PA	75	10	1	23	1	1			
ANT	71	5	3	23	3	0			
DBT	14	2	0	12	2	0			
FLU	77	13	3	23	4	2			
PYR	73	17	2	23	4	3			
BAA	74	12	2	23	3	0			
CHR	75	11	1	23	5	1			
BAP	74	12	1	23	2	1			
BEP	54	9	1	23	3	2			
BBKF	64	9	2	22	4	1			
DBAHA	70	7	1	23	4	1			
PER	35	4	2	21	6	0			
BGHIP	72	22	1	23	2	1			
ICDP	74	16	3	23	2	2			
PAH alkylated compounds									
NAPC1	29	11	0	16	3	1			
NAPC2	25	5	0	16	2	0			
NAPC3	25	4	0	16	2	1			
NAPC4	8	0	0	10	0	1			
PAC1	15	0	0	12	1	0			
PAC2	15	2	0	12	3	0			
PAC3	15	1	0	12	2	0			

	Region II			Region III			Region IV		
	Total	**down**	**up**	**total**	**down**	**up**	**total**	**down**	**up**
DBTC1	14	0	0	12	1	0			
DBTC2	15	1	0	12	1	0			
DBTC3	14	1	1	12	2	0			
Polybrominated diphenyl ethers									
BDE28				3	0	0			
BDE47	8	1	0	11	4	0			
BDE66				3	1	0			
BDE85				1	1	0			
BDE99	7	2	0	7	3	0			
BD100				5	1	0			
BD153	2	0	0	4	2	0			
BD154				4	1	0			
BD183	1	1	0	2	0	0			
BD209	12	0	0	7	0	0			
Polychlorinated biphenyls									
CB28	46	17	1	11	1	0			
CB52	45	14	1	10	2	1			
CB101	53	15	1	11	2	1			
CB105	12	3	0	7	1	1			
CB118	52	21	0	11	1	1			
CB138	55	24	0	14	3	0			
CB153	58	21	2	15	1	1			
CB156	2	0	1	6	0	0			
CB180	46	22	1	11	0	0			
Other organochlorines									
DDEPP	19	3	0						
DDTOP	7	1	0						
DDTPP	18	5	0						
TDEPP	18	6	0						
HCB	34	14	0						
HCBD	10	0	4						
HCHA	7	1	0						
HCHB	10	0	1						
HCHG	16	6	1						

Table 3: Summary of trends in contaminants in water

	Region II			Region III		
	Total	**down**	**up**	**Total**	**down**	**Up**
Metals						
Cadmium	9	4	0			
Copper	9	2	2	51	0	17
Lead	9	4	1	4	0	0
Nickel	9	6	0	47	0	8
Zinc	9	1	7	9	0	1
PAH parent compounds						
NAP	27	4	0			
ACNLE	27	2	1			
ACNE	27	1	1			
FLE	27	11	0			
PA	27	2	0			
ANT	27	7	0			
DBT	24	4	0			
FLU	27	7	0			
PYR	27	8	0			
BAA	27	2	0			
CHR	27	3	0			
BAP	27	1	0			
BEP	27	2	0			
BBKF	3	0	0			
DBAHA	27	3	1			
PER	27	1	0			
BGHIP	27	2	0			
ICDP	27	2	0			
Polychlorinated biphenyls						
CB28	24	0	0			
CB52	24	1	1			
CB138	24	2	0			
CB153	24	2	0			
Other organochlorines						
DDEPP	24	1	0			
DDTPP	24	4	1			
TDEPP	24	3	2			
HCB	24	0	1			
HCHA	24	23	0			
HCHB	24	12	0			
HCHG	33	31	0			
HCH	24	24	0			
ALD	23	21	0			
DIELD	24	12	0			

	Region II			Region III		
	Total	**down**	**up**	**Total**	**down**	**Up**
END	23	20	0			
Pesticides						
ATRZ	3	2	0			

Table 4: Summary of environmental status of contaminants and biological effects in biota: B = blue, G = green, O = orange (above BAC, but no EAC or equivalent), R = red

	Region I				**Region II**				**Region III**				**Region IV**			
	B	G	O	R	B	G	O	R	B	G	O	R	B	G	O	R
Metals																
Cadmium	5	0	22	0	43	0	125	0	65	0	57	0	59	0	15	0
Copper	1	0	16	0	8	0	103	0	5	0	94	0	0	0	67	0
Lead	17	0	10	0	37	0	131	0	44	0	78	0	26	0	48	0
Mercury	13	13	0	18	8	15	0	183	19	26	0	98	10	10	0	64
Zinc	0	0	17	0	0	0	105	0	5	0	94	0	0	0	67	0
Organotins																
TBSN+	1	1	0	1	16	9	0	33	0	0	0	4	7	4	0	6
PAH parent compounds																
NAP	0	9	0	1	0	64	0	7	0	23	0	3	0	22	0	0
PA	1	9	0	0	1	87	0	0	3	81	0	1	4	53	0	0
ANT	0	10	0	0	0	83	0	0	0	79	0	3	0	56	0	0
FLU	4	4	0	2	4	75	0	7	10	66	0	9	7	47	0	3
PYR	7	2	0	2	1	76	0	7	8	60	0	15	6	49	0	2
BAA	3	6	0	1	2	80	0	4	10	65	0	7	5	49	0	2
CHR	6	0	3	0	9	0	62	0	27	0	53	0	9	0	49	0
BAP	1	9	0	0	2	74	0	1	12	68	0	1	4	52	0	0
BGHIP	1	9	0	0	1	84	0	1	9	73	0	0	5	51	0	0
ICDP	2	0	8	0	6	0	73	0	24	0	57	0	12	0	44	0
PAH metabolites																
PA1OH					2	0	2	0								
PYR1OH					4	19	12	0	0	14	0	0				
Polybrominated diphenyl ethers																
BDE28	0	10	0	0	5	76	0	0	8	79	0	1	10	46	0	0
BDE47	0	19	0	0	0	93	0	0	0	92	0	0	0	56	0	0
BDE66					0	0	41	0	0	0	22	0	0	0	23	0
BDE85					0	0	23	0	0	0	3	0	0	0	23	0
BDE99	0	18	0	0	0	82	0	7	0	83	0	6	0	56	0	0
BD100	0	19	0	0	0	80	0	10	0	82	0	8	0	56	0	0
BD126	0	0	8	0	0	0	12	0								
BD153	2	6	0	0	1	81	0	0	6	75	0	1	17	39	0	0
BD154	0	10	0	0	0	82	0	2	0	87	0	1	0	56	0	0
BD183	1	0	6	0	0	0	36	0	0	0	42	0	0	0	23	0
BD209	0	0	9	0	0	0	25	0								
Other organobromines																
HBCD	0	10	0	0	0	62	0	0	0	25	0	1	0	30	0	0
Organofluorines																
PFOS	0	4	0	0	0	42	0	1								

	Region I				Region II				Region III				Region IV			
Polychlorinated biphenyls																
CB28	6	17	0	0	35	82	0	13	54	38	0	7	44	16	0	0
CB52	7	16	0	0	9	111	0	15	40	55	0	7	25	35	0	0
CB101	5	21	0	1	3	109	0	32	23	68	0	11	3	54	0	3
CB105	7	0	3	0	4	0	62	0	48	0	43	0	22	0	32	0
CB118	9	7	0	11	3	38	0	104	22	40	0	40	0	12	0	48
CB138	4	23	0	1	0	120	0	22	4	94	0	4	0	55	0	5
CB153	2	25	0	1	0	140	0	5	1	99	0	2	0	60	0	0
CB156	7	0	3	0	20	0	45	0	61	0	29	0	41	0	13	0
CB180	7	16	0	1	17	114	0	3	45	55	0	1	13	47	0	0
Dioxins																
TEQDFP					0	3	0	2								
Other organochlorines																
DDEPP	8	0	7	0	0	0	82	0	3	0	84	0	1	0	48	0
HCB	10	5	0	0	14	55	0	1	48	23	0	0	19	7	0	0
HCHA	7	0	2	0	8	0	34	0	52	0	13	0	22	0	24	0
HCHG	7	6	0	0	16	39	0	11	54	12	0	2	28	21	0	0
Imposex																
VDS	1	1	0	0	21	39	0	20	20	16	0	5	2	31	0	23
Other biological effects																
%DNATAIL					0	0	4	0								
EROD					21	0	14	0	19	0	5	0				
NRR					0	4	0	0								
SFG													0	4	0	17
SURVT					0	4	0	0								

Table 5: Summary of human health status of contaminants in biota: G = green, R = red

	Region I		**Region II**		**Region III**		**Region IV**	
	G	R	G	R	G	R	G	R
Metals								
Cadmium	25	2	165	16	130	1	84	3
Lead	27	0	183	10	136	6	85	2
Mercury	28	0	175	1	120	0	84	0
Organotins								
TBSN+	2	1	56	4	3	1	17	0
PAH parent compounds								
FLU	9	1	81	5	81	4	55	2
BAP	8	2	61	16	73	8	53	3
Polybrominated diphenyl ethers								
SBDE6	0	10	0	88	0	90	0	56
Organofluorines								
PFOS	4	0	41	2				
Polychlorinated biphenyls								
SCB6	24	4	116	13	96	4	58	2
Dioxins								
TEQDFP			5	0				
Other organochlorines								
HCB	15	0	70	0	70	0	23	0
HCHG	13	0	66	0	68	0	46	0

Table 6: Summary of status of contaminants in sediment: B = blue, G = green, O = orange (above BAC, but no EAC or equivalent), R = red

	Region II				**Region III**				**Region IV**			
	B	G	O	R	B	G	O	R	B	G	O	R
Metals												
Arsenic	31	0	51	0	18	0	6	0	0	0	0	0
Cadmium	34	74	0	17	15	10	0	0	18	18	0	0
Chromium	0	19	0	106	0	1	0	24	0	25	0	9
Copper	54	24	0	46	12	2	0	11	0	29	0	7
Lead	13	8	0	101	8	4	0	13	8	14	0	14
Mercury	15	23	0	87	7	7	0	11	14	2	0	20
Nickel	38	0	89	0	1	0	24	0	0	0	0	0
Zinc	19	17	0	83	7	4	0	14	0	27	0	9
Organotins												
TBSN+	0	0	0	40	0	0	0	7				
PAH parent compounds												
NAP	10	58	0	22	1	22	0	1				
PA	14	90	0	27	3	17	0	5	4	21	0	9
ANT	11	86	0	27	4	17	0	2	3	19	0	10
DBT	0	26	0	0	0	16	0	0				
FLU	15	104	0	12	4	19	0	2	6	22	0	6
PYR	11	107	0	10	4	19	0	2	7	23	0	4
BAA	11	100	0	18	3	18	0	4	4	20	0	9
CHR	11	111	0	9	2	20	0	3	9	19	0	6
BAP	22	99	0	8	4	19	0	2	11	19	0	4
BGHIP	57	0	71	0	8	0	17	0	9	0	25	0
ICDP	71	0	58	0	10	0	15	0	8	0	25	0
Polybrominated diphenyl ethers												
BDE28	1	22	0	0	5	13	0	0				
BDE47	0	52	0	0	0	22	0	1				
BDE66	1	25	0	0	0	19	0	0				
BDE85	1	14	0	1	3	7	0	0				
BDE99	0	40	0	11	0	22	0	1				
BD100	0	32	0	8	3	18	0	0				
BD153	2	39	0	0	0	14	0	0				
BD154	1	39	0	0	2	19	0	0				
BD183	4	40	0	0	5	17	0	0				
BD209	0	26	0	22	0	7	0	7				
Polychlorinated biphenyls												
CB28	8	60	0	26	5	15	0	1	0	15	0	9
CB52	4	68	0	34	1	18	0	3	0	15	0	5
CB101	3	80	0	29	0	20	0	2	0	15	0	8
CB118	4	32	0	77	1	11	0	10	0	10	0	18

	Region II				Region III				Region IV			
CB138	4	69	0	0	1	19	0	0	0	23	0	7
CB153	4	112	0	2	1	23	0	0	0	28	0	2
CB180	7	91	0	5	2	19	0	0	0	19	0	6
Other organochlorines												
DDEPP	0	0	24	0	0	0	3	0				
HCB	4	0	37	0	0	0	1	0				
HCHG	13	0	4	0								
DIELD	0	0	2	0	0	0	2	0				

Table 7: Summary of status of contaminants in water: G = green, R = red

	Region II		Region III	
	G	R	G	R
Metals				
Cadmium	10	15	52	0
Lead	9	0	51	2
Nickel	16	0	67	0
Organotins				
TBSN+	0	6		
PAH parent compounds				
NAP	37	0	1	0
ANT	29	0	1	0
FLU	35	2	1	0
BAP	21	15	0	1
Organochlorines				
DDTPP	48	0		
HCEPX	0	16		
HCH	43	6		
Pesticides				
ATRZ	9	0	1	0

Table 8: Summary of regional assessments of trends and environmental status of metals in biota and sediment. The regional trend is indicated by up, down or — (no significant change). The regional status is indicated by blue (below BAC); green (below EAC or equivalent); orange (above BAC, but no EAC or equivalent); red (above EAC or equivalent). Note that some region metal combinations are assessed for status, but not trends and these are only coloured; conversely, other combinations are only assessed for trends (there are no assessment criteria) and these are not coloured.

Region	Subregion	Arsenic	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Nickel	Selenium	Silver	Tin	Zinc
Biota													
1	Barents Sea	—	—	—	—	—	—	—	—		—		—
	West of Iceland												
	Greenland-Scotland ridge	—	—			—	—	—		—			—
	East of Iceland												
	Norwegian Sea	—	—	—	—	—	down	—	—		—	up	—
2	Norwegian Trench	—	down	up	—	—	down	—	up		—		—
	Northern North Sea	—	—	up	—	—	—	—	—	—	—		—
	Skagerrak and Kattegat	—	—	down	—	—	—	—	—		—		—
	Southern North Sea	up	up	—		up	up	up	—	up			up
	Channel		up	up		up	up	up	up		—		up
3	Irish and Scottish West Coast	down	—	—	down	—	—	—	down	—	down		—
	Irish Sea	—	down	—	down	up	—	—	—	—	down		—
	Celtic Sea	—	—	—	up	—	—	—	up	up	—		—
4	Northern Bay of Biscay		up	up		up	up	up	up		—		up
	Iberian Sea	down	—			up	down	—					down
	Gulf of Cadiz												
Sediment													
2	Norwegian Trench												
	Northern North Sea	up	—	—		down	—	down	—				down
	Skagerrak and Kattegat												
	Southern North Sea	down	down	down		down	down	down	down				down
	Channel	—	up	—		—	—	—	—				
3	Irish and Scottish West Coast	—	up	—		—	—	down	—				—
	Irish Sea	—	—	—		down	down	down	—				—
	Celtic Sea												

Region	Subregion	Arsenic	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Nickel	Selenium	Silver	Tin	Zinc
4	Northern Bay of Biscay												
	Iberian Sea												
	Gulf of Cadiz												

Table 9: Summary of regional assessments of trend and environmental status of polycyclic aromatic hydrocarbon (PAHs)s, polycyclic aromatic hydrocarbon metabolites (PYR1OH) in fish, polychlorinated biphenyls (PCBs), polybrominated diphenyl ethers in biota and sediment (PBDEs), organotins in sediment, and imposex (VDS) in whelks. The regional trend is indicated by up, down or – (no significant change). The regional status is indicated by blue (below BAC); green (below EAC or equivalent); orange (above BAC, but no EAC or equivalent); red (above EAC or equivalent). The polychlorinated biphenyl assessment is split into non-planar compounds (CB28, CB52, CB101, CB138, CB153, CB180) and the mono-ortho compound CB118.

Region	Subregion	PAHs	Metabolites	PCBs		PBDEs	Organotins	Imposex
				non-planar	CB118			
Biota								
1	Barents Sea							
	West of Iceland							
	Greenland-Scotland ridge			down	down	—		
	East of Iceland							
	Norwegian Sea			—	down			
2	Norwegian Trench			—	—			
	Northern North Sea	down	—	down	—	down		down
	Skagerrak and Kattegat	—		down	down	—		down
	Southern North Sea	—	—	—	—	down		down
	Channel	—	—	down	down	—		down
3	Irish & Scottish West Coast	—		down	down	down		down
	Irish Sea	—	—	down	down	down		down
	Celtic Sea	—		down	down	—		down
4	Northern Bay of Biscay	—		down	down	down		down
	Iberian Sea	down		down	—	—		down
	Gulf of Cadiz							
Sediment								
2	Norwegian Trench							
	Northern North Sea	—		down	—	—		
	Skagerrak and Kattegat							
	Southern North Sea	—		down	down		down	
	Channel	—						
3	Irish & Scottish West Coast	up		—	—	—		
	Irish Sea	—		—	—	down		
	Celtic Sea							
4	Northern Bay of Biscay							
	Iberian Sea							
	Gulf of Cadiz							

Table 10: Summary of regional assessments of trend and health status of metals (cadmium, mercury and lead), polycyclic aromatic hydrocarbons (benzo[a]pyrene and fluoranthene), polychlorinated biphenyls (sum of the six non-planar ICES CBs) and polybrominated diphenyl ethers (sum of BDE28, 47, 99, 100, 153, 154) in biota. The regional trend (the same results as in Tab. 8-9) is indicated by up, down or – (no significant change). The regional status is indicated by green (below MPC or QS human health); red (above MPC or QS human health).

Region	Subregion	Metals			PAHs		PCBs	PBDEs
Biota		cadmium	lead	mercury	BAP	FLU	SCB6	SBDE6
1	Barents Sea	—	—	—				
	West of Iceland							
	Greenland-Scotland ridge	—	—	—			down	
	East of Iceland							
	Norwegian Sea	—	down	—			—	
2	Norwegian Trench	down	down	—			—	
	Northern North Sea	—	—	—	down	down	down	down
	Skagerrak and Kattegat	—	—	—	—	—	—	—
	Southern North Sea	up	up	up	—	—	—	down
	Channel	up	up	up	—	up	down	—
3	Irish & Scottish West Coast	—	—	—	—	—	down	down
	Irish Sea	down	—	—	up	—	down	down
	Celtic Sea	—	—	—	—	—	down	—
4	Northern Bay of Biscay	up	up	up	—	—	down	down
	Iberian Sea	—	down	—	down	down	down	—
	Gulf of Cadiz							

The Aspect
12 Finsbury Square
London
EC2A 1AS
United Kingdom

t: +44 (0)20 7430 5200
e: secretariat@ospar.org
www.ospar.org

Our vision is a clean, healthy and biologically diverse North-East Atlantic Ocean, which is productive, used sustainably and resilient to climate change and ocean acidification.

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