OSPAR COMMISSION

Protecting and conserving the North-East Atlantic and its resources

Levels and trends in marine contaminants and their biological effects – CEMP Assessment report 2015

Monitoring and Assessment Series

2016

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.

Acknowledgement

This report has been prepared by the Working Group on Monitoring and on Trends and Effects of Substances in the Marine Environment (MIME). Special thanks to Dr Martin M. Larsen, Denmark, and Dr Rob Fryer, UK, for their hard work in producing this report.

Levels and trends in marine contaminants and their biological effects – CEMP Assessment report 2015

The 2015-16 MIME roll-over (http://dome.ices.dk/osparmime2015/main.html) assessed 7615 time series (of three years or more) in biota, of which 5216 were assessed for trends and 6727 for status, and 3453 time series in sediment, of which 2360 were assessed for trends and 2725 for status. A breakdown of trends and status by region and determinand is given in Tables 1-4.

For organics, the prevailing trend is generally downwards. However, parent PAHs in sediments in Region II and Region III are tending to increase. For metals, there is a mixture of upwards and downwards trends, with a relatively high proportion of upwards trends for Cd and Hg in biota and As, Cu and Ni in sediments. The increase in sediment parent PAH concentrations is the most noticeable difference since the 2013-14 assessment (OSPAR Monitoring and Assessment series, Levels and trends in marine contaminants and their biological effects – CEMP Assessment Report 2014, http://www.ospar.org/work-areas/cross-cutting-issues/cemp).

The assessment methodology is described in the help files that accompany the assessment. There was one major change to the methodology used for contaminants and biological effects (other than imposex) in the 2014-15 assessment. Previously, a time series was modelled by summarising the concentrations each year by an annual index, and then using a weighted linear regression or loess smoother (depending on the number of years) to describe changes in the annual indices over time. This year, the concentrations were modelled directly using a mixed model, which also estimated the different variance components in the data. The advantage is that measurements below the detection limit could also be incorporated (by treating them as left-censored data), which allowed some times series to be extended and others to be included in the assessment for the first time. At present, only those time series where the proportion of less-than measurements is not too high can be modelled in this way, but it is hoped to extend the methodology to include all time series with at least three years of data for the 2016-17 assessment.

There was also a major change to the methodology used for assessing VDS when individual stage measurements were available, rather than the summary indices. The individual stages were modelled using a proportional odds model and trends were allowed that included a change-point between 2004 and 2008, the period when the ban on TBT was coming into force. The advantages are that the uncertainty in the trend and status assessments can be more correctly quantified and more flexible forms of trend, which match patterns seen in the data, can be fitted. One problem is that some time series are a mixture of individual measurements and indices, and the new methodology can only be applied to the subset of the time series with individuals. However, it is hoped that these time series can be extended back in time by the resubmission of legacy data including individual measurements.

The number of sediment time series has dropped since the 2014-15 assessment. However, this is because some monitoring stations that are close together have been grouped for assessment purposes. This should provide time series that are more powerful for detecting trends and assessing status.

Table 1: Summary of trends in contaminants and biological effects in biota

	Region I			Region II			Region III			Region IV		
	total	down	up	total	down	up	total	down	up	total	down	up
Metals												
CD	8	2	0	151	32	23	85	31	7	40	16	5
HG	9	3	0	162	27	20	70	6	8	40	11	0
PB	6	3	0	154	60	10	84	14	8	40	21	1
CU	9	1	1	143	26	6	77	13	3	38	3	4
ZN	9	2	1	144	38	7	77	15	3	38	13	0
PAHs (parent)												
NAP	3	1	0	54	23	3	14	2	1	10	0	0
PA	3	1	0	69	23	1	34	5	4	33	8	0
ANT				43	13	0	11	0	1	28	5	3
DBT				13	1	0	1	1	0			
FLU	3	1	0	64	17	4	32	4	2	33	10	1
PYR	3	2	0	64	18	1	31	5	1	33	9	1
BAA	3	2	0	50	16	1	17	8	1	33	8	1
CHR	3	2	0	50	17	0	19	8	0	33	7	0
BAP	2	1	0	32	8	0	9	5	0	33	3	4
BGHIP	3	2	0	43	8	1	16	6	0	33	5	0
ICDP	1	1	0	33	3	1	14	2	0	31	5	0
CBs												
CB28	5	4	0	83	37	1	46	20	0	31	12	0
CB52	5	3	0	99	37	1	47	21	0	32	16	0
CB101	6	6	0	125	64	3	65	22	1	41	22	0
CB105	4	4	0	69	49	1	25	9	0	25	8	0
CB118	9	8	0	132	74	3	68	19	2	41	15	4
CB126				7	3	0						
CB138	9	9	0	105	56	0	65	25	1	25	18	0
CB153	9	9	0	143	71	2	71	14	3	41	26	0
CB156	3	3	0	46	18	1	18	3	0	21	11	0
CB169				7	1	1						
CB180	6	6	0	102	50	1	49	9	4	37	22	0
Organobromin s												
BDE28	1	0	0	8	0	0	12	3	0			
BDE47	3	1	0	30	16	0	28	14	0	21	6	1
BDE99	2	1	0	17	8	0	20	12	0	21	10	1
BD100	3	1	0	27	4	2	23	9	0	20	7	1
BD153				9	1	0	14	5	0	10	3	0
BD154	3	1	0	7	2	2	17	5	1	17	4	1
Pesticides												
DDEPP	7	6	0	87	32	1	28	4	2	39	7	1

	Region I			Region II			Region III			Region IV		
HCB	7	4	0	57	14	1	24	10	0	5	0	0
HCHA	3	3	0	25	14	1	22	7	0	26	9	0
HCHG	2	2	0	66	52	0	23	9	0	38	19	0
Dioxins, furans and POPs												
TCDD				9	2	0						
CDF2T				9	4	1						
PFOS	3	2	0	5	4	0						
Organometals												
DBTIN				10	4	0						
MBTIN				6	3	1						
TBTIN	2	2	0	28	23	0						
TPTIN				1	1	0						
Biological effects												
EROD				7	2	0	1	0	0			
PYR1OH				5	0	0	1	0	0			
PA1OH				4	2	0						
BAP3OH				3	2	0						
ACHE				1	0	0						
ALAD				3	0	0						
SFG										17	4	0
VDS	2	2	0	104	61	0	55	9	0	16	11	0
INTS				9	3	0						

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									
CD	67	20	2	20	1	4	29	2	1
HG	66	22	0	26	8	0	29	7	1
PB	31	0	1	26	2	2	29	2	1
AS	43	0	7	26	0	5	29	0	3
CR	31	0	1	24	0	1	29	6	0
CU	47	1	8	27	1	2	29	0	3
NI	46	0	6	27	0	3	29	0	1
ZN	26	0	0	25	1	0	29	10	0
PAHs (parent)									
NAP	18	0	1	18	0	1			
PA	21	1	2	20	0	2	29	6	0
ANT	39	3	1	19	1	1	29	8	2
DBT	12	0	0	13	1	1			
FLU	18	1	3	19	0	0	29	7	0
PYR	21	1	4	19	0	1	29	9	0
BAA	28	1	5	19	0	0	29	7	0
CHR	22	1	4	15	0	0	29	7	0
BAP	25	1	6	19	0	1	29	10	0
BGHIP	20	1	5	19	0	0	29	3	0
ICDP	17	1	5	20	0	0	29	14	0
PAHs (alkylated)									
NAPC1	10	0	0	4	0	0			
NAPC2	23	2	0	22	3	0			
NAPC3	24	4	1	22	3	0			
PAC1	14	2	0	18	2	0			
PAC2	14	3	1	18	3	0			
PAC3	11	1	0	14	4	0			
DBTC1	10	1	1	17	2	0			
DBTC2	11	3	0	17	3	0			
DBTC3	11	2	0	17	4	0			
CBs									
CB28	34	10	1	14	4	1	15	0	0
CB52	32	9	0	16	6	0	19	0	4
CB101	46	12	2	18	7	1	18	1	0
CB105	11	5	0	7	0	0	15	0	0
CB118	45	18	1	18	4	2	16	0	0
CB138	47	22	1	17	5	0	20	0	0
CB153	48	13	1	18	2	1	19	1	0
CB156	2	0	0	4	0	0	18	0	0

	Region II			Region III			Region IV		
CB180	38	13	1	15	4	1	17	0	0
Organobromines									
BDE28				2	0	0			
BDE47	5	1	0	7	2	0			
BDE66				3	1	0			
BDE99				1	1	0			
BD100				5	1	0			
BD153				2	0	0			
BD154				4	0	0			
BD183				2	0	0			
Organometals									
DBTIN	10	7	0						
MBTIN	13	3	0						
TBTIN	7	6	0						

Table 3: Summary of 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																
CD	0	8	0	1	47	114	0	3	41	66	0	1	46	20	0	1
HG	5	6	0	0	19	159	0	0	11	94	0	0	11	55	0	0
PB	4	7	0	0	32	132	0	7	27	73	0	7	17	41	0	8
CU	0	0	3	0	23	0	98	0	16	0	68	0	10	0	52	0
ZN	0	0	3	0	0	0	122	0	1	0	83	0	0	0	63	0
PAHs (parent)																
NAP	0	3	0	1	0	69	0	6	0	34	0	2	0	16	0	1
PA	0	4	0	0	2	84	0	0	2	56	0	0	11	45	0	0
ANT	0	3	0	0	0	63	0	1	0	42	0	2	0	44	0	1
FLU	1	3	0	0	2	65	0	8	2	45	0	5	14	40	0	2
PYR	1	3	0	0	3	63	0	11	2	39	0	7	8	46	0	2
BAA	0	3	0	0	4	64	0	9	1	41	0	7	6	40	0	3
CHR	1	0	2	0	6	0	72	0	7	0	38	0	7	0	46	0
BAP	0	3	0	0	3	48	0	0	1	26	0	2	4	45	0	0
BGHIP	1	2	0	0	1	62	0	4	1	42	0	3	5	42	0	1
ICDP	0	0	2	0	1	0	54	0	3	0	33	0	10	0	39	0
CBs																
CB28	3	8	0	0	32	97	0	22	22	39	0	21	32	17	0	2
CB52	3	8	0	0	18	101	0	20	16	54	0	11	14	34	0	4
CB101	0	10	0	1	8	121	0	33	9	69	0	15	4	43	0	12
CB105	3	0	8	0	32	0	52	0	22	0	23	0	19	0	26	0
CB118	3	2	0	6	5	40	0	116	5	28	0	68	2	15	0	47
CB138	2	9	0	0	0	115	0	11	5	79	0	8	0	34	0	9
CB153	0	11	0	0	0	156	0	10	0	100	0	1	0	58	0	2
CB156	3	0	7	0	34	0	50	0	26	0	14	0	23	0	19	0
CB180	3	8	0	0	29	107	0	3	18	59	0	3	12	44	0	0
Pesticides																
DDEPP	3	0	8	0	0	0	91	0	0	0	44	0	0	0	43	0
HCB	3	0	8	0	25	0	44	0	31	0	2	0	17	0	7	0
HCHA	3	0	0	0	47	0	22	0	30	0	4	0	33	0	5	0
HCHG	3	4	0	2	51	23	0	14	24	1	0	8	37	3	0	3
Organometals																
TBTIN	0	1	0	1	1	1	0	28					0	1	0	8
Biological effects																
EROD					12	0	3	0	3	0	3	0	0	0	0	0
PYR1OH					1	3	8	0	0	3	0	0				
PA1OH					0	0	4	0								
SFG													1	12	0	11

VDS	1	1	0	0	18	48	0	40	3	40	0	18	2	4	0	43

Table 4: 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												
CD	24	59	0	7	19	7	0	2	3	25	0	1
HG	14	12	0	66	8	11	0	9	0	8	0	21
PB	14	4	0	34	9	6	0	13	1	1	0	27
AS	21	0	33	0	22	0	7	0	0	0	0	29
CR	0	12	0	37	0	2	0	26	0	7	0	22
CU	34	8	0	26	14	4	0	11	0	2	0	27
NI	16	0	43	0	7	0	22	0	0	2	0	27
ZN	15	6	0	26	8	7	0	13	0	10	0	19
PAHs (parent)												
NAP	11	11	0	3	1	23	0	3				
PA	13	17	0	2	4	16	0	7	13	12	0	4
ANT	12	45	0	1	5	18	0	7	8	20	0	1
DBT	0	16	0	0	0	16	0	0				
FLU	11	12	0	0	4	21	0	2	12	15	0	2
PYR	10	18	0	0	4	22	0	2	10	19	0	0
BAA	12	24	0	0	3	19	0	3	12	15	0	2
CHR	11	20	0	0	3	23	0	2	13	16	0	0
BAP	14	19	0	1	6	18	0	1	13	16	0	0
BGHIP	23	0	0	7	8	0	0	18	11	7	0	11
ICDP	20	4	0	2	9	7	0	9	13	14	0	2
CBs												
CB28	8	46	0	10	7	21	0	3	0	24	0	2
CB52	1	58	0	7	1	28	0	1	0	28	0	1
CB101	0	63	0	5	1	27	0	2	0	18	0	8
CB118	4	21	0	43	1	11	0	20	0	8	0	19
CB138	5	60	0	2	0	30	0	2	0	21	0	6
CB153	5	63	0	0	0	30	0	0	0	27	0	0
CB180	6	60	0	1	2	27	0	0	0	22	0	5

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OSPAR's vision is of a clean, healthy and biologically diverse North-East Atlantic used sustainably

ISBN: 978-1-911458-06-7
Publication Number: 672/2016