



# CEMP guidelines for coordinated monitoring for eutrophication, CAMP and RID

(OSPAR Agreement 2016-05, revised 2021)

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## 1 Introduction

In 2014 the OSPAR Commission adopted a renewed OSPAR Joint Assessment and Monitoring Programme (JAMP) 2014–2021 (OSPAR Agreement 2014-02, updated annually) <http://www.ospar.org/work-areas/cross-cutting-issues/jamp>), which was updated for the period 2014 to 2023 focusing on the development of new general assessments of the quality status of the marine environment for 2023. OSPAR co-ordinates repeated measurement and assessment of the marine environment over a 10–20 year timeframe.

Eutrophication is the result of excessive enrichment of water with nutrients, which may cause an increase in the accelerated growth of algae in the water column and higher forms of plants living on the bottom of the sea. This may result in a range of undesirable disturbances in the marine ecosystem, including a shift in the composition of the flora and fauna, which affects habitats and biodiversity, and the depletion of oxygen, causing death of fish and other species. Human activities resulting in anthropogenic nutrient enrichment encompass **inputs** from point sources (e.g. sewage plants or industry) and from diffuse sources (e.g. agriculture, households not connected to sewerage, overflows, and atmospheric inputs).

The OSPAR Eutrophication Monitoring Programme<sup>1</sup> is an integral part of the OSPAR Eutrophication Strategy. It provides the basis for enabling Contracting Parties to assess and classify the eutrophication status of their maritime waters under the Common Procedure for the Identification of the Eutrophication Status of the OSPAR Maritime Area (“Common Procedure”<sup>2</sup>). The Common Procedure provides an assessment framework for Contracting Parties to evaluate the eutrophication status of their parts of the OSPAR maritime area and for identifying those areas for which actions are needed under the Eutrophication Strategy.

This document provides links to the monitoring guidelines, data sources, processing procedures and assessment products.

## 2 Monitoring

### **The Coordinated Environmental Monitoring Programme (CEMP)<sup>3</sup>**

Monitoring of the marine environment by OSPAR Contracting Parties under the Coordinated Environmental Monitoring Programme (CEMP) is coordinated through adherence to monitoring guidance and quality assurance procedures adopted by the OSPAR Commission. Three requirements essential for the realisation of the CEMP are:

- guidelines,
- quality assurance tools, and
- assessment tools.

The aim is to ensure that comparable and quality assured datasets are available from across the OSPAR maritime area. The CEMP webpage <http://www.ospar.org/work-areas/cross-cutting-issues/cemp> provides links to the most up to date versions of the OSPAR monitoring guidelines that apply under the CEMP. OSPAR monitoring guidance is regularly reviewed in collaboration with ICES and where necessary updated to take account of new developments including the inclusion of new monitoring parameters in the CEMP. The following documents provide specific descriptions of monitoring and are available from the same webpage:

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<sup>1</sup> OSPAR Agreement 2005-04. Supersedes agreement 1995-5. Source: EUC 2005 Summary Record - EUC 05/13/1, Annex 6. Agreement updated 2013 (see OSPAR 13/21/1, §6.7)

<sup>2</sup> OSPAR Agreements 2005-03 and 2013-08

<sup>3</sup> OSPAR Agreement 2016-01

- The Eutrophication Monitoring Programme<sup>4</sup>
- Eutrophication Monitoring Guidelines: nutrients<sup>5</sup>, chlorophyll<sup>6</sup>, oxygen<sup>7</sup>, benthos<sup>8</sup>, phytoplankton species composition<sup>9</sup>

### **Comprehensive Atmospheric Monitoring Programme (CAMP)**

- General outline of monitoring requirements defined within the Comprehensive Atmospheric Monitoring Programme CAMP:  
<http://www.ospar.org/work-areas/hasec/chemicals/camp>.
- Detailed monitoring guidelines are described in OSPAR Agreement 2015-04, 'Guidance for the Comprehensive Atmospheric Monitoring Programme (CAMP)', including the following specific guidance documents
  - Guidelines for sampling and analysis of mercury in air and precipitation (OSPAR Agreement 1997-08)
  - Guidelines on the Measurement of Atmospheric Inputs of PAHs (OSPAR Agreement 2003-08, updated 2005)
  - Guidance note on the sampling and analysis of PCBs in air and precipitation (OSPAR Agreement 1997-09)
- Modelling and assessment products are produced externally through the Co-operative Programme for Monitoring and Evaluation of the long range transmission of air pollutants in Europe (EMEP) (<http://www.emep.int/>). The EMEP numerical model for nitrogen deposition is described here: <http://www.emep.int/mscw/models.html#mscwmodels> and data are available here: [http://emep.int/mscw/index\\_mscw.html](http://emep.int/mscw/index_mscw.html).

### **Comprehensive Study of Riverine Inputs and Direct Discharges**

- General outline of monitoring requirements defined within the Comprehensive Study on Riverine Inputs and Direct Discharges (RID) <http://www.ospar.org/work-areas/hasec/chemicals/rid>.
- The Riverine Inputs and Direct Discharges Monitoring Programme (RID) applicable from 1 January 2015 is described in OSPAR Agreement 2014-04.
- Guidelines for the estimation of riverine inputs of PAHs (OSPAR Agreement 2002-12)

#### HARP-NUT guidelines

- OSPAR HARP-NUT Guideline 1: Framework and approach of the harmonised quantification and reporting procedures for nutrients (OSPAR Agreement 2004-02a)
- OSPAR HARP-NUT Guideline 2: Quantification and reporting of nitrogen and phosphorus discharges/losses from aquaculture plants (OSPAR Agreement 2004-02b<sup>10</sup>)

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<sup>4</sup> OSPAR Agreement 2005-04

<sup>5</sup> OSPAR Agreement 2013-04

<sup>6</sup> OSPAR Agreement 2012-11

<sup>7</sup> OSPAR Agreement 2013-05

<sup>8</sup> OSPAR Agreement 2012-12

<sup>9</sup> OSPAR Agreement 2016-06

<sup>10</sup> Revised 2019

- OSPAR HARP-NUT Guideline 3: Quantification and reporting of nitrogen and phosphorus discharges from industrial plants (OSPAR Agreement 2004-02c<sup>11</sup>)
- OSPAR HARP-NUT Guideline 4: Quantification and reporting of nitrogen and phosphorus discharges from waste water treatment plants and sewerage (OSPAR Agreement 2004-02d<sup>12</sup>)
- OSPAR HARP-NUT Guideline 5: Quantification and reporting of nitrogen and phosphorus losses from households not connected to public sewerage (OSPAR Agreement 2004-02e)
- OSPAR HARP-NUT Guideline 6: Quantification and Reporting of Nitrogen and Phosphorus Losses from Diffuse Anthropogenic Sources and Natural Background Losses (OSPAR Agreement 2007-08)
- OSPAR HARP-NUT Guideline 7: Trend analysis and flow-normalisation (OSPAR Agreement 2004-02g<sup>13</sup>)
- OSPAR HARP-NUT Guideline 8: Quantification of nitrogen and phosphorus losses from diffuse sources by riverine load apportionment (OSPAR Agreement 2004-02h)
- OSPAR HARP-NUT Guideline 9: Quantification and reporting of the retention of nitrogen and phosphorus in river catchments (OSPAR Agreement 2004-02i)

## 2.1 Purpose

The objectives of the Eutrophication Monitoring Programme are to enable Contracting Parties:

- to assess eutrophication status and trends, in particular through the application of the OSPAR Common Procedure; to assess pressures on the marine environment;
- to evaluate the effectiveness of measures in relation to the objectives of the OSPAR Eutrophication strategy; mindful that the design of the national monitoring programmes should be serving the purposes of OSPAR and should as well, for those Contracting Parties bound by these instruments, maximise the possibility for using the same monitoring for the EU Water Framework Directive and the EU Marine Strategy Framework Directive.

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<sup>11</sup> Revised 2018

<sup>12</sup> Revised 2018

<sup>13</sup> Revised 2018

## 2.2 Quantitative Objectives

The quantitative objectives of the Eutrophication Monitoring Programme<sup>14</sup> include:

- to contribute to coherent datasets on key ecosystem variables that contribute to a better understanding of ecosystem functioning, being responsive to broader considerations identified in application of the Ecosystem Approach;
- ensuring that the monitoring data generated can be used in application of models;
- and covers, as required, the need for temporal trend and spatial distribution assessment with the power to detect change.

## 2.3 Monitoring Strategy

Pressures principally from inputs of nitrogen and phosphorus should be monitored for all relevant parts of the OSPAR area, through CAMP, RID and EMEP products. The minimum requirements for a eutrophication monitoring programme (in addition to monitoring of nutrient loads via CAMP, RID and EMEP products) should therefore be as follows:

### a. Non-problem areas with regard to eutrophication

In non-problem areas with regard to eutrophication the monitoring programme has the function of detecting changes in the eutrophication status or confirming the status of particular areas as non-problem areas. This should be done with respect to assessment parameters and their assessment levels related to the area-specific background concentrations defined in the Comprehensive Procedure. Clearly, monitoring effort should be limited to a limited number of parameters and a limited frequency of measurements, although spatial coverage should not be neglected.

### b. Problem areas with regard to eutrophication

In problem areas with regard to eutrophication the monitoring programme should focus on long-term trends in nutrient concentration and on a selection of related eutrophication effect parameters, taking into account corresponding long-term trends in nutrient inputs. A larger number of parameters and a higher sampling frequency should be considered than is the case for non-problem areas, so as to satisfy statistical requirements. The spatial coverage should also be more focused than for non-problem areas. Monitoring should continue until the non-problem area status is achieved.

### c. Areas with low confidence

Areas where assessment parameters have low confidence and the status with regard to eutrophication cannot be determined with sufficient certainty, either due to high variability, low monitoring effort or because these areas are close to the assessment levels, the requirements of problem areas (see b) should be applied until the status (non-problem or problem area) can be determined with at least moderate confidence. In areas where low confidence is based on low monitoring effort but reduced monitoring is appropriate due to the low risk of eutrophication, the requirements of problem areas (b) will not be applied.

## 2.4 Sampling Strategy

Sampling strategy as described in the Eutrophication Monitoring Programme<sup>15</sup>, CAMP and RID documentation.

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<sup>14</sup> OSPAR Agreement 2005-04

<sup>15</sup> OSPAR Agreement 2005-04

## **2.5 Quality Assurance/ Quality Control**

Quality assurance (QA) is described extensively in the guidelines on Quality Assurance for biological monitoring in the OSPAR area<sup>16</sup> and CEMP appendices 6 and 7<sup>17</sup>. QA is described in the following Eutrophication Monitoring Guidelines for specific components: nutrients<sup>18</sup>, chlorophyll<sup>19</sup>, oxygen<sup>20</sup>, benthos<sup>21</sup>, phytoplankton species composition<sup>22</sup>, CAMP and RID documentation.

## **2.6 Data reporting, handling and management**

Data are reported to ICES Database on Oceanography and Marine Ecosystems (DOME), which is INSPIRE compliant. Quality assurance of data analysis and reporting are described extensively in the guidelines on Quality Assurance for biological monitoring in the OSPAR area<sup>23</sup> and in the CEMP<sup>24</sup>. RID data are reported to the RID Database and CAMP data to the database at NILU (see RID and CAMP documentation).

## **3 Assessment**

Assessment of eutrophication is fully described and defined in the OSPAR Common Procedure<sup>25</sup> (COMP), and an overview is provided on the OSPAR website: <http://www.ospar.org/work-areas/hasec/eutrophication/common-procedure>.

CAMP Data Assessments, Co-operative Programme for Monitoring and Evaluation of the long range transmission of air pollutants in Europe (EMEP)

RID Data Assessments, Guidance on input trend assessment and the adjustment of loads<sup>26</sup>.

Where the assessment and reporting of the Common Indicators differs from the Common Procedure, they are described in the relevant common indicator's technical specification sheets.

### **3.1 Data acquisition**

Data acquisition is predominantly from the ICES DOME, RID and CAMP databases (see the annual RID and CAMP data reports and the Common Indicator Technical Specification sheets).

### **3.2 Preparation of data**

Data are prepared as described in the CEMP and COMP<sup>27</sup>.

See the annual RID and CAMP data reports and the Common Indicator Technical Specification sheets

### **3.3 Assessment criteria**

The agreed list of harmonised assessment criteria for eutrophication is defined in the COMP. Background, reference and threshold levels are defined in the COMP.

See the annual RID and CAMP data reports and the Common Indicator Technical Specification sheets

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<sup>16</sup> OSPAR Agreement 2002-15

<sup>17</sup> OSPAR Agreement 2016-01

<sup>18</sup> OSPAR Agreement 2013-04

<sup>19</sup> OSPAR Agreement 2012-11

<sup>20</sup> OSPAR Agreement 2013-05

<sup>21</sup> OSPAR Agreement 2012-12

<sup>22</sup> OSPAR Agreement 2016-06

<sup>23</sup> OSPAR Agreement 2002-15

<sup>24</sup> OSPAR Agreement 2016-01 revised 2017 and 2018

<sup>25</sup> OSPAR Agreement 2013-08

<sup>26</sup> OSPAR Agreement 2003-09 revised 2017

<sup>27</sup> OSPAR Agreement 2013-08

### **3.4 Spatial Analysis and / or trend analysis**

Analysis and confidence limits as described in the COMP.

See the annual RID and CAMP data reports and the Common Indicator Technical Specification sheets

### **3.5 Presentation of assessment results**

Presentation of assessment results as described in the COMP.

See the annual RID and CAMP data reports and the Common Indicator Technical Specification sheets

## **4. Change Management**

Actions required to update the CEMP are described in section 4 of the CEMP.

The OSPAR subsidiary body responsible for monitoring and assessing eutrophication in the marine environment is ICG-Eut, which should periodically consider the implementation of the CEMP, for those aspects of the JAMP where monitoring guidelines, quality control procedures and assessment tools are in place. This consideration should track the progress of these programmes, e.g. collating data, producing assessment reports and initiating new programmes as and when opportunities arise.

The OSPAR subsidiary body responsible for monitoring and assessing inputs to the marine environment is INPUT, which should periodically consider the implementation of the CEMP, for those aspects of the JAMP where monitoring guidelines, quality control procedures and assessment tools are in place. This consideration should track the progress of these programmes, e.g. collating data, producing assessment reports and initiating new programmes as and when opportunities arise, specifically the RID and CAMP review groups.