OSPAR CEMP Guideline

Common Indicator: Seal abundance and distribution (M3)

(OSPAR Agreement 2016-11)¹

This OSPAR biodiversity indicator is still in the early stages of implementation and as a result of iteration and learning, it is anticipated that there will be evolution of the methods and approaches documented in the CEMP guidelines. Version updates will be clearly indicated and be managed in a phased approach via ICG-COBAM through its expert groups and with the oversight and steer of BDC.

Contents

1 Introduction 2
2 Monitoring 2
   2.1 Purpose 2
   2.2 Quantitative Objectives - Temporal trend and spatial distribution for the monitoring programme 3
   2.3 Monitoring Strategy 3
   2.4 Monitoring Methods 3
   2.5 Quality assurance/ Quality Control 4
3 Assessment 5
   3.1 Preparation of data - Spatial aggregation of data 5
   3.2 Assessment criteria 6
   3.3 Spatial Analysis and / or trend analysis 8

¹ This document exists in English only
1 Introduction

The OSPAR Common Indicator: M3 – Seal abundance and distribution will contribute to assessments of the state of marine mammals and assessments of Good Environmental Status under the Marine Strategy Framework Directive: MSFD criteria: 1.1 Species distribution and 1.2 Population size; MSFD indicators: 1.1.2 Distributional pattern and 1.2.1 Population abundance.

The importance of seals as a component of marine biodiversity has been recognised in that they are included in the Indicative list of characteristics for assessing Good Environmental Status in the Marine Strategy Framework Directive. They are also listed in Annex II and V of the Habitats Directive and so are species which are the subject of additional Community legislation. This indicator would serve to trigger the investigation of possible cause-effect relationships as a basis for measures.

This indicator assesses changes in the abundance and distribution of across the Great North Sea and the UK part of the Celtic Seas.

This indicator describes the abundance and changes in distribution for both species, the grey seal (Halichoerus grypus) and harbour seal (Phoca vitulina), and uses estimates of seal numbers from monitoring programmes many of which began in the late 20th century and are run on a regular basis. The frequency and timing of seal surveys varies among OSPAR Contracting Parties and take place during one or more of a seal key life stage, such as moultng or breeding, when the seal species comes ashore.

Grey seals are highly mobile and range over large distances so their abundance is assessed at a large scale with the single unit covering both the Celtic Seas and Great North Sea regions. Harbour seals do not to range as far from their favoured haul-out sites so their abundance has been assessed at 21 assessment units, although there is insufficient data for some of these units. The change in distribution for both species is assessed at the smaller assessment units used for harbour seal abundance.

2 Monitoring

2.1 Purpose

As top predators seals can reflect the state of the marine ecosystem. They have a varied diet and are very mobile so that their abundance and distribution would be expected to respond to significant natural and manmade changes in the marine environment or at their haul out sites. Natural and manmade events including disease, competition with other species, shifts in resources, disturbance, and fisheries interactions are likely to have an influence on the species. Although no straightforward link has been demonstrated between seal abundance and distribution and human activities, a number of human activities may, at least in part, be drivers of trends. Changes in distribution or declines in abundance would signal the need for further investigative research to establish a cause.
2.2 Quantitative Objectives - Temporal trend and spatial distribution for the monitoring programme

The monitoring required for seal indicator M3 is on the numbers and location of individuals on land at colonies or haul out sites throughout the Great North Sea and the UK part of the Celtic Seas (OSPAR Regions II and III).

Monitoring should be conducted on a site by site basis and needs to be representative of each assessment unit.

Monitoring must coincide with the period of pupping or moulting and some addition work to establish the local phenology is also required to ensure monitoring is appropriately timed. Seal phenology will vary not only from species to species and from one Contracting Party (CP) to another but in some cases within a CP’s waters.

In an ideal world, both grey and harbour seals would be surveyed repeatedly throughout the year. However, in most areas this level of monitoring is not economically feasible, and most CPs undertake population censuses in one or perhaps two seasons of the year. There are two key periods during the year when most grey and harbour seal surveys take place which cover key life-stages – breeding (pupping) and moulting. Harbour seals give birth to pups in early summer and moult after breeding in late summer. Grey seals pup in the autumn or winter and moult in early spring. The frequency of surveys varies across CPs during these periods due to differences in the total number of resident animals, funding, geography and historical development of the monitoring programmes. For grey seals in particular choosing an ideal single time to survey is difficult because of the potential discrepancy between the breeding population and the population present during other times of the year (Brasseur et al. 2014; Russell et al. 2014).

2.3 Monitoring Strategy

Data collection is largely carried out and funded by national monitoring schemes (see Annex 1).

Most schemes have a central data storage mechanism (e.g. national database). Most countries monitor a sample of their colonies. Colony survey frequency varies by Assessment Unit and ranges from annually to approximately every 5 years.

2.4 Monitoring Methods

Grey seal pups are counted using aerial photographic survey methods; where these are not possible, ground counts or boat-based counts may be conducted. Multiple counts per colony are generated, spread across the appropriate life stage event (usually pupping).

All CPs have in place some form of monitoring of harbour seals during their annual summer moulting period (August) when the probability that animals will haul out, and be detectable during a survey, is higher.

During the harbour seal moult surveys, some CPs also count grey seals present at the haul-out although the probability of these animals hauling out during this time of year is not necessarily high and varies considerably. Grey seals may also be counted during their annual mouling period in the early spring. Minimum population sizes can be estimated from the haul-out counts of harbour seal, again assuming that the animals have a higher probability of hauling out and being detected during
the moult. In those regions where it is feasible to conduct synoptic surveys during this time, a robust estimate of grey seal population size can be derived.

The fact that grey seals form large breeding colonies in the late autumn provides an indirect way to estimate total population abundance by counting the number of pups born or ‘produced’ at a colony. Multiple surveys are conducted and the number of pups is either reported at the maximum of multiple counts (“pup counts”), or input into an established statistical model to estimate the total number of pups produced at that colony (“pup production”). Using demographic models, these pup production estimates are scaled up to total population size and this number ‘checked’ against an independent population size estimate derived from counts made during other parts of the year (e.g. during the August harbour seal counts or during the grey seal moult). Scaling from pup counts to pup production to total population size is not straightforward (see Briefing Paper 16/02 in SCOS 2016 and previous papers therein). Where grey seals also are counted during harbour seal moult surveys in the summer, these counts are used in the present analysis to constrain the total grey seal population size. However, because grey seals may travel extensively between breeding and foraging sites (Brasseur et al., 2014; Russell et al., 2014), animals counted in a particular location during the summer are not necessarily those that breed in the region. See Annex 1 for details of current and known seal monitoring programmes in each Assessment Unit.

In the UK, pup counts are converted to total pup production at each colony using an established statistical model that describes how the number of pups at the site vary over the season (SCOS, 2016). Most other Contracting Parties count pups at multiple times over the pupping season and the maximum count is taken as a minimum estimate of pup production. Calculated from the UK data, maximum pup counts represent 0.82 (95% CI 0.81 – 0.83) of the total pup production.

The grey seal pupping data collected for M5 is also used for part of this common indicator M3- Seal abundance and distribution. Monitoring costs for both indicators are thus partially shared.

2.5 Quality assurance/ Quality Control

Each national monitoring scheme has its own QA/QC protocols, although it is recommended that European standards should be developed. A minimum standard should be to follow internationally recognised monitoring methods and nationally funded monitoring schemes currently meet this standard.

Data reporting, handling and management

Each CP has its own data storage mechanism. Within each assessment unit indicator M5 is constructed from all available data from constituent CPs before being assessed. National data needs to be submitted to a central data custodian who is also responsible for analysis of data and dissemination of results. Currently, Sea Mammal Research Unit at St Andrews University (UK) provides temporary storage of the data. A more permanent central data storage mechanism is required.

Reporting format (see Annex 2)

A data call was made in May 2015 for data for M3 (M5), with all CPs asked to provide data on grey seals and harbour seals for the period 1992–2014. The call described the seal data, metadata and format required. Data were received from Denmark, France, Germany, the Netherlands, Norway and the United Kingdom. Counts were provided for individual haul-out sites (both species) and breeding colonies (grey seals only) and summed to give a single number for that year for that AU.
Not all Contracting Parties monitor all sites annually. Assessment of trends in abundance of grey seal and harbour seal is only completed where at least four annual data points are available for each assessment unit.

Following experience gained it is likely that the request will be modified slightly for future assessments. This would fit especially well if a more permanent central data storage mechanism is developed.

3 Assessment

This indicator is generated using time series of seal abundance and location at colonies and haul-out sites along the Great North Sea and the UK part of the Celtic Seas.

3.1 Preparation of data - Spatial aggregation of data

Despite their ability to travel long distances, individual mature grey seals of both sexes are usually faithful to particular breeding sites, and may return to within 10–100 m of individual breeding locations (Pomeroy et al., 2000). A subdivision of the European populations into Assessment Units (AU) was proposed for the whole range of grey seals in order to describe changes distribution on land. These AUs are the same as those for the harbour seal abundance and distribution assessments as harbour seals do not to range as far from their favoured haul-out sites.

The boundaries of 21 AUs proposed are shown in Figure 1. It should be noted that the AUs in the North Sea are broadly similar to the previously defined as EcoQO sub-units.
Figure 1. Assessment units for seal distribution and for harbour seal abundance.

Figure 2 The single assessment unit for grey seal abundance

Grey seals are highly mobile and range over large distances so their abundance is assessed at a large scale with the single unit covering both the Celtic Seas and Great North Sea regions (Figure 2).

3.2 Assessment criteria

The current abundance should, in an optimal approach, be assessed against baselines that equate to reference conditions, i.e. the status at a set at a point in the historical time-series when human impacts were considered to be negligible. However, such historical abundance data are not available and available data time series provides no indication of when an unimpacted state might have occurred nor what abundance values would have been. It would also be unrealistic to expect to be able to achieve reference conditions again as they reflect a past level of negligible human impact (by definition) which cannot now be restored, given for instance large-scale coastal developments and tourism. Reference conditions would also not reflect changes due to natural drivers such as climate.

An alternative approach would be to set the baseline at a recent value of abundance for each species, noting that the baseline could later be changed to a more meaningful value as and when knowledge allows. This approach has been used, taking into consideration reflections by ICES WGMME tat highlighted the problems in setting baselines to the time series and proposed that trend-based targets, such as the EcoQOs on harbour seal abundance and grey seal pup-production, which do not require comparison to a baseline, could be adopted for the common indicators (ICES 2014a).

Two baselines were utilised for M3:

2. A ‘rolling’ baseline of the previous reporting round (6 years).

The fixed reference level baseline used was based on the baseline year used by some Member States for reporting under the European Union Habitats Directive (Council Directive 92/43/EEC). Where data were not available from 1992, the start of the data time series was used as the baseline. Indicator assessment values were set as a deviation from the baseline value (Method 3; OSPAR, 2012). Using these baselines allowed for assessment of trends in the seal populations. A short term rate-based assessment value was also adopted that uses a rolling baseline (Method 1; OSPAR, 2012). Here, the average annual rate of population change over consecutive six-year periods (the reporting cycle for the European Union Marine Strategy Framework Directive; MSFD) was assessed against the next. The rolling baseline provides a means to indicate change in population size compared with the previous six-year assessment period, rather than relying solely on an historical fixed baseline, which probably reflects a point in time when the population is already subject to anthropogenic pressures.

A potential issue with this type of quantitative trend thresholds, known as ‘shifting baselines’ is that each successive assessment uses a different starting point as the basis for comparison. This could result in a substantial cumulative decrease occurring over more than one six-year assessment period not being flagged as a problem, because in each six-year period the rate of decline remained below the assessment value (OSPAR, 2012).

Use of the two types of baseline and associated assessment values seeks to provide an indicator that would warn against both a slow but long-term steady decline (the problem of ‘shifting baselines’ associated with only having a rolling baseline) and against a recovery followed by a subsequent decline (potentially missed with a fixed baseline set below reference conditions). Bearing in mind that the arbitrarily assigned baseline does not necessarily reflect a state without impacts, it is not possible to assess the status of seals in relation to the concept of a “favourable conservation status” as applied in the EU Habitats Directive using the assessment values applied in this indicator.

The ICG-COBAM expert group on marine mammals has suggested the following threshold be applied separately to each seal species:

“Maintain populations in a healthy state, with no decrease in population size with regard to the baseline (beyond natural variability) and restore populations, where deteriorated due to anthropogenic influences, to a healthy state”.

The M3 indicator assessment values are:

**Assessment value 1**: No decline in seal abundance of > 1% per year in the previous 6 year period (this is approximately 6% over 6 years).

This uses a rolling baseline based on the previous six-year period which seeks to identify if seal populations are maintained in a healthy state, with no decrease in population size with regard to the baseline (beyond natural variability) and to identify if efforts are needed to restore populations, where they have deteriorated due to anthropogenic influences, to a healthy state.

To estimate the annual increase or decrease in the number of animals counted within the previous six-year reporting round, a trend was fitted to the sum of all available data in each AU for the period 2009–2014. Generalised linear models (GLMs) were fitted to count data with a quasi-Poisson error distribution and log link. Annual growth rate (%) and 80% confidence intervals were estimated for each AU. Although no formal hypothesis testing was conducted, 80% confidence intervals were calculated to reflect the choice to set the statistical significance level, \( \alpha \), equal to 0.20 or 20%.

**Assessment value 2**: No decline in seal abundance of >25% since the fixed baseline in 1992 (or closest value).
The baseline chosen (1992) relates to that used by some Member States for reporting under the European Union Habitats Directive (Council Directive 92/43/EEC) (or if such data are not available, the start of the data series). The 25% currently approximates to 1% a year since 1992. Testing shows that there is sufficient monitoring to assess against this assessment value with confidence. Where a shorter timescale is assessed, the 25% decline since the baseline is not equivalent to those AUs where data do extend to 1992 (for example, a 25% decline since 2003 describes a more rapid contraction in the population than a 25% decline since 1992).

**Assessment of distribution**

A similar set of assessment values as used for seal abundance were suggested for seal distribution, but as meaningful changes in seal distribution are currently difficult to detect and assess from abundance surveys this aspect of the indicator will be considered as a ‘surveillance indicator’. Describing the distribution of seals from surveys that are designed primarily to assess abundance is problematic because these are designed for when the seals are on land. Any distribution metric based on these data will have inherent limitations arising from three main issues:

Spatial coverage: Seal abundance surveys necessarily census animals seen hauled-out on land and do not address the distribution at sea. To estimate at-sea usage, long-term telemetry data are necessary (e.g. Jones et al., 2013).

Sampling effort: Ideally in studies of distributional change, a complete and standardized survey is conducted repeatedly in the area of interest. The areas of interest for this indicator assessment are the AUs. Surveys have been prioritised towards those areas of known and high seal occurrence. Statistically, this could lead to a bias in seal distribution metrics due to preferential sampling.

Temporal coverage: the surveys cover narrow time windows during key life-stages such as moulting, breeding and pupping. The distribution of seals can be different between these stages. Grey seals, for example, may completely vacate breeding areas for the rest of the year. The present analysis assesses changes in moulting distribution for harbour seals, and changes in breeding colony distribution for grey seals.

Despite these limitations, survey data may be useful to detect large-scale contractions in population distributions in terms of reduced use or abandonment of haul-outs or breeding areas, depending on the spatial resolution with which presence / absence data are reported.

### 3.3 Spatial Analysis and / or trend analysis

To address the points above two assessment values were used to assess grey and harbour seal abundance in each Assessment Unit.

There are many ways in which the number of seals counted during any one year could vary, aside from representing true changes in population size. These include variation in weather, or a disturbance at a haul-out site prior to counting. It is therefore advisable to examine the variability in survey counts and to incorporate this variability into trend or population size change estimates. The International Council for the Exploration of the Sea (ICES) Working Group for Marine Mammal Ecology (WGMME) (ICES, 2014b) provided general advice on the need to understand the statistical power of current and proposed monitoring programmes. In the present context, statistical power is the percentage confidence in not missing a significant decline. Statistical power depends on the sample size (number of surveys), the level of statistical significance set (α-level), variance in the
counts, and the magnitude of the trend, that is, -1% and -25%. The ICES WGMME (ICES, 2014b) recommended that monitoring should achieve a minimum of 80% power – which equates to a 20% chance of making a Type II error (i.e. the frequency with which a true decline would not be detected). The same group also recommended that the threshold for detection of a ‘significant’ trend be relaxed from the traditional \( \alpha = 0.05 \) to \( \alpha = 0.20 \). The \( \alpha \) parameter, or significance level, equates to the probability of concluding that a significant trend exists when in fact it does not (Type I error). An \( \alpha \) value of 0.2 and power of 80% means there is equal probability of making an incorrect conclusion (either Type I or Type II error) about the detection of a trend.

Current monitoring programmes vary in the level of statistical power achievable. To carry out a full study of retrospective power to detect changes in the observed population trends, detailed information about the between- and within-year variability in all survey counts would be necessary, which was not available. Consequently, it was not possible to undertake a full assessment of power. Because 80% statistical power is not feasible to achieve in most areas, confidence intervals (CIs) were used to provide a relevant measure of confidence in the assessment. Simply said, they describe the frequency with which the true, unobservable, population parameter (here, the mean count) could be expected to fall within the intervals described by an upper and lower confidence limit. Where the confidence intervals encompass the assessment value the data do not provide conclusive evidence for the calculated value being above or below the assessment value.

### 3.4 Development of assessment methods

#### i. Population size

a. **Grey seal** abundance is to be estimated from a Bayesian demographic model (SCOS, 2016) fitted to pup production/counts and informed, where available, by independent estimates of population size from grey seal moult counts or counts of grey seal made during the harbour seal moult. This analysis will be supported by any available estimate of the proportion of time grey seals spend hauled out during the survey window that CPs are able to provide.

b. **Harbour seal** abundance is assessed through a measure of ‘minimum population size’ for each assessment unit, made from counts of harbour seals on land at haul-out sites during moult. This proxy for population size is an underestimate of the true population size as it includes only those animals hauled out at the time of counting. This metric was previously used to construct the EcoQO on harbour seals.

To determine the change in the abundance of seals since the baseline year, generalised linear models (GLMs) or generalised additive models (GAMs) were fitted to the sum of count data within an AU with a quasi-Poisson error distribution and log link using all available annual survey data in the range 1992 to 2014. The percentage change in abundance since baseline year (\( \Delta \text{baseline} \)) and 80% confidence intervals were calculated from fitted values. Although no formal hypothesis testing was conducted, 80% confidence intervals were calculated to reflect the choice to set the significance level, \( \alpha \), equal to 0.20 or 20% (Formula A).

\[
\Delta_{\text{abundance}} = \frac{B - A}{A} \times 100
\]
Formula A: Calculation of long-term trend in abundance,
Where A is the count fitted by the model in the baseline year and B is the count fitted by the model in the most recent survey year.

The use of the two assessment values aims to provide an indicator that would warn against both a slow but long-term steady decline (the problem of ‘shifting baselines’ associated with only having a rolling baseline) and against a recovery followed by a subsequent decline (potentially missed with a fixed baseline set below reference conditions). The two assessment values together would be able to act as a trigger for investigation of any necessary management measures to promote a steady recovery and subsequent slowing of growth as carrying capacity is approached.

ii. Distributional pattern
Percentage change in occupancy by seals between two periods for a given spatial unit:

\[ \Delta_{distribution} = \left( \frac{B}{N} - \frac{A}{N} \right) \times 100 \]

Formula B: Calculation of changes in distributional pattern
Where A is the number of spatial units (e.g. sub-areas, grid cells) in an AU occupied by seals during reference period A; B is the number of units occupied in a subsequent period B, and N is the total number of spatial units within the AU.


iii. Shift in occupancy
An index to describe the overall shift in the seasonal distribution of seals between sub-areas or grid cells over time:

\[ \text{Shift} = \frac{2(A&B)}{A + B} \]

Formula C: Calculation of shift index
Where A is the number of spatial units (e.g. sub-areas, grid cells) occupied by seals during reference period A; B is the number of units occupied in a subsequent period; A&B is the number of identical units occupied in both periods.


The shift index value is between 0 and 1: a value of 0 indicates that there has been a complete shift in the spatial units occupied; a value of 1 indicates there has been no shift.

The shift index was not calculated for grey seal breeding colonies because female seals usually return to the same colony year after year and the colony location does not shift much over time.

3.5 Presentation of assessment results
Data needs to be collated for each assessment units and then analysed to provide an estimate of abundance and a location. Any changes in abundance can then be compared to the threshold values. For the OSPAR 2017 Interim Assessment (IA2017) the data will be collated and assessed for each AU centrally by Sea Mammal Research Unit, St Andrews (UK).

The method of presentation used for assessments so far is shown by an example of harbour seal abundance. Harbour seal abundance assessment results showing each Assessment Unit against the threshold of no decline in abundance of more than 25% since baseline year on a map is shown in Figure 3.

**Figure 3.** Example of a display format for a harbour seal abundance assessed against a threshold of no decline of >25% since 1992.
Figure 4. Example of a display format for a harbour seal abundance assessed against a threshold of no decline in mean annual abundance of >1% over the previous 6 years.

A second example using the same format and showing harbour seal abundance for each AU assessed against the threshold of no decline in mean annual abundance of more than 1% over the previous 6 years is shown in Figure 4.

Distribution will be presented in table form. Change in occupancy rate between the most recent reporting round (2007:2012) and the previous reporting round (2001:2006) (Δoccupancy) within each Assessment Unit is represented by symbols to indicate if the occupancy rate has increased between the two time periods (↑), decreased (↓) or stayed the same (↔). The shift index (ranging from 0 to 1) is given in separate column.

4 Change Management

The common indicator is maintained under ICG-COBAM which is under BDC.

5 References


## Current and known plans for monitoring grey seal pup production

<table>
<thead>
<tr>
<th>Country</th>
<th>Seafarers and/or coastal states</th>
<th>Seabirds and/or coastal sites</th>
<th>Faucet seals (as of 2016)</th>
<th>Harp seals (as of 2016)</th>
<th>Grey seal pup production</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>France</td>
<td>Pingt-Port, St. Brieuc and santoo</td>
<td>Combination aerial and visual surveys, up to 2.5 km from coast</td>
<td>Combination aerial and visual surveys, up to 2.5 km from coast</td>
<td>Combination aerial and visual surveys, up to 2.5 km from coast</td>
<td>Monthly pup counts</td>
<td>Monthly pup counts</td>
</tr>
<tr>
<td>England</td>
<td>Yorkshire</td>
<td>Repeated aerial survey, annual</td>
<td>Repeated aerial survey, annual</td>
<td>Repeated aerial survey, annual</td>
<td>Repeated aerial survey, annual</td>
<td>Monthly pup counts</td>
</tr>
<tr>
<td>Scotland</td>
<td>Lowland</td>
<td>Repeated aerial survey, annual</td>
<td>Repeated aerial survey, annual</td>
<td>Repeated aerial survey, annual</td>
<td>Repeated aerial survey, annual</td>
<td>Monthly pup counts</td>
</tr>
<tr>
<td>Northern England</td>
<td>No plans for monitoring grey seal pup production</td>
<td>No plans for monitoring grey seal pup production</td>
<td>No plans for monitoring grey seal pup production</td>
<td>No plans for monitoring grey seal pup production</td>
<td>No plans for monitoring grey seal pup production</td>
<td>Monthly pup counts</td>
</tr>
<tr>
<td>Shetland</td>
<td>Repeated aerial survey, annual</td>
<td>Repeated aerial survey, annual</td>
<td>Repeated aerial survey, annual</td>
<td>Repeated aerial survey, annual</td>
<td>Repeated aerial survey, annual</td>
<td>Monthly pup counts</td>
</tr>
<tr>
<td>Shetland</td>
<td>Repeated aerial survey, annual</td>
<td>Repeated aerial survey, annual</td>
<td>Repeated aerial survey, annual</td>
<td>Repeated aerial survey, annual</td>
<td>Repeated aerial survey, annual</td>
<td>Monthly pup counts</td>
</tr>
<tr>
<td>Wales</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Monthly pup counts</td>
</tr>
<tr>
<td>Northern Ireland</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Monthly pup counts</td>
</tr>
<tr>
<td>England</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Monthly pup counts</td>
</tr>
<tr>
<td>Scotland</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Monthly pup counts</td>
</tr>
<tr>
<td>Germany</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Monthly pup counts</td>
</tr>
<tr>
<td>Norway</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Monthly pup counts</td>
</tr>
</tbody>
</table>

**Notes:**
- Grey seal pup production is monitored using aerial surveys or ground surveys.
- Some plans include repeat surveys to assess changes in pup production.
- Monthly pup counts are used to track changes in population size.
- Grey seal pup production is monitored within specific areas to ensure accurate counts.

---

**OSPAR Commission**

**OSPAR Agreement 2016-11**
Annex 2

Instructions for filling in the OSPAR Seal Data Reporting Format (May 2015)

Please ensure that these notes are used when preparing your data submission. Data not following the reporting format will be returned. Please:

- do not remove, add or adjust any columns or calculations included in the associated MS Excel reporting sheet.
- only fill out the reporting sheet as it is delivered to you each year, do not use old versions. They may appear to be replicas but subtle variations are present due to the on-going streamlining of the reporting process at the Secretariat.
- All coordinates are to be calculated using WGS84 and to be presented as decimal degrees.
- All blank values to be left as blank or “NA”

1. Data Use

The Contracting Parties will report data (as specified below) that will enable the assessment of two biodiversity Common Indicators:

**M3 – Abundance and distribution of seals**, in the Greater North Sea and Celtic Seas (OSPAR Regions II and III).

**M5 – Grey seal pup production**, in the Greater North Sea and Celtic Seas (OSPAR Regions II and III).

Data submitted by Contracting Parties will be used by the Sea Mammal Research Unit\(^2\) to construct indicators for each of the proposed Assessment Units (see Annex 1). They will then perform assessments against respective targets and baselines (please see Common Indicator Technical Specifications for details of Assessment Units and targets/baselines). Both indicators will be constructed from past and future data collected by existing monitoring schemes.

Both indicators have been adopted by Contracting Parties in the Greater North Sea Region and will form part of the OSPAR Intermediate Assessment 2017 (IA2017) in this region. The data submitted in this call will be used in the assessment sheets for M3 and M5 that ICG-COBAM will present to BDC 2016.

---

\(^2\) [www.smru.st-andrews.ac.uk](http://www.smru.st-andrews.ac.uk)
The indicators are currently Candidates in the Celtic Seas. The data collected at sites in the Celtic Seas and submitted in this call will enable the indicators to be tested there. These testing results will be used by ICG-COBAM to advise Contracting Parties on whether to include assessments of one or both indicators in the IA2017 for the Celtic Seas region.

2. Reporting Format

Please fill in the four spreadsheets in this Excel Workbook OSRAR_M3_M5_Reporting_Format.xls. These four tables will be used to construct a database.

Before entering your data, please read the instructions provided below. The instructions give detailed guidance on how to complete each field in each data table.

Please note fields highlighted in green are essential as they provide a unique link between the data tables. The fields highlighted in blue are optional, please supply the information wherever possible.

M3_Abundance_Distribution

The data required are as follows:

**Harbour seal moult counts and locations** – a single count of harbour seals made during their mouling period for that year. If multiple surveys are conducted over the season, report the value used in national monitoring programs and associated estimate of variability if available and/or the number of replicate surveys conducted. To describe large-scale changes in distribution through time, counts must be accompanied either by a coordinate, or by a site/area name and midpoint location of the site/area.

**Grey seal moult counts and locations** – where available, a single count of grey seals made during their mouling period for that year. If multiple surveys are conducted over the season, report the value used in national monitoring programs and associated estimate of variability if available and/or the number of replicate surveys conducted. To describe large-scale changes in distribution through time, counts must be accompanied either by a coordinate, or a site or area name and midpoint location. If for some reason grey seal moult counts are not available, please submit any other available data (e.g. during the harbour seal moult count).

<table>
<thead>
<tr>
<th>Field</th>
<th>Example</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>SpeciesID</td>
<td>Pv</td>
<td>Choose species from list: ‘PV’, ‘Hg’</td>
</tr>
<tr>
<td>Country</td>
<td>UK</td>
<td>Country the data is reported by</td>
</tr>
<tr>
<td>Site_name_ID</td>
<td>Orkney_4b</td>
<td>Site_name_ID for corresponding entry in</td>
</tr>
</tbody>
</table>
### OSPAR CEMP guidelines

Common Biodiversity indicators: Seal abundance and distribution (M3)

#### Technical Specifications

#### Annex 2: OSPAR Seal data reporting format

<table>
<thead>
<tr>
<th><strong>Year</strong></th>
<th>2012</th>
<th>Year reported data applies to</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Count</strong></td>
<td>99</td>
<td>Number of hauled out seals counted</td>
</tr>
<tr>
<td><strong>CV estimate</strong></td>
<td></td>
<td>Estimate of the variability in repeated counts in the form of the coefficient of variation (standard deviation / mean) of replicate counts</td>
</tr>
<tr>
<td><strong>Number_surveys</strong></td>
<td>1</td>
<td>the number of replicate surveys used to calculate the annual count</td>
</tr>
<tr>
<td><strong>Month</strong></td>
<td>08</td>
<td>date (dd/mm/yy) or month (mm) the survey was carried out;</td>
</tr>
<tr>
<td><strong>Survey_ID</strong></td>
<td>Pv_MOULT_FW</td>
<td>Survey_ID for corresponding entry in ‘Survey_Meta_Data’ worksheet</td>
</tr>
<tr>
<td><strong>Source</strong></td>
<td>SMRU</td>
<td>Identify source of data</td>
</tr>
<tr>
<td><strong>Season</strong></td>
<td>Harbour seal moult</td>
<td>Select from dropdown list: ‘breeding’, ‘grey seal moult’, ‘harbour seal moult’</td>
</tr>
<tr>
<td><strong>Latitude</strong></td>
<td>59.01</td>
<td>If coordinates of individual groups of animals counted are available, please provide here in decimal degrees and projected to WGS84</td>
</tr>
<tr>
<td><strong>Longitude</strong></td>
<td>-2.97</td>
<td>If coordinates of individual groups of animals counted are available, please provide here in decimal degrees and projected to WGS84</td>
</tr>
</tbody>
</table>

---

**M5_Hg_pup_production**

---

OSPAR Commission

OSPAR Agreement 2016-11
The data required are as follows:

**Grey seal pup counts and/or production** – a single count of grey seal pups born, total pups (alive + dead), or pup production. Please include details of what is counted and how in the Survey_Meta_Data worksheet. To describe large-scale changes in colony distribution through time, please provide the approximate coordinates for the colony in the Spatial_Data worksheet.

<table>
<thead>
<tr>
<th>Field</th>
<th>Example</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Country</td>
<td></td>
<td>Country the data is reported by</td>
</tr>
<tr>
<td>Site_name_ID</td>
<td>of May</td>
<td>Site_name_ID for corresponding entry in ‘Spatial_Data’ worksheet</td>
</tr>
<tr>
<td>Year</td>
<td>2</td>
<td>Year reported data applies to</td>
</tr>
<tr>
<td>Pups count</td>
<td></td>
<td>Number of pups counted</td>
</tr>
<tr>
<td>Pup production</td>
<td>1</td>
<td>Total pup production if estimated</td>
</tr>
<tr>
<td>CV estimate</td>
<td></td>
<td>Estimate of the variability in repeated counts in the form of the coefficient of variation (standard deviation / mean) of replicate counts</td>
</tr>
<tr>
<td>Number_surveys</td>
<td></td>
<td>the number of replicate surveys used to calculate the annual count</td>
</tr>
<tr>
<td>Month</td>
<td></td>
<td>date (dd/mm/yy) or month (mm) the survey was carried out;</td>
</tr>
<tr>
<td>Survey_ID</td>
<td>_PUP_FW</td>
<td>Survey_ID for corresponding entry in ‘Spatial_Data’ worksheet</td>
</tr>
<tr>
<td>Source</td>
<td>RU</td>
<td>Identify source of data</td>
</tr>
</tbody>
</table>
Spatial_Data

The location of each count data point are required to describe changes in harbour seal distribution (of moultling sites) and in grey seal distribution (of breeding and non-breeding sites). If possible, please provide the coordinates of individual groups of animals that have been counted. In cases where seals are or have been counted per spatial unit or site and not as individual groups of animals, data are requested at as fine a resolution as possible (e.g. giving the coordinates of images that were taken and then analysed subsequently, or the midpoint coordinates of the site/subarea). Please also provide for each location the corresponding ‘Site_name_ID’, ‘OSPAR_region’ and ‘MSFD_Assessment_Unit’ (see Annex 1). If shapefiles of subareas are available, please submit these to Nora Hanson (nnh@st-andrews.ac.uk) in WGS84 format. The collation of spatial data at the finest spatial and temporal resolution would allow a more robust assessment of changes in distribution and would be flexible to changes in Assessment Unit, or national management unit boundaries in the future.

<table>
<thead>
<tr>
<th>Field</th>
<th>Example</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site_name_ID</td>
<td>Orkney_4b</td>
<td>Name of the haul-out site, subarea, or colony</td>
</tr>
<tr>
<td>Country</td>
<td>UK</td>
<td></td>
</tr>
<tr>
<td>FD_Assessment_Unit</td>
<td>North Coast &amp; Orkney</td>
<td>One of the 19 proposed seal Assessment Units (see Annex 1, and Excel sheet ‘LISTS’ for reference)</td>
</tr>
<tr>
<td>National_Management_Unit</td>
<td>Orkney</td>
<td>Any other national management unit that the site belongs to</td>
</tr>
<tr>
<td>PAR_region</td>
<td>II</td>
<td>One of 3 OSPAR regional seas (see Annex 1, and dropdown list in Excel spread sheet)</td>
</tr>
<tr>
<td>ICES_area</td>
<td>IVa</td>
<td>One of 16 ICES areas that the site belongs to (see Annex 1, and dropdown list in Excel spread sheet)</td>
</tr>
<tr>
<td>point Latitude</td>
<td>59.01</td>
<td>Please provide here in decimal degrees and projected to WGS84 the midpoint</td>
</tr>
</tbody>
</table>
OSPAR CEMP guidelines
Common Biodiversity Indicators: Seal abundance and distribution (M3)
Technical Specifications
Annex 2: OSPAR Seal data reporting format

| point Longitude | -2.97 | Please provide here in decimal degrees and projected to WGS84 the midpoint coordinates of the haul-out group, site or subarea |

Survey_Meta_Data

<table>
<thead>
<tr>
<th>Field</th>
<th>Example</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Survey_ID</td>
<td>Hg_PUP_FW</td>
<td>A unique identifier to link with M5 or M3 worksheets</td>
</tr>
<tr>
<td>Survey_method</td>
<td>Aerial, fixed-wing</td>
<td>Details of the survey method</td>
</tr>
<tr>
<td>Species</td>
<td>Hg</td>
<td></td>
</tr>
<tr>
<td>Country</td>
<td>UK</td>
<td></td>
</tr>
<tr>
<td>Contact</td>
<td>Callan Duck</td>
<td>Please provide a national contact for data queries</td>
</tr>
<tr>
<td>Email</td>
<td><a href="mailto:Cdd1@st-andrews.ac.uk">Cdd1@st-andrews.ac.uk</a></td>
<td></td>
</tr>
<tr>
<td>Institute</td>
<td>University of St Andrews</td>
<td></td>
</tr>
<tr>
<td>Replicates</td>
<td>4-6 flights/colony/season</td>
<td>The number of replicate surveys conducted in the season</td>
</tr>
<tr>
<td>Pup production</td>
<td>Pup production is estimated from counts (whitecoats, moulted and dead pups) using a mathematical model</td>
<td>Details of the method used to estimate pup production from pup counts if applicable</td>
</tr>
<tr>
<td>Proportion time hauled out +/- 95%CI</td>
<td>NA</td>
<td>For moult counts, please provide any available estimates (from telemetry studies) of the</td>
</tr>
</tbody>
</table>
OSPAR CEMP guidelines
Common Biodiversity Indicators: Seal abundance and distribution (M3)
Technical Specifications
Annex 2: OSPAR Seal data reporting format

<table>
<thead>
<tr>
<th></th>
<th>proportion of time animals spend hauled out during the survey window</th>
</tr>
</thead>
<tbody>
<tr>
<td>References</td>
<td>Special Committee on Seals reports (available at: <a href="http://www.smru.st-andrews.ac.uk/pageset.aspx?psr=411">http://www.smru.st-andrews.ac.uk/pageset.aspx?psr=411</a>)</td>
</tr>
<tr>
<td>Notes</td>
<td>Any other relevant information</td>
</tr>
</tbody>
</table>

Proposed Assessment Units

1) Grey Seal Abundance

Proposed Assessment Unit for Atlantic grey seal abundance comprise the OSPAR Regions II (The Greater North Sea) and Region III (Celtic Seas). This may also include some data from the NW France that is actually in Region IV.

2) Proposed Assessment Units for harbour seals (M3) and grey seal distribution (M3) and grey seal pup production (M5).

See map below

NB. Data from outside the Assessment Units should be submitted in response to this data call.
OSPAR CEMP guidelines
Common Biodiversity Indicators: Seal abundance and distribution (M3)
Technical Specifications
Annex 2: OSPAR Seal data reporting format

Map of Proposed Assessment Units for harbour seals (M3) and grey seal distribution (M3) and grey seal pup production (M5).