

# OSPAR CEMP Guidelines

## Common Indicator: Grey seal pup production (M5)

(OSPAR Agreement 2016-12)<sup>1 2</sup>

*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.*

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<sup>1</sup> This document exists in English only

<sup>2</sup> Update 2022

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# 1 Introduction

The OSPAR Common Indicator: M5 – Grey seal (*Halichoerus grypus*) pup production will contribute to assessments of the state of marine mammals and assessments of Good Environmental Status under the Marine Strategy Framework Directive: MSFD criterion: 1.3 Population Condition; MSFD indicator: 1.3.1 Population demographic characteristics.

As of 2021, this indicator describes changes in grey seal pup production estimates (or associated metrics) derived from counts at breeding colonies on islands, sandbanks and the coasts across OSPAR Regions I, II and III (Arctic Waters, the Celtic Seas and the Greater North Sea).

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.

Only grey seal pup production is used as a common indicator. Harbour seals pup individually or in small groups at remote sites and do not pup in the same large aggregations that grey seals generally do. Furthermore, harbour seal pups can swim from birth and are born with cryptic (adult-like) pelage. The monitoring of harbour seal pup production is therefore very difficult and few Contracting Parties (CPs) monitor the pupping of harbour seals. Consequently, it is not possible to develop a common indicator for harbour seal pup production.

## 2 Monitoring

### 2.1 Purpose

As top predators, seals may reflect the state of the marine ecosystem. They have a varied diet and are mobile to varying degrees depending on the species, 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 as well as events with anthropogenic causes, including disease outbreaks, competition with other species, shifts in resources, disturbance, and fisheries interactions are likely to influence distribution and abundance of the species.

Seals were hunted well into the 20th century, resulting in population depletions across OSPAR Regions. Protective legislation to reduce those anthropogenic threats has supported the recovery of colonies in more recent years however the legal removal of seals to protect fisheries or for hunts are still carried out and the persistent threat from bycatch remains present across many areas (Granquist, 2020). Exposure to persistent organochlorine and petroleum compounds are well established as an identifiable cause of substantial historic reproductive failure and hence declines in abundance within the Baltic Sea sub-population of Atlantic grey seals and across the Greater North Sea (Jenssen, 1996; Sørmo et al., 2003; de Wit et al., 2020).

Changes in grey seal pup production can be assessed at a much higher resolution than can what be achieved through the single AU used for assessing grey seal abundance in M3: Seal Abundance and Distribution, which is relevant for the ecological range of the species in the north-east Atlantic. The more localised scale of assessments of pup production, and hence detected changes in AU might be expected to reflect changes in environmental conditions before they become evident as changes in

the overall population size. Further 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 indicator M5 is on the pup production (number of pups born) of grey seals at colonies throughout Arctic seas, the Great North Sea, the Celtic Seas (OSPAR Regions I, II and III).

Atlantic grey seals pup in the autumn or winter and moult in early spring. The frequency of surveys varies across CPs due to differences in the total number of breeding individuals, funding, geography, and historical development of the monitoring programmes.

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 additional work to establish the local phenology is required to ensure monitoring is appropriately timed. Seal phenology will vary not only from species to species but can also vary from one Assessment Unit to another.

## **2.3 Monitoring Strategy**

Data collection is largely carried out and funded by national monitoring schemes (see Annex 2 for details of current and known seal monitoring programmes in each Assessment Unit). The aim of this data collection is to estimate either total pup production, or peak pup production using one or more survey within the breeding period. Most schemes have a central data storage mechanism (e.g. national database). Many CP's monitor the entire grey seal colony however survey frequency varies by Assessment Unit and ranges from annually to approximately every 5 years.

## **2.4 Monitoring Methods**

Grey seal pups are counted at major breeding sites ('colonies') usually using aerial photographic survey methods; where these are not possible, ground counts or boat-based counts may be used instead (e.g. Stringell *et al.*, 2014). Multiple counts per colony are conducted, spread across the breeding season (August – February, depending on colony location).

For many colonies in Scotland (including all the major ones), pup counts are used to estimate total pup production, that is, the total number of pups produced over the season. at each colony using an established statistical model that describes how the number of pups at the site vary over the season (Russell *et al.* 2019). Similarly, Ireland and Iceland also estimate pup production using multiple counts (Ó Cadhla *et al.* 2013; Granquist & Hauksson, 2019)

All other Contracting Parties (CPs) count pups several times during the pupping season and provided peak count values as an index of pup production, The peak count gathered from monitoring will always under-estimate pup production because pups are born and leave the colony at different times and the breeding season is longer than any one pup stays on the colony. For some smaller colonies or stretches of coast where pups are born, often a single count is used as an index of pup production. Hereafter, both types of estimates are referred to collectively as a 'pup production index'.

Colony survey frequency varies by 'Assessment Unit' (AU) and ranges from annually to about five-yearly. In many AUs monitoring is undertaken in specific areas by local organisations and does not form part of synoptic surveys.

## **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. For the QSR2023 assessments, national data were submitted to an ICES data portal, which operated as the central data custodian. The data were then accessed by the Sea Mammal Research Unit at St Andrews University (UK) for analysis.

### *Reporting format (see Annex 2)*

## **3 Assessment**

This indicator is generated using time series of grey seal pup production (no. of pups born) at Assessment Units (AUs) (Fig 1) along the Great North Sea, the Celtic Seas and Arctic Waters.

### **3.1 Data Call**

A data call was made in February 2021 for data for M5, all Contracting Parties were asked to provide data on an AU-scale of peak grey seal pup count and/or total pup production estimates for the period 1992 (or earliest year) –2019 (or latest year). Data were received from the UK, Ireland, France, Belgium, Germany, the Netherlands, Denmark, Sweden, Norway, and Iceland.

The data request will likely be modified for future assessments as lessons continue to be learned from each round of reporting.

### **3.2 Preparation of data**

#### *Assessment Units*

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).

The boundaries of 25 Assessment Units used for this assessment are shown in Figure a.

The AUs do necessarily not represent demographically independent populations and that survey coverage and monitoring effort is higher where breeding grey seals are most abundant. The AUs reflects a balance between population structure evidence and feasible monitoring sites for both harbour and grey seals within CPs. Monitoring of grey seal pups is conducted by the same organisations, and at a similar scale to that data provided for M3: Seal Abundance and Distribution and so match those AUs used for conducting assessments on harbour seals, and grey seal distribution within M3. The assessment units in the Greater North Sea are broadly similar to those previously defined as OSPAR EcoQO sub-units.

Assessment Units were not developed for waters around CP's Greenland and Faroe Islands as the data available were not suitable for a quantitative assessment.

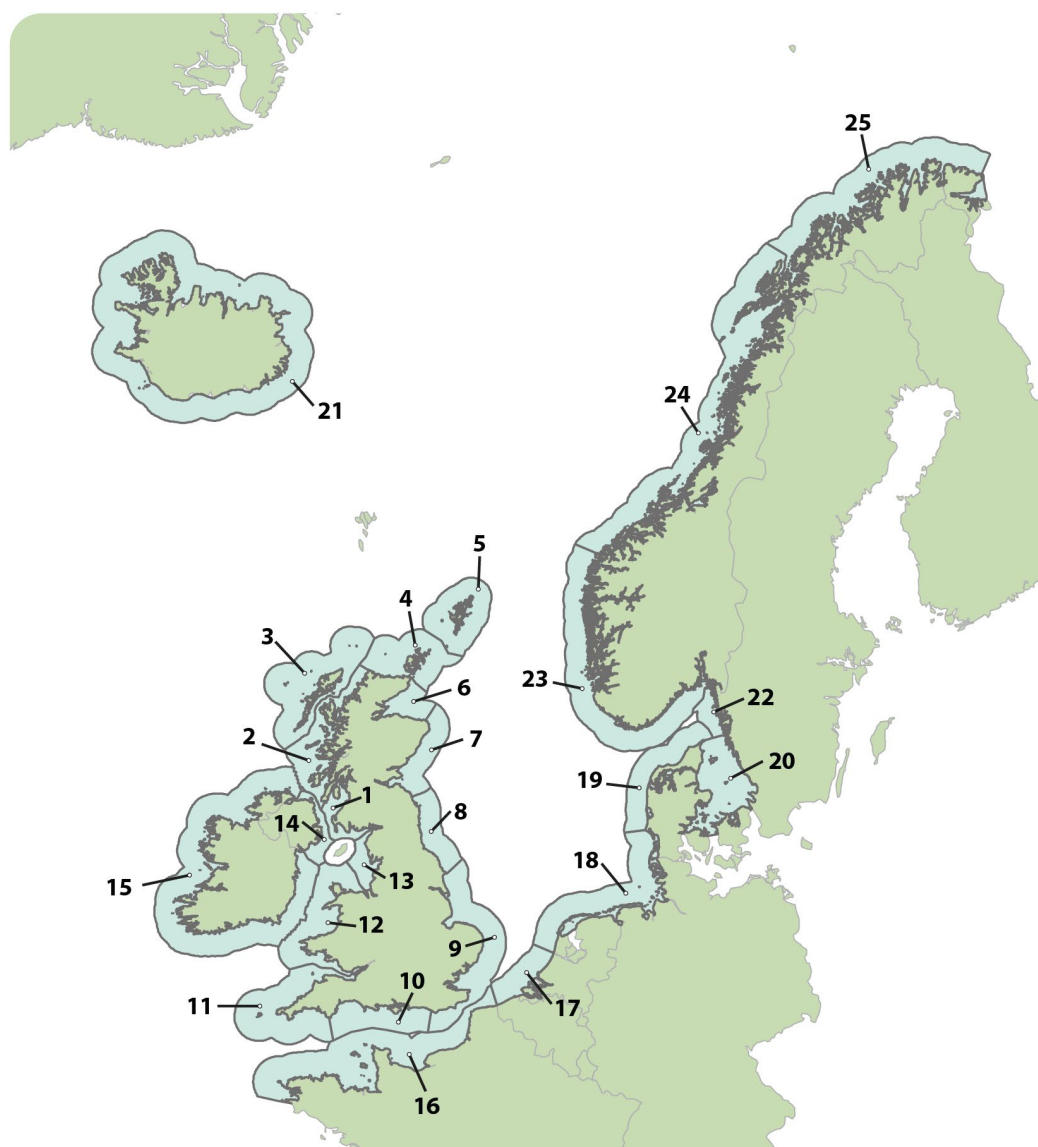


Figure a: Grey seal pup production assessment units

Key: 1. Southwest Scotland, 2. West Scotland, 3. Western Isles, 4. North Coast & Orkney, 5. Shetland, 6. Moray Firth, 7. East Scotland, 8. Northeast England, 9. Southeast England, 10. South England, 11. Southwest England, 12. Wales, 13. Northwest England, 14. Northern Ireland, 15. Ireland, 16. French North Sea & Channel Coast, 17. Belgium coast and Dutch Delta, 18. Wadden Sea, 19. Limfjorden, 20. Kattegat, 21. Iceland, 22. Skagerrak, 23. Norway (Hvaler – Stad), 24. Norway (Stad – Vesterålen), 25. Norway (Troms – Finnmark)

### 3.3 Assessment criteria

Current pup production 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, seals have been historically hunted both illegally and legally and it is not possible to know the undisturbed state, nor, for some areas, the current carrying capacity that could be attained alongside protection from illegal hunting. Time series data

for abundance and distribution of grey seals do not provide an indication of a time when seal populations were not impacted by anthropogenic pressures such as hunting or natural diseases and what that would look like in terms of abundance and distribution. 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 drivers such as climate.

An alternative approach is to set the baseline at a recent value of pup production, noting that the baseline could later be changed to a more meaningful value as knowledge allows. ICES WGMME highlighted the problems in setting baselines to the time series and proposed that trend-based targets, such as the EcoQO on grey seal pup-production, which do not require comparison to a baseline, could be adopted for the common indicators (ICES 2014a). As a consequence of these considerations, two baselines were utilised for M5.

The baselines for M5 are:

1. A 'fixed' reference level (1992 or nearest).
2. A 'rolling' baseline of the previous reporting round (6 years).

The 1992 fixed reference level year used was selected based on the baseline year used by some Member States for reporting under the European Union Habitats Directive (Council Directive 92/43/EEC). This year does however represent a time following recent protective measures in many countries, and so populations had not yet recovered from severe depletion at this time. For harbour seal, data as far back as 1992 were not available in all AUs; in such cases, the start of the data time series was used as a historical baseline. The baseline year for the long-term trend in grey seal abundance was based on availability of data from the most populous subAUs. 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.

This rolling baseline provides a means to indicate change in population abundance size compared with a previous OSPAR assessment's six-year period (e.g., 2009-2014 in IA2017), 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, such as culling or natural pressures such as phocine distemper virus (PDV) outbreaks.

A potential challenge 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). The two assessment values together would be able to act as a trigger for investigation of any necessary management measures to promote recovery. It should however be noted that in many AU's, the baseline year of 1992 represents a severely depleted population state (e.g from PDV outbreaks, or historic anthropogenic removal) and so caution should be taken when interpreting any assessment outputs as the safeguard intended by applying two baselines and assessment values is not present.

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 M5 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).

No decline in seal abundance over 6% in the 6-year period. This is approximately 6% over 6 years)

This uses a rolling baseline (Method 1; OSPAR, 2012) based on the most recent six-year period, seeking to identify if seal populations are maintained, with no decrease in population size with regard to the (short-term) baseline (beyond natural variability (<1% per year)) 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 most recent six-year reporting round, the fitted trend abundance in 2014 was compared against that of 2019. To maximise robustness of trends, the whole time series provided (ie. pre 2014 and post 2019) were used for both the short and the long-term assessments. This deviates from those methods used previously in 2017 when a trend was fitted to all the available data in each AU for the period 1992-2019 and short-term trends were fitted using only a subset of the time series.

**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). Testing shows that there is sufficient monitoring to assess against this assessment value with confidence. It should however be noted that if data are not available from 1992, and a shorter timescale is assessed, the 25% decline since the baseline is not equivalent to those AUs where data do extend to 1992 (i.e. a 25% decline since 2003 would describe a more rapid contraction in the population than a 25% decline since 1992).

### 3.4 Statistical Power of Assessments

To address the points above two assessment values were used to assess grey seal pup production in each Assessment Unit.

There are many reasons why pup counts could vary, aside from representing true changes in pup production. These include variation in weather and a recent disturbance at a colony. It is therefore advisable to examine the variability in survey counts and to incorporate this variability into trend estimates. The International Council for the Exploration of the Sea (ICES) Working Group for Marine Mammal Ecology (WGMME) (ICES, 2014) provided general advice on the need to understand the statistical power of 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 ( $\alpha$ -level), variance in the counts, and the magnitude of the trend, that is, -1%/yr (6% over 2014-2019) and -25% (between the historical baseline of 1992 and 2019). 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. These recommendations have been carried over for the QSR2023 assessments.

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 trends, detailed information about the between-year variability in pup production indices would be necessary. A full assessment of power was not undertaken here, but confidence intervals (CIs) provide a measure of confidence in the assessment. Simply said, they describe the frequency with which the true, unobservable, population parameter could be expected to fall within the intervals described by an upper and lower confidence limit. Where the confidence intervals encompass the assessment value these data do not provide conclusive evidence for the calculated value being above or below the assessment value.

### 3.5 Development of assessment methods

Pup production estimates from all colonies within a given AU were summed to generate an overall assessment for that area. Quantitative assessments of trends in pup production were only completed for those AUs where four or more annual data points were available. For AUs for which there were a limited number or temporal extent of counts for the AU, when possible, a more comprehensive time series from a subset of the AU was used as a proxy to allow robust trend fitting.

Grey seal pup production estimates were assessed in relation to a baseline set at 1992 (or the start of the time series where this was after 1992), and by calculating a single value of annual population change over the short- and long-term assessment periods. To better maximise the robustness of identified trends, all years were used for both the short and the long-term assessments. This deviates from those methods used as part of the IA2017 whereby estimates were assessed by calculating the average rate of annual population change across the time series.

Total pup production estimates, or peak counts were modelled as a function of year assuming negative binomial or Poisson error distribution and log link (Russell et al. 2019). Generalized additive models (GAMs) were fitted within mgcv (Wood, 2011) and Akaike information criterion (AIC) was used to select a final model. For all datasets, at least three models were fitted: an intercept-only GLM (null model), an exponential (linear on the link scale) year effect within a GLM, and a nonlinear smooth year effect within a GAM (restricted to 5 knots). For Scottish AUs, a step increase in pup abundance was offered between 2010 (the last film survey) and 2012 (the first digital survey) to account for the artificial increase in pups associated with the change in aerial survey method. This allowed the assessment to be based on the trends excluding this jump.

The percentage change in abundance since baseline year ( $\Delta_{\text{baseline}}$ ) and 80% confidence intervals were calculated for each AU from fitted values of the short- and long-term assessment periods. 80% confidence intervals were calculated to reflect the choice to set the significance level,  $\alpha$ , equal to 0.20 or 20% (Formula A). Where confidence intervals encompass the assessment value, the data do not provide conclusive evidence for the calculated value being above or below the assessment value.

$$\Delta production = \frac{C - A}{A} * 100$$

Formula A: Calculation of long-term trend in production. Where A is the count fitted by the model in the baseline year and C is the count fitted by the model in the most recent survey year during an assessment of long-term shifts.

### 3.6 Presentation of assessment results

Data needs to be gathered for each assessment units and then analysed to provide a measure of any change in pup production. The change in pup production can then be compared to the assessment values. For the OSPAR 2023 Quality Status Report (QSR2023) the data will be collated and assessed for each AU centrally by Sea Mammal Research Unit, St Andrews (UK). The analysis for M5 is relatively simple and could therefore be assessed by individual CPs. However as much of the data gathering is run by the same organisations within CP's between M3 and M5, it is simpler and more economic to run M5 and M3 assessments centrally and from a single data holding source.

The method of presentation used for assessments is shown by an example of grey seal pup production assessment results showing each grey seal pup production AU against the threshold of no decline in abundance of more than 25% since baseline year on a map (Figure b).

Using the same format and showing pup production for each AU assessed against the threshold of no decline in mean annual abundance of more than 6% in the previous 6 years is shown in Figure c.

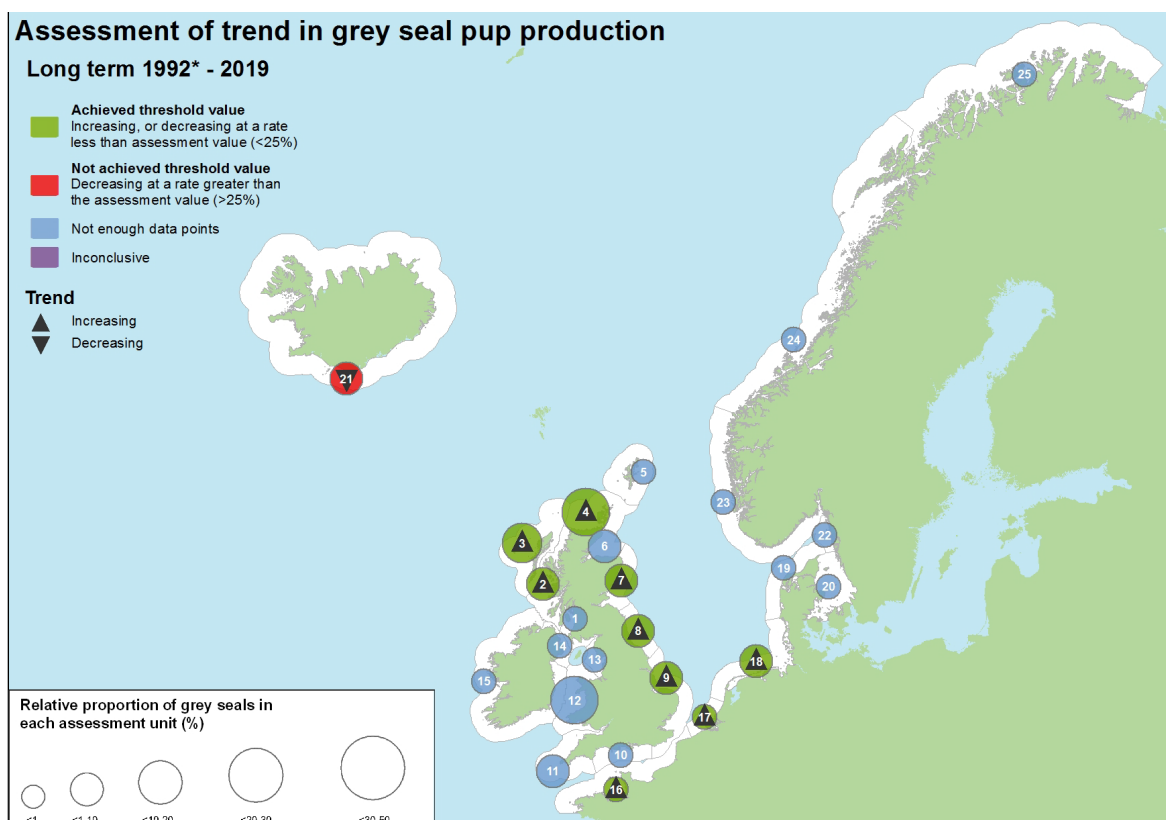


Figure b: Change in grey seal pup production during the period 1992–2019, assessed against no decline greater than 25%.

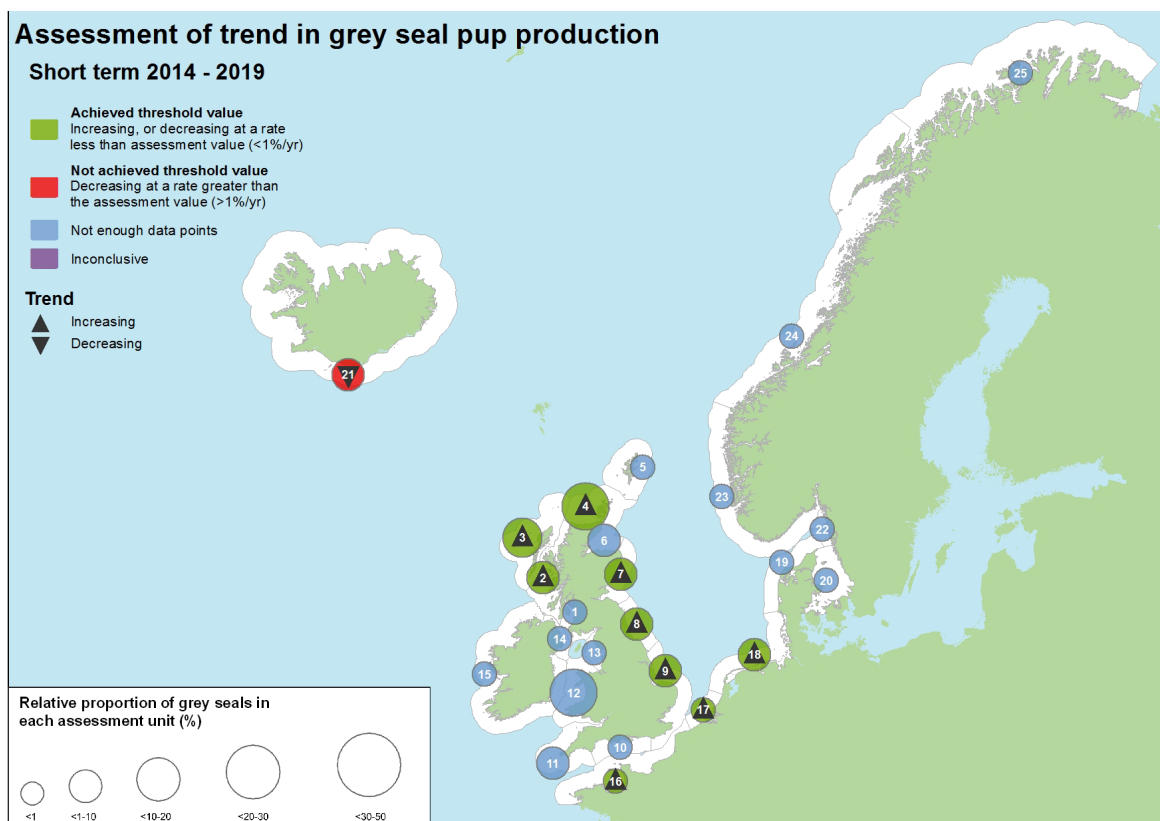


Figure c: Change in grey seal pup production during the period 2014–2019, assessed against a threshold of no decline in abundance >6% in the previous 6 years (approximately 1% per year).

## 4 Change Management

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

## 5 References

de Wit, C.A., Bossi, R., Dietz, R., Dreyer, A., Faxneld, S., Garbus, S.E., Hellström, P., Koschorreck, J., Lohmann, N., Roos, A. and Sellström, U., 2020. Organohalogen compounds of emerging concern in Baltic Sea biota: Levels, biomagnification potential and comparisons with legacy contaminants. *Environment International*, 144, p.106037.

Granquist, S.M. and Hauksson, E., 2019. Aerial census of the Icelandic grey seal (*Halichoerus grypus*) population in 2017: Pup production, population estimate, trends and current status. *Marine and Freshwater Research in Iceland*. HV, 2.

ICES 2014a. Report of the working group on Marine Mammal Ecology (WGMME). 10-13 March, 2014 Woods Hole, Massachusetts, USA. ICES CM 2014/ACOM: 27, 230pp

ICES, 2014b. OSPAR request on implementation of MSFD for marine mammals. In Report of the ICES Advisory Committee, 2014. ICES Advice 2014, Book 1, Section 1.6.6.1.

Jenssen, B.M., 1996. An overview of exposure to, and effects of, petroleum oil and organochlorine pollution in grey seals (*Halichoerus grypus*). *Science of the Total Environment*, 186(1-2), pp.109-118.

Ó Cadhla, O., Keena, T., Strong, D., Duck, C. and Hiby, L., 2013 Monitoring of the breeding population of grey seals in Ireland, 2009 - 2012. Irish Wildlife Manuals, No. 74. National Parks and Wildlife Service, Department of the Arts, Heritage and the Gaeltacht, Dublin, Ireland.

OSPAR, 2012. MSFD Advice Manual and Background Document on Biodiversity. Version 3.2. OSPAR Biodiversity Series. Available at:  
[http://www.ospar.org/documents/dbase/publications/p00581/p00581\\_advice%20document%20d1\\_d2\\_d4\\_d6\\_biodiversity.pdf](http://www.ospar.org/documents/dbase/publications/p00581/p00581_advice%20document%20d1_d2_d4_d6_biodiversity.pdf)

Pomeroy, P. P., Twiss, S. D. and Redman, P. 2000. Philopatry, site fidelity and local kin associations within grey seal breeding colonies. *Ethology*: 899–919.

Russell DJF, Morris CD, Duck CD, Thompson D, Hiby L., 2019. Monitoring long-term changes in UK grey seal pup production. *Aquatic Conserv: Mar Freshw Ecosyst.* 29(S1):24–39.  
<https://doi.org/10.1002/aqc.3100>

Sørmo, E.G., Skaare, J.U., JÜSsi, I., JÜSsi, M. and Jenssen, B.M., 2003. Polychlorinated biphenyls and organochlorine pesticides in Baltic and Atlantic gray seal (*Halichoerus grypus*) pups. *Environmental Toxicology and Chemistry: An International Journal*, 22(11), pp.2789-2799.

Stringell, T., Millar, C., Sanderson, W., Westcott, S. and McMath, M. 2014. When aerial surveys will not do: grey seal pup production in cryptic habitats of Wales. *Journal of the Marine Biological Association of the United Kingdom*. 94: 1155-1159.

Wood, S. N. (2011). Fast stable restricted maximum likelihood and marginal likelihood estimation of semiparametric generalized linear models. *Journal of the Royal Statistical Society, Series B (Statistical Methodology)*, 73, 3–36. <https://doi.org/10.1111/j.1467-9868.2010.00749>.

## Annex 1. OSPAR Common indicators: Instructions for filling in the OSPAR Seal Data Reporting Format (February 2021)

Since the last OSPAR seal data call in 2016, some changes have been made to the data format and to the data submission method. These changes have been necessary to store new variables not included in 2016 but which are in the new OSPAR Biodiversity Database hosted and maintained by ICES. Please ensure you read all the guidance below:

- Always use the latest version of the reporting sheets, which will be delivered as part of the OSPAR data call. Do not use old versions.
- Please do not use any thousand separators (commas, apostrophes, or blanks) in number fields.
- Latest guidance and formats will always be available on <http://biodiversity.ices.dk>

### 1. Data Use

Contracting Parties will report data (as specified below) that will enable an assessment, of two Biodiversity Common Indicators:

M3 - Seal abundance and distribution (harbour and grey seal)

M5 - Grey seal pup production

These indicators have been adopted by some Contracting Parties as part of their cooperation with other EU Member States in implementing the Marine Strategy Framework Directive (MSFD - 2008/56/EC).

The data will also contribute to OSPAR achieving its thematic strategy on Biological Diversity and Ecosystems; in particular with the “regional, coordinated development of monitoring and assessment of marine biodiversity and ecosystem functioning”.

Marine mammals, including seals, are top predators, and comprise an important part of marine biodiversity. Seals are most reliably counted when they are hauled out on land, and counts are usually conducted during breeding or moulting seasons. The current monitoring does not account for distribution at sea. Further information on the assessments and required spatial scale is provided below. Current and known plans for monitoring harbour and grey seals are detailed in Annex 1 to Annex 3. A glossary of key terms is in Annex 4.

#### **M3 - Seal abundance and distribution (harbour and grey seal)**

The distribution and abundance assessments for both grey and harbour seal (M3) use counts of hauled out animals, as well as location of haulouts surveyed.

- **Harbour seal moult counts** – all counts of harbour seals by haulout unit (see next section for description of unit) and Assessment Unit made during their moulting period for that year.
- **Harbour seal pup counts** – where available, all counts of harbour seals by haulout unit and Assessment Unit made during their pupping period for that year
- **Grey seal moult counts** – where available, all counts of grey seals by haulout unit and Assessment Unit made during their moulting period for that year.

- **Grey seal August counts** – where available, all counts by haulout unit and Assessment Unit of grey seals made during the harbour seal moult surveys.

#### **M5 - Grey seal pup production**

For the assessment of grey seal pup production, counts of hauled out grey seal pups during the pupping/breeding season are used, as well as location of breeding colonies surveyed:

- **Grey seal pup counts** – all counts of grey seal pups by breeding unit divided into categories if used (e.g. dead, alive, whitecoat, moulted).
- **Grey seal pup production** – estimates of total pup production if available.

#### **Spatial scale (count locations)**

The count data are requested on two spatial scales depending on the indicator:

- Haulout units (required) and by AU (if available) for M3 harbour and grey seal abundance and distribution.
- Breeding unit (required) and by AU (if available) for M5 grey seal pups.

Assessments of distribution of hauled out seals of both species, harbour seal abundance and grey seal pup production are made at the scale of the assessment units (AUs) in Figure 1. Grey seals are highly mobile and range over large distances, so their abundance will be assessed at a larger scale with a single AU covering OSPAR regions I (Arctic Waters), II (Greater North Sea) and III (Celtic Seas), but for the purpose of analysis, data are requested at the scale of the grey seal pup production units (Figure 1).

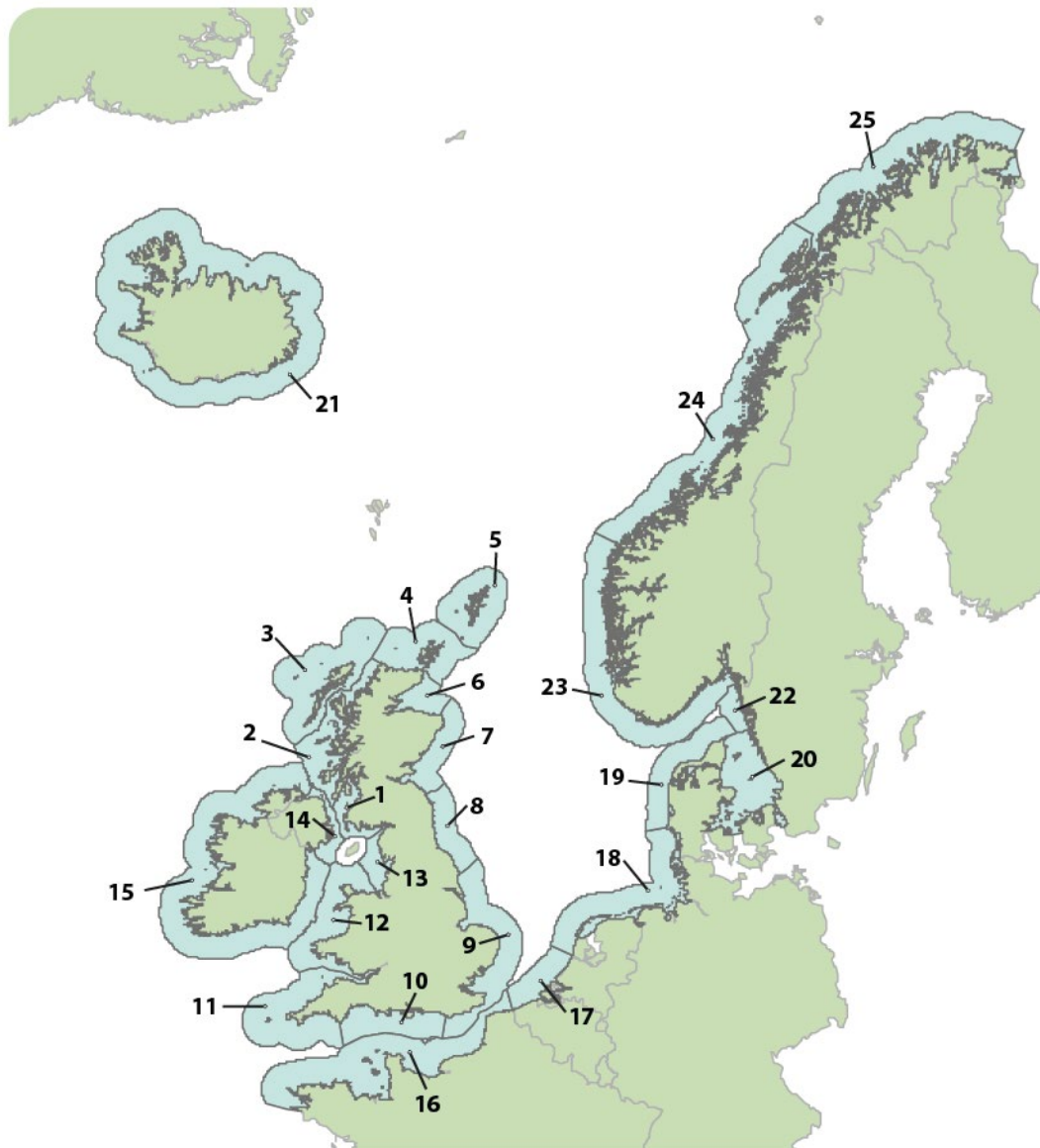
The finer resolution (haulout unit or breeding unit) will allow investigation of changes in harbour seal distribution (of haulout units) and in grey seal distribution (of haulout units and breeding units). Each finer resolution data entry should be ascribed to one of the relevant AUs (see Figure 1).

To generate the M3 distribution indicator, submitted data will need to be converted into gridded presence/absence data covering OSPAR regions I, II and III. All data should be provided by the scale of a haulout unit, or on a 5 x 5 km grid. To minimise the processing required to submit data, haulout unit is an arbitrary unit which can represent part of what may biologically considered a haulout (e.g. a count associated with the location of an individual photograph), a haul out or a cluster of haulouts. Haulout units for which the spatial extent is < c. 2.5 km can be input as Points. Polygons should reflect the approximate extent of haulouts/clusters and can be used instead of points for any haulout unit but must be used for any haulout units which are >2.5 km in spatial extent. Haulout units do not need to be consistent across surveys, but every haulout unit must be described in **Table 4. Haulout/breeding unit description**. A new haulout unit in Table 4 should be added if the location of the associated point or the extent of the associated polygon has changed since the last survey – this is important for the distribution element of the indicator. For example, for a particular haulout (e.g. Pandora Sands), there may be two associated haulout units, one for surveys in prior to 2000, and one for post 2000 due to a movement of the sandbank.

For M5 assessments, distributional change is not examined in the same way and thus data should be provided by individual breeding unit. 'Breeding unit' refers to a grey seal breeding colony(ies) on which pup counts and pup production estimates are provided. Irrespective of spatial extent, such colonies can be represented by points or polygons and must be identifiable (i.e. consistent) between surveys.

Unless data are provided on a 5 x 5 km grid, survey effort data must also be provided for the M3 indicator (**Table 5. Seal Survey Effort**) so areas of no seals can be distinguished from areas from areas of no survey. Such data should be provided per survey round (e.g. one row for each moult survey conducted in a year).

Survey data should be indicated as a polygon. Effort data is not necessary for M5 breeding units because breeding units stay constant through time and thus survey effort will be indicated by the presence of a count (e.g. 0). All survey IDs should be added to **Table 5. Seal Survey Effort** whether spatial information is required or not. Where spatial information is not required (for M5 grey seal pup data and for M3 data supplied on a 5 x 5 km grid) 'breeding units' or '5km grid' can be selected under data\_resolution and survey effort containing presence and absence data can be selected under data\_type.



**Figure 1.** Assessment units (AUs) for distribution for both species indicators, harbour seal abundance and grey seal pup production. [Grey seal abundance will be assessed at a larger scale with a single AU covering OSPAR regions I, II and III, but for the purpose of analysis, data are requested at the scale of the units presented in this figure.] More information on the AUs are available as a shapefile: here: [https://odims.ospar.org/layers/geonode:ospar\\_assessment\\_areas\\_2021\\_02\\_001](https://odims.ospar.org/layers/geonode:ospar_assessment_areas_2021_02_001)

1. Southwest Scotland, 2. West Scotland, 3. Western Isles, 4. North Coast & Orkney, 5. Shetland, 6. Moray Firth, 7. East Scotland, 8. Northeast England, 9. Southeast England, 10. South England, 11. Southwest England, 12. Wales, 13.

Northwest England, 14. Northern Ireland, 15. Ireland, 16. French North Sea & Channel Coast, 17. Belgium coast and Dutch Delta, 18. Wadden Sea, 19. Limfjorden, 20. Kattegat, 21. Iceland, 22. Skagerrak, 23. Norway MA1 (Lista – Stad), 24. Norway MA2 (Stad – Lofoten), 25. Norway MA3 (Vesterålen – Varanger).

## 2. Reporting Format 2021

To report data on seals, please use the latest version of the document “OSPAR\_Seals\_reporting\_format.xlsm” available from <http://ices.dk/data/data-portals/Pages/Biodiversity.aspx>.

The data required are described in detail in Tables 1-6 below. For code and drop-down references please refer to the vocabulary lists that accompany the MS Excel data entry sheets:

- a) File\_information
- b) Seal\_AU\_totals
- c) Haulout\_Breeding\_Unit\_Abundance
- d) Unit\_description (for haulout / breeding units)
- e) Seal\_survey\_effort
- f) Seal\_survey\_programme\_metadata

## 3. Submitting data online

Each Contracting Party should submit their data to the ICES data portal. **Data submission deadline is 28-Feb-2021.**

**Step 1:** The Excel sheets should be downloaded via <http://ices.dk/data/data-portals/Pages/Biodiversity.aspx> and filled out with data.

**Step 2:** When the data sheets are filled out, the <Export data to XML> button on the ‘Export\_data’ worksheet should be pressed to produce the xml data file (see Figure 2).

**Note:** the Excel file contains macros that are used for transforming the worksheets to the XML data format for uploading. Generally, you should only enable macros from a trusted source, please ensure you download the Excel file from ICES directly to be sure of a clean, virus free file.



## Biodiversity data - Seals

This file converts data to an XML file that can be uploaded to the Seals biodiversity database.

1) COPY YOUR DATA INTO THE EXCEL FILE tabs:

worksheet tab: File_information	This worksheet should always be filled in
worksheet tab: Seal_AU_totals	This worksheet should be filled in if possible
worksheet tab: Haulout_Breeding_Unit_Abundance	This worksheet should always be filled in
worksheet tab: Unit_description	This worksheet should be filled when the Unit i
worksheet tab: Seal_survey_effort	This worksheet should always be filled in
worksheet tab: Seal_survey_programme_metadata	This worksheet should be filled when the surve
worksheet tab: Vocabularies	For reference, used in the dropdown boxes on w

All red outlined cells are mandatory and should be checked / filled in

All green outlined cells are optional

2) Use the button here to export the completed Excel data template to

Export data to XML

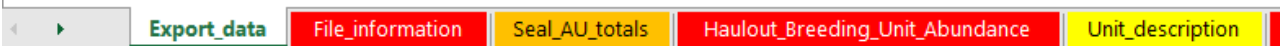
5) The vocabularies are included as a worksheet tab. These are the valid codes for use in the drop down boxes in the spreadsheet fields. The vo  
<https://vocab.ices.dk>

5.a) The complete list of EDMO codes can be found in:

<https://vocab.ices.dk/?ref=1398>

<https://www.seadatanet.org/Metadata/EDMO-Organisations>

6) Go to this website for more information on the reporting requirements, to upload your data, or to access the latest versions of the submission  
<https://biodiversity.ices.dk>



**Figure 2.** Excel sheet with the button for XML export.

**Step 3:** The XML file should then be uploaded to the ICES website (<http://biodiversity.ices.dk/ManageSeals>).

### Login

A login is required in order to upload and manage data. The ICES sharepoint login can be used, if you do not have an ICES login please contact [accessions@ices.dk](mailto:accessions@ices.dk)

During data submission, data will be checked for correct use of vocabulary codes and data types. This quality control will ensure that the data standards have been met, a report of control issues will be generated and made available to the submitter online. Data not complying with the correct format will not be accepted by the uploading utility.

The Excel worksheets are described on the following pages. Fields marked in red are mandatory whereas fields marked in green are optional. The sheets [File\_information], [Seal\_AU\_totals], [Haulout\_breeding\_unit\_abundance] and [Seal\_survey\_effort] are the actual data tables that are to be submitted every year, whereas the worksheets [Unit\_description] and [Seal\_survey\_programme\_metadata] are reference tables that are filled out initially, and only updated when changes occur.

Some fields have specific 'fixed' values that need to be entered. These values are contained in the sheet 'Vocabularies' included with the Excel data entry sheets.

#### **Data Access**

OSPAR is committed to making as much information as possible publicly available, consistent with achieving other similarly important goals of public policy. The framework for this is set out in Article 9 of the OSPAR Convention and Annex 3 of the OSPAR Rules of Procedure (2013-2).

Contracting Parties should contact Chris Moulton ([chris.moulton@ospar.org](mailto:chris.moulton@ospar.org)) if they have any queries over what data to include in the submissions.

Data access can be specified by the submitters directly in the submission form as:

**Public** Data are sourced outside the terms of the OSPAR data policy and are publicly accessible

**Restricted** Data, in their reported form, are not to be made publicly accessible. All aggregated data products are, by default, publicly available, including those derived from restricted data

Data will be made available in line with the terms of the OSPAR Data Policy where they are not restricted:  
[https://odims.ospar.org/data\\_policy.html](https://odims.ospar.org/data_policy.html)

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**Table 1. File information**

Column Header	Optional / mandatory	Format Example	Explanation
Country	Mandatory	SE	ISO 3166 Code (2 ALPHA) (Vocabulary)
Reporting_organisation	Mandatory	3512	EDMO code lookup (Vocabulary)
Contact	Mandatory	Jon Smitsson	Name or email for point of contact for data submission (person who can direct queries to relevant survey co-ordinator or data manager)

**Table 2. Seal AU Totals**

Column Header	Optional / mandatory	Format Example	Explanation
Species_name	Mandatory	<i>Phoca vitulina</i>	Scientific name, according to the World Register of Marine Species (WoRMS) – <a href="http://www.marinespecies.org">www.marinespecies.org</a>  Vocabulary: <i>Phoca vitulina</i> (harbour seal); <i>Halichoerus grypus</i> (Atlantic grey seal)
Focal_year	Mandatory	1989	This year which the data most pertains to. If the AU is covered in a single year, this is the survey year. If providing an AU total derived from incomplete surveys over multiple years this should be the year which you think best represents these data.
Start_year	Optional	1987	Please include a row for each year from 1980 (or earliest year) to 2019. Enter different start and end years if providing an AU total derived from incomplete surveys over multiple years.
End_year	Optional	1989	Enter different start and end years if providing an AU total derived from incomplete surveys over

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			multiple years.
Seal_assessment_unit	Mandatory	20	Refer to Figure 1. Vocabulary: 1, 2.....25.
PARAM	Mandatory	Pup count	Vocabulary: pup count (all); adult/juvenile count; total count (all ages); pup production.
Value	Mandatory	400	Number of individuals or pups; or pup production
Estimate_type	Mandatory	Count on single day	Type of abundance estimation  Vocabulary: modelled estimate; count on single day; count over multiple days; counts over multiple years; maximum; average
Activity_type	Mandatory	GSM	Activity within the unit related to the species being reported, i.e. moult or breeding counts for harbour seal, and summer, breeding or moult counts for grey seal.  Vocabulary: moult; breeding; summer.
Survey_start_month	Optional	03	Start month of the survey, MM
Survey_end_month	Optional	06	End month of the survey, MM
Survey_programmeID	Mandatory	1	This is a unique identifier that provides links to Table 6 - Survey_programme_metadata
Data_access	Mandatory	Public	Indicates if data are public or restricted  “Public” for data that are publicly accessible  “Restricted” if data, in their reported form, are not to be made publicly accessible. All aggregated data products are, by default, publicly available, including those derived from restricted data

**Table 3. Haulout Breeding Unit Abundance**

Column Header	Optional / mandatory	Format Example	Explanation
Species_name	Mandatory	<i>Phoca vitulina</i>	Scientific name, according to the World Register of Marine Species (WoRMS) – <a href="http://www.marinespecies.org">www.marinespecies.org</a>  Vocabulary: <i>Phoca vitulina</i> (harbour seal); <i>Halichoerus grypus</i> (Atlantic grey seal)
Year	Mandatory	1987	The year that the reported data applies to. Please include a row for each year from 1980 to 2019.
Date	Optional (mandatory for pup counts only)	20160921	The date (yyyymmdd) count was made. Mandatory for pup counts, optional for all others.
UnitID	Mandatory	4427	A national unique numerical identifier for each unit (used to link to Table 4 – Haulout_breeding_unit_description). Allow for multiple entries of a unit in the same year if multiple counts available.
PARAM	Mandatory	Pup count (all)	Vocabulary: pup count (all); pup count (whitecoat); pup count (moulted pups); pup count (dead pups); pup count (other categories); adult/juvenile count; total count (all ages); pup production. Please note if dead pups are included separately, they should not be included in whitecoat or moulted pups.
Value	Mandatory	400	Number of adults or pups; or pup production
Estimate_type	Mandatory	single count	Type of abundance estimation  Vocabulary: modelled estimate; single count
Activity_type	Mandatory	GSM	Activity within the unit related to the species being reported, i.e. moult or breeding counts for harbour seal, and summer, breeding or moult counts for grey seal.

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			Vocabulary: moult; breeding; summer.
Survey_start_month	Optional	03	Start month of the survey, MM
Survey_end_month	Optional	06	End month of the survey, MM
SurveyID	Mandatory	1	This is a unique identifier that provides links to Table 5 - Seal_survey_effort
Survey_programmeID	Mandatory	1	This is a unique identifier that provides links to Table 6 - Seal_survey_programme_metadata
Data_access	Mandatory	Public	Indicates if data are public or restricted "Public" for data that are publicly accessible; "Restricted" if data, in their reported form, are not to be made publicly accessible. All aggregated data products are, by default, publicly available, including those derived from restricted data;

**Table 4. Unit\_description (for haulout / breeding units)**

Column Header	Optional / mandatory	Format Example	Explanation
UnitID	Mandatory	4427	A national unique numerical identifier for each count site (used to link to Table 3 – Haulout_Breeding Unit_Abundance).
Unit_name	Optional	Lazy Sandbank	free text
Unit_type	Mandatory	Breeding unit	Vocabulary: breeding unit, haulout unit
Geometry_type	Mandatory	Point	Vocabulary: point; line; polygon
Latitude	Optional	61.36	If providing point data. WGS84, decimal degrees
Longitude	Optional	-6.97	If providing point data.

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			WGS84, decimal degrees
Polygon	Optional	{ "type": "Feature", "geometry": { "type": "LineString", "coordinates": [ [102.0, 0.0], [103.0, 1.0], [104.0, 0.0], [105.0, 1.0] ] }, "properties": { "prop0": "value0", "prop1": 0.0 } }	Define the polygon using GeoJSON ( <a href="http://geojson.org/">http://geojson.org/</a> )  WGS84, decimal degrees
Area_type	Optional	OSPARRegion	Area reference type. Vocabulary: OSPARRegion
Area_reference	Optional	2	Vocabulary: 1 = Arctic Waters, 2 = Greater North Sea, 3 = Celtic Seas, 4 = Bay of Biscay and Iberian Coast, 5 = Wider Atlantic
Seal_assessment_unit	Mandatory	20	Refer to Figure 1. Vocabulary: 1, 2.....25.

**Table 5. Seal Survey Effort**

Column Header	Optional / mandatory	Format Example	Explanation
SurveyID	Mandatory	A	Use a unique identifier that provides link to the survey for which data is being provided as per Table 3 – Haulout/breeding unit Abundance. One row show be provided by survey round. E.g. one per duplicate moult survey in a given year
Survey_programmeID	Mandatory	1	This is a unique identifier that provides links to Table 6 – Seal_survey_programme_metadata
PlatformClass	Mandatory	Land	Please fill out the survey platform,

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			<p>use only one option per cell.</p> <p>Vocabulary: aerial, boat, land (ICES accepted vocabulary)</p>
Count_method	Mandatory	Observed	<p>Please fill out the count method, use only one option per cell.</p> <p>Vocabulary: observed, photo</p>
Start Date	Mandatory	20160821	Date which the survey started on
End Date	Mandatory	20160825	Date which the survey ended on
Data_resolution	Mandatory	Haulout units	<p>Please fill out the resolution for the data being provided. Spatial effort data supplied as a polygon or multipolygon is required if M3 data is not supplied on a 5 x 5 km grid. M5 grey seal pup data and M3 data supplied on a 5 x 5 km grid do not require spatial effort data.</p> <p>Vocabulary: haulout units, breeding units, 5km-grid</p>
Data_type	Mandatory	Presence only	<p>Please select one option for data type to describe the survey effort.</p> <p>Vocabulary: Presence&amp;absence, presence only</p>
Geometry_type	Optional	Polygon	<p>Effort data supplied as a polygon or multipolygon is required if M3 data is not supplied on a 5 x 5 km grid. M5 grey seal pup data and M3 data supplied on a 5 x 5 km grid do not require a polygon, so the field can be left blank.</p> <p>Vocabulary: polygon, multipolygon.</p>
Polygon	Optional	<pre>{ "type": "Feature",   "geometry": {     "type": "LineString",     "coordinates": [       [102.0, 0.0], [103.0, 1.0], [104.0, 0.0], [105.0, 1.0]     ]   },   "properties": {     "prop0": "value0",</pre>	<p>Define the polygon or multipolygon covered using GeoJSON (<a href="http://geojson.org/">http://geojson.org/</a>)</p> <p>WGS84, decimal degrees</p>



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		<pre> “prop1”: 0.0 } } </pre>	
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**Table 6. Seal survey programme metadata**

Column Header	Optional / mandatory	Format Example	Explanation
Survey_programmeID	Mandatory	1	Use a unique identifier that provides link to the survey programme for which data is being provided as per Table 2 – Seal_AU_totals or Table 3 – Haulout_Breeding Unit_Abandance or Table 5 – Seal_survey_effort
Programme_name	Mandatory	Seals Monitoring Programme (SMP)	Full name of survey with abbreviation in parentheses.
Start_year	Mandatory	1986	Enter the year the survey started.
End_year	Optional	2005	Enter the year the survey ended. If the survey is ongoing, please leave blank.
Country	Mandatory	SE	ISO 3166 Code (2 ALPHA) – see Vocabulary. Enter one country only per cell.
Institute	Mandatory	“3512” for The Swedish Agency for Marine and Water Management	Data monitoring organisation. EDMO code lookup (Vocabulary)
Contact	Optional	Jon Smitsson	Point of contact for survey (e.g. co-ordinator or data manager).
Website	Optional	<a href="http://www.slu.se/en/seals">www.slu.se/en/seals</a>	Website dedicated to survey (or survey protocol) if available.
Survey_protocol	Optional	Counts are usually conducted between 10:00 and 16:00 (local time) within 2 hours of low tide in dry weather	Free text Please add additional information on survey protocol (e.g. counts are usually conducted between 10:00 and 16:00 (local time) within x hours of low tide in dry weather).
References	Optional	Smitsson et al (2012)	Any relevant references that describe methods and/or results.

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**Annex 2. Current and known plans for monitoring grey seal pup production in the OSPAR area (adapted and updated from ICES 2021 & ICES 2014b).**

Country	OSPAR Assessment Unit	Monitoring region	Monitoring method	Metric			
				Peak pup count	Estimated up production		
United Kingdom	1. Southwest Scotland		Annual aerial survey until 2010, biennial thereafter.		Y		
	2. West Scotland						
	3. Western Isles		Annual aerial survey until 2010,				
	4. North Coast & Orkney		Annual aerial survey until 2010, biennial thereafter.				
	5. Shetland		Annual ground count since 2004.			Diffic	
	6. Moray Firth	Repeat aerial survey, annual to 2010 biennial thereafter					
	7. East Scotland						
	8. Northeast England	North Sea: Farne Islands, East England	Annual ground count				
	9. Southeast England	North Sea: Donna Nook and Norfolk colonies, Southeast England	Annual ground count				
	10. South England	N/A					
	11. Southwest England	Celtic Sea: Welsh coasts and Southwest England	Ground counts on beaches, in caves or from cliff tops.	Y		Pup	
	12. Wales						
	13. Northwest England	N/A					
	14. Northern Ireland				Y		
Ireland	15. Ireland	East and Southeast Ireland, Southwest and West Ireland & Northwest Ireland	Aerial surveys on rotational basis, each surveyed at least once within a 6-year cycle	Y		P col repli	
Ireland		Southwest and West Ireland					
Ireland		Northwest Ireland					
France	16. French North Sea & Channel Coast	North Sea: Archipelago of Sept Îles and adjacent haul-	Monthly ground census and photo identification	Y		Pu	

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		outs				pop th
France		Archipelago of Molene and adjacent haul-outs				
France		Baie de Somme and adjacent haul-outs				
Netherlands <sup>3</sup>	17. Belgium Coast & Dutch Delta	Dutch Delta	Monthly aerial survey.			Mon ha cred
	18. Wadden Sea	Wadden Sea	Aerial survey conducted five times per year from November to March/April.	Y		
Germany <sup>3</sup>		Wadden Sea (Lower Saxony/Hamburg, Schleswig–Holstein)	Aerial survey conducted five times per year from November to March/April.  For Lower Saxony/Hamburg, grey seal pup counts restricted to the main pupping colony since winter 2017/2018			
Germany <sup>3</sup>		Helgoland	Daily land counts since 2016.			
Denmark <sup>3</sup>		Wadden Sea	Replicate annual aerial survey (3 flights) since 2014.			Mo un cou un appro
Denmark	-	Kattegat	Aerial surveys (2 flights for grey seal pups) since 2021			Not also as th with Bal seas altho two canr

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Iceland	21. Iceland	Entire coast	Aerial count, every five years at least.	Y		
Norway	23. Norway (Hvaler – Stad),	Rogaland	Ground count, every five years at least.	Y		

<sup>[3]</sup> [Coordinated monitoring under TMAP \(Trilateral Monitoring and Assessment Programme\), coordinated by EG-Seals \(Trilateral Seal Expert Group\); http://www.waddensea-secretariat.org/monitoring-tmap/topics/marine-mammals](http://www.waddensea-secretariat.org/monitoring-tmap/topics/marine-mammals)

## Annex 3. Glossary.

**Unit** refers to the spatial scale at which data are provided, i.e. assessment unit, haulout unit or breeding unit, and is defined throughout.

**Haulout unit** is an arbitrary unit which can represent part of what may biologically considered a haulout (e.g. a count associated with the location of an individual photograph), a haul out or a cluster of haulouts. Haulout units for which the spatial extent is < c. 2.5 km can be input as Points. Polygons should reflect the approximate extent of haulouts/clusters and can be used instead of points for any haulout unit but must be used for any haulout units which are >2.5 km in spatial extent.

**Breeding unit** refers to a grey seal breeding colony(ies) on which pup counts and pup production estimates are provided. Irrespective of spatial extent, such colonies can be represented by points or polygons and must be identifiable (i.e. consistent) between surveys.

**Survey ID** is a unique identifier that provides a link to the survey effort for which haulout unit or breeding unit abundance data is being provided.

**Survey programme ID** is a unique identifier for the survey programme, that provides a link between survey programme metadata, survey effort and the AU, haulout unit or breeding unit abundance data that is being provided.