

Home / Action areas / Monitoring and assessment / Monitoring Manual / Mammals / Health status

Monitoring programme: Biodiversity - Mammals

Programme topic: Mammals

## SUB-PROGRAMME: SEAL HEALTH STATUS

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### TABLE OF CONTENTS

[Regional coordination](#)

[Purpose of monitoring](#)

[Monitoring concepts table](#)

[Assessment requirements](#)

[Data providers and access](#)

[References](#)

### REGIONAL COORDINATION

The monitoring of this sub-programme is: **partly coordinated** within HELCOM Seal *ad hoc* expert group.

- [Common monitoring guidelines](#).
- Common quality assurance programme: missing. National QA/QC exists.
- Common database: missing.

### PURPOSE OF MONITORING (Q4K)

Follow up of progress towards:

|   |                                  |   |
|---|----------------------------------|---|
| <b>Baltic Sea Action Plan (BSAP)</b>                    | Segments                         | Biodiversity  |
|   | Ecological objectives            | Healthy wildlife<br>Viable populations of species   |
| <b>Marine strategy framework directive (MSFD)</b>       | Descriptors                      | D1 Biodiversity<br>D4 Food webs   |
|   | Criteria ( <a href="#">Q5a</a> ) | 1.3 Population condition<br>8.2 Effects of contaminants   |
|   | Features ( <a href="#">Q5c</a> ) | Biological features:<br>A description of the population dynamics, natural and actual range and status of species of marine mammals and reptiles occurring in the marine region or subregion |
| <b>Other relevant legislation (<a href="#">Q8a</a>)</b> | Habitats Directive               |   |

Assessment of: ([Q4k](#))Scale of data aggregation for assessments: ([Q10a](#))

HELCOM assessment unit levels

|  |          |   |  |                            |
|--|----------|---|--|----------------------------|
| State/Impacts                          | <b>X</b> | Temporal trends<br>State classification | 1 - Baltic Sea                                   | <b>X</b> (for grey seal)   |
| Pressures                              |          |   | 2 - Subbasins                                    | <b>X</b> (for ringed seal) |
| Human activities causing the pressures |          |   | 3 - Subbasins with coastal and offshore division |                            |
| Effectiveness of measures              |          |   | 4 - Subbasins with coastal WFD division          |                            |

**MONITORING CONCEPTS TABLE**

| Coordination  | Elements<br><u>Q9a (Q5c)</u> | Parameter<br><u>Q9a (Q5c)</u> | Method<br><u>Q9c, Q9d</u>  | QA/QC<br><u>Q9e, 9f</u> | Frequency<br><u>Q9h, 9i</u> | Spatial<br>resolution<br><u>Q9g, 9i</u> | Link to<br>HELCOM<br>core<br>indicators                           | Link to<br>MSFD GES<br>characteristics<br><u>Q5b</u> | Spatial<br>scope<br><u>Q4i</u> | Monitoring<br>started<br><u>Q4h</u> | CPs<br>monitoring |
|---|------------------------------|-------------------------------|--|-------------------------|-----------------------------|---|---|--|--------------------------------|-------------------------------------|-------------------|
| Through<br><a href="#">HELCOM Seal<br/>Expert Group</a> | Grey seal                    | Reproduction<br>rate          | <a href="#">Necropsies<br/>investigations<br/>of female<br/>reproductive<br/>organs and<br/>age<br/>determination</a><br>(in Swedish)  | National                | Year round                  | Other                                   | <a href="#">Reproductive<br/>status of<br/>marine<br/>mammals</a> | 1.3 Population<br>condition                          | EEZ                            | 1975                                | FI, PL, SE        |
| Through<br><a href="#">HELCOM Seal<br/>Expert Group</a> | Grey seal                    | Marine<br>mammal<br>blubber   | <a href="#">Necropsies<br/>measuring<br/>blubber<br/>thickness on<br/>the sternum in<br/>1-3 years old.</a><br>(in Swedish)            | National                | Year round                  | Other                                   | <a href="#">Nutritional<br/>status of<br/>seals</a>               | 1.3 Population<br>condition                          | EEZ                            | 1975                                | FI, SE            |
| Through<br><a href="#">HELCOM Seal<br/>Expert Group</a> | Ringed<br>seal               | Reproduction<br>rate          | <a href="#">Necropsies<br/>investigations<br/>of female<br/>reproductive<br/>organs and<br/>age<br/>determination.</a><br>(in Swedish) | National                | Year round                  | Other                                   | <a href="#">Reproductive<br/>status of<br/>marine<br/>mammals</a> | 1.3 Population<br>condition                          | EEZ                            | SE 1975<br>FI 1999                  | FI, SE            |
| Through<br><a href="#">HELCOM Seal<br/>Expert Group</a> | Ringed<br>seal               | Marine<br>mammal<br>blubber   | <a href="#">Necropsies<br/>measuring<br/>blubber<br/>thickness on<br/>the sternum in<br/>1-3 years old.</a><br>(in Swedish)            | National                | Year round                  | Other                                   | <a href="#">Nutritional<br/>status of<br/>seals</a>               | 1.3 Population<br>condition                          | EEZ                            | SE 1975<br>FI 1999                  | FI, SE            |
| Through<br><a href="#">HELCOM Seal<br/>Expert Group</a> | Harbour<br>seal              | Reproduction<br>rate          | <a href="#">Necropsies<br/>investigations<br/>of female<br/>reproductive<br/>organs and age<br/>determination.</a><br>(in Swedish)     | National                | Year round                  | Other                                   | <a href="#">Reproductive<br/>status of<br/>marine<br/>mammals</a> | 1.3 Population<br>condition                          | EEZ                            | SE 1988                             | DE, DK, SE        |

|  |                 |                             |  |          |            |       |  |                             |     |         |  |
|--|-----------------|-----------------------------|--|----------|------------|-------|--|-----------------------------|-----|---------|--|
| Through<br><u>HELCOM Seal<br/>Expert Group</u> | Harbour<br>seal | Marine<br>mammal<br>blubber | <u>Necropsies<br/>measuring<br/>blubber<br/>thickness on<br/>the sternum in<br/>1-3 years old.</u><br>(in Swedish) | National | Year round | Other | <u>Nutritional<br/>status of<br/>seals</u> | 1.3 Population<br>condition | EEZ | SE 1988 | DE<br>(stranded<br>and by-<br>caught<br>specimen<br>only), DK,<br>SE |
|--|-----------------|-----------------------------|--|----------|------------|-------|--|-----------------------------|-----|---------|--|

## Brief description of monitoring

Detailed information on monitoring frequency and spatial resolution has not yet been collected from all countries but will be added.

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### Element / parameter

Female reproductive status measured as pregnancy rate:

- proportion of females with presence of a fetus in the pregnancy period and birth rate
- proportion of females showing post partum signs as ovarian corpus albicans and uterine scars between time for birth and implantation
- proportion of mature females 2-5 years old measured as presence of an ovarian corpus luteum between time for birth and implantation.

Stranded seals can be used for the additional parameter 'uterine obstructions and leiomyoma'.

Nutritional status measured as blubber thickness (mm) at sternum in 1-3 years old.

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### Method

Reproductive status: Data for the core indicators are received during seal necropsies. For reproductive status the uterus is examined for fetus or postpartum signs and ovaries are examined for corpora luteum and albicans.

Nutritional status: Data for the core indicators are received during seal necropsies. For nutritional status the blubber thickness is measured to the nearest millimeter at the sternum between the muscle and the skin. Age is determined by teeth sections.

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|                           |  |
|---------------------------|--|
| <b>QA/QC</b>              | <p>HELCOM Seal <i>ad hoc</i> expert group health team coordinates and evaluates.</p> <p>During the three decades of monitoring two persons in Sweden (veterinarian and patho-biologist) have conducted the necropsies (Bergman, 1999). During these three decades several people in Finland (veterinarians, seal biologists) have performed necropsies. In Germany and Poland necropsies are performed by veterinarians. National consultations and synchronisations are made continuously between people in different countries.</p> <p>Age determinations of the grey seals are performed by counting growth layer groups (GLGs) in the cementum of teeth according to a well-established method. Readings of tooth sections are made independently by two persons. More information in <a href="#">this paper</a> (in Swedish).</p> |
| <b>Frequency</b>          | <p>All by-caught and stranded seal species are sampled all year round and hunted seals from middle of April. The number of seals is dependent on people collecting and sending them.</p>   |
| <b>Spatial Scope</b>      | <p>The female reproductive status of all three seal species is assessed on available material in Level 2 assessment units. Most of the grey and ringed seals data on reproduction is from the Gulf of Bothnia. Currently material from the southern Baltic Sea is insufficient for assessment of reproductive status of grey seals. For harbor seals the assessment area is Kattegat.</p> <p>The Swedish data including by-caught grey seals is insufficient, N=26 during 2002-2012 from the Baltic Proper.</p> <p>The nutritional status is assessed for all three seal species based on available data originating from by-catch and hunting. The nutritional status is assessed for the whole Baltic Sea.</p>   |
| <b>Spatial resolution</b> | <p>Baltic Sea</p>  |

## ASSESSMENT REQUIREMENTS

### Monitoring requirements and gaps

Monitoring is to be carried out to fulfill assessment requirements of HELCOM ecological objectives that are specified through HELCOM core indicators. The requirements on monitoring can include number of stations, the sampling frequency and replication.

|                                |  |
|--------------------------------|--|
| <b>Monitoring requirements</b> | <p>The health core indicators for seals are female reproductive status and nutritional status. The female reproductive status is sensitive for contaminants and starvation and the nutritional status is sensitive for ecological changes in the fish communities.</p> |
|--------------------------------|--|

Changes in female reproduction, is closely linked to PCB-contamination and the pregnancy rate dropped to 17% in female ringed seals and similar for grey seals during the 1970s. During the same time period there were no indices of starvation in seals.

The reproductive status includes:

- Pregnancy rate measured as per cent  $\pm$  CI females having a fetus after delayed implantation time
- Birth rate measured as per cent  $\pm$  CI females with postpartum signs between the time of birth and implantation.
- Per cent  $\pm$  CI mature young females (2-5 years old) measured as presence of corpus luteum in ovaries between the time of birth and implantation.
- Per cent females showing uterine pathological changes year round.

Female reproduction is measured from hunted and by-caught seals and for some parameters also from stranded seals. At present the assessment of female reproduction depends on hunted seals for sufficiency of data.

The nutritional status is measured as geometric mean  $\pm$  CI of blubber thickness in 1-3 years old females and males during the fattest time of the year, the pregnancy period. The monitoring of nutritional status should be confined to by-caught and hunted seals and these two categories should be assessed separately since by-caught seals are usually leaner. In areas without seal hunting the monitoring can be carried out based on by-caught seals only.

Data compilation:

By-caught, stranded and shot seals are received and necropsied all year around in Sweden and mostly in the springtime in Finland. Sweden and Finland have most data from Baltic grey seals and ringed seals. Sweden also has harbour seal data. Denmark and Germany (by-caught and stranded animals only) may also have harbour seal data. Data from Poland, Estonia, Lithuania, Latvia and Russia is welcomed. For grey seals it will be evaluated if the data held by Finland and Sweden is sufficient to make a Baltic wide assessment of the health of the species.

Data is assessed and also presented as trends. Reproductive data is presented in five year intervals and blubber thickness in 3 year intervals for grey seals. The intervals (GES) for ringed seals (nutritional status) and harbor seals (reproductive status and nutritional status) have not yet been decided.

**Gaps**

The funding for the health assessment in the different countries is not ensured thus it is difficult to collect and treat the basic data needed for the development of core indicators.

Monitoring of the Baltic marine mammals started in the 1970s when the health of the seal populations was seriously threatened by contaminants, especially organochlorines. The populations have slowly recovered but new threats have arisen (e.g. other contaminants). There is lack of data, especially for harbor porpoises and harbor seals but also for ringed seals. Thus, knowledge of normal reproduction rate and blubber thickness does not exist for Baltic marine mammals. Data from outside the Baltic could be used to determine normal limits, but the possible issue here is that the ecosystem outside the Baltic Sea is different with dissimilar opportunities to forage. In the Baltic, grey seals also have a smaller body size than in the northeast Atlantic (UK and Norway), which in turn are smaller than in the northwest Atlantic (McLaren 1993).

Trends of the overall health status of the Baltic ringed seal are uncertain due to low numbers of necropsied whole animals. Health investigations have focused on female reproductive tracts, which have been collected systematically since the late 1970's. However, recent findings indicate that the overall health problems due to environmental toxins have decreased during the past decades (Nyman et al. 2002, Routti 2009).

Data from investigations on the overall health status of the western population of harbor seals could probably serve as normal data also to determine GES in the Kalmarsund harbor seal population. Health parameters of harbor seals from the Swedish west coast are only monitored from hunted animals.

Data on harbour porpoises is insufficient to determine the overall health status at this time.

For female reproductive status sufficient data is available for seals from the Gulf of Bothnia (grey seal and ringed seal) and the Swedish west coast (harbour seal, Kattegat) while there is limited data from Baltic Proper and Gulf of Riga. Data on harbor porpoise is insufficient.

**Adequacy for assessment of GES (Q5d)**

Monitoring should provide adequate data and information to enable the periodic assessment of environmental status, and distance from and progress towards GES as required by MSFD under Article 9 and 11.

|  |      |
|--|------|
| <b>Adequate data?</b>                      | Yes* |
| <b>Established methods for assessment?</b> | Yes  |
| <b>Adequate understanding of GES?</b>      | Yes  |

**Adequate capacity to perform assessments?**

Yes

\*NOTE: The MSFD classifies the selective extraction of species and the associated biological disturbance as pressures and impacts to the marine environment which must not jeopardize the achievement of the good environmental status according to MSFD or the ecological objectives according to the HELCOM BSAP. Hunting is therefore not a Baltic Sea wide option for data collection.

**Assessment of natural variability (Q5e)**

Pregnancy rate is measured as presence or absence of a foetus in the pregnancy period in 6–24-year-old grey seals and from the proportion of 7–25-year-old females with CA in spring. GES is proposed to be assessed every third year (pooling the data for each 3-year period) for 6–24-year-olds, and every sixth year pooling the data for each 6-year period, separately for young (4–5-year-old) and adult ( $\geq 6$ -year-old) females. For ringed seals, a period of 10 years to get enough data may be needed. Figures today suggest that in 4–20-year-old grey seals, GES could be set at the lower limit of the 95% confidence interval, i.e. at about 80%, referring to the period 2008–2009 which is proposed to be defined as representative of a healthy population. However, recently calculated values for 6–24-year-old grey seals show higher pregnancy rate values and need to be further considered. The same GES boundary is proposed for the ringed seal. Data should also be presented as trends.

Blubber thickness is measured at the sternum between the muscle layer and the skin during the pregnancy period (August-February for grey and ringed seals). New methods that allow the use of data from all months are currently being considered. Suggested reference levels for GES are the lower limit of the 95% confidence interval for the geometric mean. These have been calculated for 1–3-year-old, 5–20-year-old males, and 5–20-year-old females in the Norwegian and Swedish grey seals from hunt in 1999–2004. The reason for basing the proposed GES boundary to data from before 2005 is that since this year the available data indicates a trend of decreasing blubber thickness. In support for this approach, the lower limit of 95% confidence intervals for the 1–3-year-old grey seals is 26.8 mm also in Finland. Suggestion GES boundaries for grey seals during the season of pregnancy from stranded, by-caught or hunted animals.

| Age class  | Sex               | Geometric mean - Confidence interval = GES boundary |
|------------|-------------------|---|
| 1–3 years  | females and males | $\geq 26$   |
| 5–20 years | males             | $\geq 36$   |
| 5–20 years | females           | $\geq 37$   |



In order to get enough data, the assessment could be renewed every third year (i.e. pooling the data for each 3-year period) for grey seals. In the Baltic, the causes of death have been shown to influence the result of the blubber measurements. Stranded seals often show a thin blubber layer (starvation due to disease or old age) and by-caught seals are often thinner than seals received from hunt. Therefore, these groups are suggested to be presented separately since their proportions will influence the GES determination. It has been discussed within the HELCOM Seal health team that the lower 95% CI could be used as the GES boundary for ringed seal as well. The lower limit of 95% confidence intervals was 35.6 mm for young and sub-adult individuals and 51.4 mm for adults in 2001–2011. The sample includes both by-caught and hunted seals from August-February.

GES limits for blubber thickness in ringed seals and harbour seals are still being investigated. Data for harbour porpoises is insufficient.

## DATA PROVIDERS AND ACCESS

|   |   |
|---|---|
| <b>Data access point</b>  | HELCOM - not yet available                                    |
| <b>Data type (Q10c)</b>   | Processed data sets   |
| <b>Data availability (Q10c)</b>   | National data centres   |
| <b>Data access (Q10c)</b>   |   |
| <b>INSPIRE standard (Q10c)</b>  | Species distribution  |
| <b>When will data become available? (Q10c)</b>  |   |
| <b>Data update frequency (Q10c)</b>   | Every 6/3 years   |
| <b>Describe how the data and information from the programme will be made accessible to the EC/EEA</b> |   |
| <b>Contact points in the Contracting parties</b>  | Contact point to national monitoring programmes will be added |
| <b>Has the data been used in HELCOM assessments?</b>  | Yes   |

## REFERENCES

Nyman M, Koistinen J, Fant ML, Vartiainen T, Helle E 2002. Current levels of DDT, PCB and trace elements in the Baltic ringed seals (*Phoca hispida baltica*) and grey seals (*Halichoerus grypus*). *Environmental Pollution* 119:399–412

Routti H. 2009. Biotransformation and endocrine disruptive effects of contaminants in ringed seals- implications for monitoring and risk assessment. PhD Dissertation, University of Turku.

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