



Population trends and abundance of seals – Grey seals

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1 Key message

This core indicator evaluates the status of the marine environment based on population trends and abundance of the grey seal in the Baltic Sea (other seal species are addressed in separate reports). Good status is achieved for each species when i) the abundance of seals in each management unit has attained a Limit Reference Level (LRL) of at least 10,000 individuals to ensure long-term viability and ii) the population trend, evaluated by species-specific growth rate, for a population either under or at Target Reference Level (TRL) is achieved indicating that growth-rates are not affected by severe anthropogenic pressures.

As a highly mobile species the grey seal population of the Baltic Sea is evaluated as a single management unit covering the whole HELCOM area. The evaluations for Population trends are based on data from 2003-2021. For reliable trend calculations this longer timeseries is needed, however the most recent data from the assessment period 2016-2021 is used to assess Population abundance.



Figure 1. The overall status evaluation results based on evaluation of the indicator 'population trends and abundance of seals' –Grey seals. The evaluation is carried out using Scale 2 HELCOM assessment units (defined in the <u>HELCOM Monitoring and Assessment Strategy Annex 4</u>), using the one-out-all-out approach. Thus, if a seal management unit, in not good status, has a given HELCOM assessment unit as part of its range, the assessment unit is marked red. **See 'data chapter' for interactive maps and data at the HELCOM Map and Data Service.**

The abundance of grey seals (i.e. around 60,000 animals) is above the threshold of Limit Reference Level (LRL) of 10,000. The population is still growing, and was, as such, evaluated as being below Target reference Level (TRL) and evaluated against the threshold of 7% annual increase during exponential growth. The annual estimated growth rate during the period 2003-2021 was 5.1% and a Bayesian analysis showed 80% support for growth rate of \geq 4.7%, which is under the threshold of 7% (Result Figure 2). Grey seals reach good status with regard to abundance, but they do not achieve good status with regard to population trend when evaluated as under TRL. With one-out-all-out –approach, the grey seals fail to achieve good environmental status (GES).

Confidence of the indicator evaluation is considered to be moderate. This is due to the difficulty in interpreting if the population is under or at TRL.

1.1 Citation

The data and resulting data products (e.g. tables, figures and maps) available on the indicator web page can be used freely given that it is used appropriately and the source is cited. The indicator should be cited as follows:

HELCOM (2023) Population trends and abundance of seals. HELCOM core indicator report. Online. [Date Viewed], [Web link]. ISSN 2343-2543

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2.1 Ecological relevance

The population trends and abundance of seals reflect changes in the number of marine top predators in the Baltic Sea. Being top predators of the marine ecosystem, marine mammals are good indicators of the state of food webs, levels of hazardous substances and direct human disturbance. Seals are exposed to bottom-up effects of ecosystem changes at lower trophic levels, but also to variations in climate (length of seasons and ice conditions) and pressures and impacts from human activities. These pressures can affect seals indirectly through e.g., decline of fish stocks, levels of harmful substances, or reproductive success in addition to causing direct mortality by hunting or by-catch. The vulnerability of seals to these pressures makes them good indicators for measuring the environmental status of ecosystems.

The growth rate of a population is the result of age-specific mortality rates and agespecific fecundity rates. It is therefore a sensitive parameter signalling if mortality or fecundity rates change. Depleted, undisturbed grey seal populations are expected to grow by 10% per year. Significantly decreasing growth rates can be a sign of densitydependence for example due to limiting food or other resources (Svensson *et al.* 2011) and the functional factors of carrying capacity. However, decreasing growth can also indicate impaired health caused by contaminants or diseases, as well as excessive hunting or high levels of by-catches.

2.2 Policy relevance

	Baltic Sea Action Plan (BSAP)	Marine Strategy Framework Directive (MSFD)
Fundamental link	 Segment: Biodiversity Goal: "Baltic Sea ecosystem is healthy and resilient" Ecological objective: "Viable populations of all native species ", and "Natural distribution, occurrence and quality of habitats and associated communities". 	 Descriptor 1 Species groups of birds, mammals, reptiles, fish and cephalopods. Criteria 2 The population abundance of the species is not adversely affected due to anthropogenic pressures, such that its long-term viability is ensured. Feature – Species groups (seals). Element of the feature assessed – Species lists (grey seals).
	 Management objective: "Effectively managed and ecologically coherent network of marine protected areas ", "Minimize disturbance of species, their habitats and migration routes from human activities"; 	

Table 1. Overview of policy relevance for this indicator.

	"Effective and coordinated			
	"Effective and coordinated			
	conservation plans and			
	measures for threatened			
	species, habitats, biotopes,			
	and biotope complexes".			
Complementary	Segment: Biodiversity	Descriptor 1 Species groups of birds, mammals,		
link		reptiles, fish and cephalopods.		
	Goal: "Baltic Sea ecosystem is			
	healthy and resilient"	Criteria 4 The species distributional		
	- Factorizat chiestive	range and, where relevant, pattern is		
	• Ecological objective:	in line with prevailing physiographic,		
	"Functional, nealthy and	geographic and climatic conditions.		
	resilient food webs".	 Feature – Species groups (seals). 		
	Management objective:	 Element of the feature assessed – 		
	"Reduce or prevent human	Species lists (grey seals).		
	pressures that lead to			
	imbalance in the	Descriptor 4 Ecosystems, including food webs.		
	foodweb".	Criteria 4 Productivity of the trophic		
		guild is not adversely affected due to		
	Segment: Hazardous	anthronogenic pressures		
	substances and litter goal	 Feature – Species groups (seals) 		
		 Flamont of the feature accessed 		
	Goal: "Baltic Sea unaffected by	Trophic guilds		
	hazardous substances and	i rophic guilds.		
	litter"	Descriptor 8 Concentrations of contaminants		
	Ecological objective:	are at levels not giving rise to pollution effects.		
	• Ecological objective. "Marine life is healthy"			
	Marine the is nearthy .	Criteria 2 The health of species and		
	Management objective:	the condition of habitats (such as their		
	"Minimize input and	species composition and relative		
	impact of hazardous	abundance at locations of chronic		
	substances from human	pollution) are not adversely affected		
	activities"	due to contaminants including		
		cumulative and synergetic effects.		
		 Feature – Species (seals). 		
		Element of the feature assessed –		
		Species lists (seals).		
Other relevant	In some Contracting Parties also EU Water Framework Directive –			
legislation:	Chemical quality, Habita	ats Directive		
	UN Sustainable Development Goal 14 (Conserve and sustainably use the			
	oceans, seas and marine resources for sustainable development) is most			
	clearly relevant, though SDG 12 (Ensure sustainable consumption and			
	production patterns) and 13 (Take urgent action to combat climate			
	change and its impacts) also have relevance.			

The core indicator(s) on the population trends and abundance of Baltic seals addresses the Baltic Sea Action Plan (BSAP 2021) Biodiversity segment goal of a "Baltic Sea ecosystem that is healthy and resilient". The ecological objectives under this goal are also clearly relevant: 'Viable populations of all native species', 'Natural distribution, occurrence and quality of habitats and associated communities', and 'Functional, healthy and resilient food webs'. The <u>HELCOM Recommendation 27/28-2 Conservation of seals in the Baltic Sea area</u> outlines the conservation goals of seals agreed on at HELCOM. The recommendation is implemented to reach the BSAP goals. The recommendation conservation goals are used as the basis for defining this indicator's threshold value.

The indicator also has clear relevance for the EU Marine Strategy Framework Directive (MSFD) (European Commission 2008), for those Contracting Parties that are also EU Member States. In particular the relevance is high fro MSFD Descriptor 1 that addresses species and habitats and also for Descriptor 4 that addresses ecosystems, including food webs. A summary overview of policy linkages is provided in Table 1.

In some Contracting Parties, the indicator also has potential relevance for implementation of the EU Water Framework Directive (WFD) and Habitats Directive. The WFD includes status categories for coastal waters as well as environmental and ecological objectives. The EU Habitats Directive (European Commission 1992) specifically states that long-term management objectives should not be influenced by socio-economic considerations, although they may be considered during the implementation of management programmes provided the long-term objectives are not compromised. All seals in Europe are also listed under the EU Habitats Directive Annex II, and member countries are obliged to monitor the status of seal populations.

The indicator is also relevant for Sustainable Development Goal 14.

2.3 Relevance for other assessments

The status of biodiversity is assessed using several core indicators. Each indicator focuses on one important aspect of a complex issue. In addition to providing an indicator-based evaluation of the population trends and abundance of seals, this indicator will also contribute to the overall biodiversity assessment, along with the other biodiversity core indicators.

The results are utilised in the HELCOM Biodiversity integrated assessment (BEAT tool) to support an overall evaluation of marine mammals.

3 Threshold values

Status for the population trends and abundance of seals in the Baltic Sea is determined by comparing population data with threshold values that have been defined based on concepts developed for the conservation of seals, in particular the <u>HELCOM</u> <u>Recommendation 27/28-2 'Conservation of seals in the Baltic Sea area'</u>, which states that the population size is to be managed with the long-term objective of allowing seal populations to recover towards carrying capacity.

Good status for abundance is achieved in a management unit if the population is above the Limit Reference Level (LRL). HELCOM set a LRL of 10,000 individuals for all the Baltic seal species for each ecologically and genetically isolated population. The LRL corresponds to the safe biological level and minimum viable population size. For grey seals the LRL is evaluated understanding that the results of the moult surveys represent a haul-out fraction of approximately 70%. The LRL of 10,000 implies a population with approximately 5,000 adult seals (and thus 2,500 adult female seals). LRL has been calculated based on estimates of minimum viable population sizes based on different extinction risk levels (1, 3, 5 and 10%) for genetically and ecologically isolated populations.

The growth rate aspect of the threshold value is evaluated separately for populations at and below the TRL. TRL is the level where the growth rate starts to level off and the population asymptotically approaches the current carrying capacity level.

- For populations that have reached the TRL, good status is defined as 'No decline in population size exceeding 10% occurred over a period up to 10 years'
- For populations below TRL, good status is defined as 3% below the maximum rate of increase for seal species, i.e. 7% annual rate of increase for grey seals.

The approach, methods and data used to define the threshold values for abundance and growth rates are explained in detail in the previous indicator report <u>Population trends and</u> <u>abundance of seals HELCOM core indicator 2018</u> (pdf).

4 Results and discussion

The results of the indicator evaluation that underlie the key message map and information are provided below.

4.1 Status evaluation

The grey seal population of the Baltic Sea is evaluated as a single management unit covering the whole HELCOM area. The evaluations for Population trends are based on data from 2003-2021. For reliable trend calculations this longer time-series is needed, but the most recent data from the assessment period 2016-2021 is used to assess Population abundance.

Population abundance evaluation: Approximately 42 000 grey seals were counted during the surveys in 2021 (Result Figure 1). Assuming a haulout-fraction of 70%, the total population estimate would be around 60 000 animals. Thus, the grey seal population abundance considerably exceeds the LRL of 10 000 and <u>achieve good environmental status in respect to abundance</u>.

Grey seal counts in the Kattegat amount to approximately 100 animals, of which a majority are found at Læsø, Anholt, Bosserne and Varberg and pupping occurs irregularly on Læsø and Anholt but also other sites (Härkönen *et al.* 2007, Galatius *et al.* 2020). A few tens of animals are seen all along the Swedish west coast during harbour seal surveys in August. The grey seals in Kattegat here come both from the Baltic Sea and the Atlantic populations (Fietz *et al.* 2016), thus this area is not included in the evaluation.

4.2 Trends

Population trend evaluation: In HOLAS II (2011-2016), expert judgment, based on data from the aerial surveys, indicated that the population approached carrying capacity, due to a levelling of the growth rate, particularly in 2015 and 2016. Thus, the evaluation was conducted using the threshold of "no decrease greater than 10% during up to a 10-year period." However, since the last evaluation the grey seal population continued to increase steadily (Figure 1), indicating that the population may still be under TRL. The TRL is the level where the growth rate starts to level off and the population asymptotically approaches the current carrying capacity level. It is difficult to establish if the observed growth is exponential or asymptotic as the difference around the inflection point is subtle. This illustrates the difficulty of identifying the TRL and emphasizes the need for high quality long-term data series for detecting changes in the growth rate. In this evaluation, it was judged based on the most recent data that the population is still growing and grey seals were therefore evaluated as being under TRL.

The annual population growth rate during 2003-2021 was 5.1%. A Bayesian analysis shows 80% support for a growth rate value of \geq 4.7% (Figure 1). Looking at a shorter time-series from 2008-2021 with the current geographical coverage and coordinated timing of the aerial surveys, the annual growth rate was 5.2%, indicating that the growth rate has not

levelled off. The growth rate from 2003 to 2021 is well below the threshold value (7%) therefore the grey seals <u>do not achieve good environmental status for the population</u> <u>trend evaluation</u>.



Figure 1. The annual number of hauled-out grey seals in the Baltic counted during the moulting surveys 2003-2021 in the Baltic Sea. The hauled-out fraction is estimated to be around 70% of the total population. The annual growth rate of Baltic grey seals during the assessment period 2003-2021 was 5.1 %. According to Bayesian statistics there 80% support for a growth rate ≥4.7%. This is well below the threshold value for good status at 7%. The trend is not showing signs of levelling off, indicating that density-dependent factors are not limiting the population growth and the abundance is still under the TRL. Modelled count index and 95% confidence interval around index are provided with a black line and grey area.

4.3 Discussion text

Overall evaluation: Based on the one-out-all-out -concept the evaluation for the management unit Baltic grey seals does not achieve good environmental status (Figure 2).



Figure 2. Overall, Baltic grey seals failed good status with regard to population growth rate, while their abundance is considerably above the threshold of LRL of 10,000. Kattegat, where a limited number of grey seals come from both Baltic and Atlantic populations, is not included in the evaluation.

HELCOM Assessment unit name (and ID)	Threshold value achieved/failed in HOLAS II	Threshold value achieved/failed in HOLAS 3	Distinct trend between current and previous evaluation.	Description of outcomes
Baltic Sea	Failed	Failed	The grey seal population abundance is estimated around 60 000 animals, considerably exceeding the LRL of 10 000, however the population trend is not showing signs of levelling off, indicating that density-dependent factors are not limiting the population growth and the abundance is still under the TRL.	Overall, Baltic grey seals failed good status with regard to population growth rate. The annual population growth rate during 2003- 2021 was 5.1%, well below the threshold value (7%), while their abundance is considerably above the threshold of LRL of 10,000.

Table 1. Overview of evaluation outcomes and comparison with previous evaluations.

5 Confidence

Confidence of the indicator evaluation is considered to be moderate for the Baltic grey seal, due to the difficulty of determining if the population is at or below TRL. Detecting a change in the trend, particularly as an indication of approaching carrying capacity, is challenging. It is important to note that even if a change in the trend would be seen, it is complex to identify if this change is due to density dependence factors or due to anthropogenic pressures (e.g. increased hunting, bycatch, etc.). Given the variation in the survey results caused by weather, changes in hunting pressure and other disturbance, a long data-series is needed. Coupled with variation in both quality and quantity of food and other potential factors altering the carrying capacity, complicates the evaluation of whether the population abundance is approaching the carrying capacity. During the current assessment period the population trend indicates a growing trend, but also cannot strongly refute density-dependence. It is also difficult to disentangle the effects that anthropogenic pressures such as hunting have on the population from those of naturally occurring factors such as density dependence. Therefore the confidence of the evaluation is moderate.

Monitoring activities are currently carried out at a high spatial resolution and temporal frequency. Historical data on population sizes of seals in all management units are available. The main pressures affecting seals, such as hunting and by-catches, diminishing ice fields and effects of contaminants are well known on a qualitative level, but more work is needed to quantify those pressures.

Survey data are available considered comparable for grey seals in the entire Baltic Sea since 2003 and the methodology by means of coordinated timing and geographical coverage of the surveys has been standardized since 2008. For grey seals there are also data from Sweden two decades before this time.

6 Drivers, Activities, and Pressures

	General	MSFD Annex III, Table 2a
Strong link	The main pressures affecting the abundance and growth rate of Baltic seal populations include hunting, by- catches, and disturbance by human activities.	Biological disturbance: -selective extraction of species, including incidental non-target catches (i.e. by commercial and recreational fishing)
Weak link	The effects of climate change can affect reproductive success of grey seals due to lower survival of the pups born on land compared to ice Fishery and food availability	Contamination by hazardous substance: - introduction of synthetic compounds - introduction of non-synthetic substances and compounds

Table 1. Brief summary of relevant pressures and activities with relevance to the indicator.

Historically, hunting of seals has been a major human pressure on all the seal species in the Baltic Sea. A coordinated international campaign was initiated in the beginning of the 20th century with the aim of exterminating the seals (Anon. 1895). Bounty systems were introduced in Denmark, Finland and Sweden over the period 1889-1912, and very detailed bounty statistics provide detailed information on the hunting pressure. The original population sizes were about 80,000 for Baltic grey seals and were estimated by a model based on hunting statistics.

The hunting pressure resulted in extirpation of grey and harbour seals in Germany and Poland in 1912, and grey seals were also extirpated from the Kattegat by the 1930s. Baltic grey seals were reduced to about 20,000 in the 1940s (Harding & Härkönen 1999).

In the beginning of the 1970s Baltic grey seals were observed aborting near full term foetuses (Helle 1980). Investigations showed a linkage to a disease syndrome including reproductive disorder, caused by organochlorine pollutions (Bergman & Olsson 1985). The reduced fertility resulted in population crashes, where numbers of grey seals dwindled to approximately 3,000 in the beginning of the 1980s (Harding & Härkönen 1999).

General hunting of grey seals was prohibited in 1974 and protective hunting in 1986. This, combined with a ban on PCBs and DDTs stopped the decline of the seal populations and promoted growth. Recent samples show that fertility is normal in grey seals (Bäcklin *et al.* 2011; Bäcklin *et al.* 2013). Protective hunting related to fishing activities was resumed again in 1997 in Finland and in 2001 In Sweden. Sweden introduced licence hunting for grey seals in 2020 and in Finland grey seal hunt has been run by regional quota since 2014. Numbers of grey seals that have been allowed to be hunted with these varying regulations in Sweden and Finland have increased from c. 500 seals in the early 2000's to c. 3500 in 2022. Although the quota is rarely filled, the increased hunting, coupled with poorly known bycatch rates has the potential to impact the growth rate of the population to the extent that the grey seal population does not achieve good environmental status. This was

confirmed by a model looking at potential growth rates in the absence of hunting and bycatch, parameterized with data from grey seal growth rates based on inventories from 2003-2020 and reproduction rates, age-structure and hunting statistics from the same time-period (Sköld 2021

Whilst the hunting statistics are well documented, the current knowledge on the level of incidental catches of Baltic seal species is limited to a few dedicated studies which suggest that this factor can be substantial. An analysis of reported incidentally caught grey seals showed that approximately 2,000 grey seals are caught annually in the Baltic fisheries (Vanhatalo *et al.* 2014).

Most haul-out sites of Baltic seals are protected during the breeding and moulting season when they are most vulnerable to disturbance. This is especially important for grey seals, where access to undisturbed land breeding sites delimit the expansion of grey seals in the Southern Baltic Sea. However, the land-breeding sites in the Baltic have not been fully identified. They differ somewhat from the haul-out sites during moulting.

7 Climate change and other factors

Climate change poses a pressure on species breeding on ice because shorter and warmer winters lead to more restricted areas of suitable ice fields (Meier *et al.* 2004). Grey seals are facultative ice breeders and their breeding success is considerably greater when they breed on ice as compared with land (Jüssi *et al.* 2008). Consequently, grey seals are predicted to be negatively affected by a warmer climate. However, effects of climate change should not be included in evaluations according to the Habitat Directive.

8 Conclusions

The Baltic grey seal abundance considerably exceeds the LRL of 10 000. As the population showed being in an increase phase and thus under the TRL, it was evaluated against the threshold of 7% annual growth rate. The population growth rate of 5.1% got 80% support for \geq 4.7% from the Bayesian analysis and thus remained under the threshold. As a result, Baltic grey seal population has not achieved good environmental status for the indicator population trends and abundance. It should however be noted that there is difficult to determine if the population is at or below TRL as detecting a change in the trend, particularly as an indication of approaching carrying capacity, is challenging.

8.1 Future work or improvements needed

Monitoring during the moulting time remains at high quality and coverage. However, there is no coordinated effort to monitor land pupping sites in the Baltic, only a few countries (Sweden, Estonia, Denmark) are currently conducting monitoring or have up-to-date inventories of on land pupping sites. These sites are likely to become of increasing importance in the future when the extent of the sea ice decreases.

There is ongoing work to define the Precautionary Approach Level for grey seals in order to gain a better understanding of when seals approach carrying capacity.

9 Methodology

9.1 Scale of assessment

This core indicator evaluates the population trends and abundance of seals using HELCOM assessment unit scale 2 (division of the Baltic Sea into 17 sub-basins). The assessment units are defined in the <u>HELCOM Monitoring and Assessment Strategy Annex 4</u>.

The existing management units of seals are based on the distribution of seal populations. The management units typically encompass a handful of HELCOM scale 2 assessment units. Evaluations are therefore done by grouping HELCOM assessment units to align with the management units defined for each seal population.

The Baltic grey seal is evaluated as a single management unit, although genetic data show spatial structuring (Fietz *et al.* 2016). Coordinated aerial surveys encompassing the entire Baltic started in 2000, but the area covered with the aerial surveys still developed until 2008. Until then some areas were covered by boat and land based surveys, which may have given somewhat lower results. Data from 2003 onwards has been considered comparable enough to be used in the trend-analyses.

9.2 Methodology applied

This core indicator evaluates whether good status is achieved by determining the growth rate of the population as well as the population size over a specified time period. The data collected and used in this indicator are based on national aerial surveys described in the <u>HELCOM Monitoring guidelines for seal abundance and distribution</u>.

Each assessment unit is evaluated against two threshold values, for population growth rate and the Limit Reference Level (LRL). The overall status of seals in each management unit only achieves good status if both threshold values are met.

Time series of data are used as input values in Bayesian analysis with uninformative priors, where it is evaluated whether observed data support the set threshold value. In this process, 80% support for a growth rate ≥ the threshold value is required. If the unit fails to achieve good status, the probability distribution is used to evaluate the confidence of the evaluation. The package 'bayesm' in the program R has been used for the analysis.

9.3 Monitoring and reporting requirements

Monitoring methodology

HELCOM common monitoring relevant for the seal population trends is documented on a general level in the HELCOM Monitoring Manual under the <u>sub-programme: Seal</u> <u>abundance</u>.

HELCOM monitoring guidelines for seals were adopted in 2014 and updated in 2018.

The Baltic grey seals are monitored at their haul-outs during their annual moulting, with the aim of estimating the abundance and trends (moulting counts). In most areas, the monitoring is performed using aerial surveys, where the seal haul-outs are photographed in areas where there is a significant occurrence of seals. The methodology does not provide a total abundance but and abundance index. Based on the assumption that the same fraction of seals are observed hauled-out during the surveys this measure is reliable especially for monitoring the long-term trend of the abundance.

Detailed descriptions of the survey methodology and analysis of results are given in the HELCOM monitoring manual.

Current monitoring

The monitoring activities relevant to the indicator that are currently carried out by HELCOM Contracting Parties are described in the HELCOM Monitoring Manual Subprogramme: Seal Abundance: <u>Monitoring Concept Table</u>

Current monitoring covers all haul-out sites presently used by seals in the Baltic Sea and is considered to be sufficient to cover the needs of the indicator except for southern ringed seals. See description in the <u>Assessment Requirements</u> of the HELCOM Monitoring Manual.

Description of optimal monitoring:

The current monitoring with mostly repeated coordinated surveys within a two-week period is optimal for monitoring the trend of grey seal abundance (<u>HELCOM monitoring</u> <u>guidelines for seals</u>).

10 Data

The data and resulting data products (e.g. tables, figures and maps) available on the indicator web page can be used freely given that it is used appropriately and the source is cited. The indicator should be cited as following:

HELCOM (2018) Population trends and abundance of seals. HELCOM core indicator report. Online. [Date Viewed], [Web link]. ISSN: 2343-2543

<u>Result: Population trends and abundance of seals – Grey seal</u> <u>Data: Population trends and abundance of seals – Grey seal</u>

11 Contributors

This indicator report for HOLAS 3 was prepared by Markus Ahola, Anders Galatius and Anja Carlsson. The assessment principles, methodology and background information are largely based on the previous evaluation report by Tero Härkönen, Anders Galatius, Morten Tange Olsen, Markus Ahola, Karin Hårding, Olle Karlsson, Mervi Kunnasranta, Lena Avellan, Petra Kääriä, Minna Pyhälä.

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12 Archive

This version of the HELCOM core indicator report was published in April 2023:

The current version of this indicator (including as a PDF) can be found on the <u>HELCOM</u> indicator web page.

Earlier versions of the indicator report are available:

Population trends and abundance of seals HELCOM core indicator 2018 (pdf)

Core indicator report - web-based version 2015 (pdf)

Extended core indicator report - outcome of CORESET II project (pdf)

Population growth rate, abundance and distribution of marine mammals 2013 (pdf)

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