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Working Group on the State of the Environment and Nature
Conservation

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Submitted by	Germany and convenor of HELCOM SEAL Health team (Ms Ursula Siebert)
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Background

HELCOM S&C 4-2016 considered a revised proposal on HELCOM core indicators '**Nutritional status of marine mammals**' (document 4J-24) and '**Reproductive status of marine mammals**' (document 4J-25), presented by Sweden. The meeting noted that German experts have raised general concerns on the indicators, i.e. whether they can be considered as good indicators of the health status of Baltic seals.

In an *ad hoc* meeting of Swedish and German seal experts in Malmö (09 September 2016) the following was agreed, inter alia:

- to inform S&C 5-2016 as well as HOD 51-2016 on the state of play in autumn 2016
- the aim to develop health indicators for all marine mammals (grey seal, harbor seal, ringed seal and possible harbor porpoise) for future assessments (beyond HOLAS II) in the whole HELCOM area
- describing a new concept and how it connects to available health indicators within the HELCOM area
- investigating the possibility of an exposé for HOLAS II on how an additional indicator should look like and complements the existing "health indicators" for marine mammals
- that Karin Hårding (Sweden) and Ursula Siebert (Germany) are willing to act as co-leads for compiling a document on how indicators could be tested in HOLAS II.

The attached document contains a first draft for a new concept for future assessments.

Action requested

The Meeting is invited to take note of the document.

HELCOM Marine mammal health indicators

Ursula Siebert, Tina Kesselring, Katrin Ronnenberg, Sacha Viquerat, Katrin Ronnenberg

Institute for Terrestrial and Aquatic Wildlife Research (ITAW), University of Veterinary
Medicine Hannover, Germany

Data on the health status of marine mammals was collected in many HELCOM countries over the last decades. The members of the HELCOM Seal Health Team have worked on homogenizing the protocols of the countries involved. Gaps of knowledge have been identified and tackled by the different countries as complete as possible. Fact sheets with the identification of key health parameter were prepared.

The development of HELCOM Marine Mammal Health Indicators requires that:

- the indicators should be applicable to all individuals of a species within the complete HELCOM area
- the indicators should be applicable on marine mammal data from hunts, stranding events and by-catches
- the indicators should quantify changes within target organs for health assessments for each species.

In the past the HELCOM indicators “Nutritional status of marine mammals” and “Reproductive status of marine mammals” have been developed for grey seals based on data collected of hunted and by-caught animals mainly from Swedish and Finnish waters.

Concerns have been raised by Germany and others about HELCOM indicator “Nutritional status of marine mammals” resulting in a study reservation. The reservations were due to:

- Blubber thickness does not represent the nutritional status of any species because changes are a combination of de- and increase of blubber and muscles and may vary throughout the year due to the availability of food items, individual life history events and other seasonal effects.
- The nutritional status of marine mammals is one of the most difficult judgements to be made and today is still based on expert opinion during the initial inspection of animals.

- Blubber thickness may vary among different HELCOM areas within one marine mammal species due to different environmental conditions (offset of local prey availability and mating periods).
- Blubber thickness is difficult to judge on neonates because of the unknown date of birth.
- Blubber thickness is an unspecific indicator for health and gives no indication about the actual health of an individual and cannot be generalized to a whole population.

The analysis of the reproductive potential of a population is an important population dynamics parameter as population growth is a vital criterion for the development and survival of a population. Grey and ringed seals of the Baltic Sea displayed distinct pathological findings of the female reproductive organs in the 1970s and 1980s among marine mammals worldwide. This includes leiomyomas, stenosis and occlusions of the uterus. Today, similar findings only occur in older grey seal females and have otherwise disappeared. Lesions of the reproductive tract in both female and male individuals can be found very rarely in the HELCOM area.

Various anthropogenic activities have the potential to create changes in the reproductive tract of marine mammals such as chemical pollution and stress due to noise pollution and disturbance / displacement. Therefore, the "Reproductive status of marine mammals" might be included in the health indicators if a systematic approach to identify key reproductive changes in female and male marine mammals in the HELCOM area is used.

Investigations on female reproduction:

For the determination of reproductive failures that may be caused by anthropogenic factors, baseline data covering ovulation rates, pregnancy rates and birth rates have to be gathered. If there is enough data available from past decades, a reproductive trend can be assessed and an outlook for the population growth or decrease can be produced on geographical subpopulation levels.

Investigations on male reproduction:

Beside documentations on pathological findings, the male reproductive tract has not yet been taken into consideration for the assessment of a population's reproductive status. In order to survey the whole population (incorporating both sexes), it is required to include a simple method for monitoring the reproductive status of male individuals into the investigations. One possibility for gaining basic knowledge on a male's reproductive status is to take histological

samples and determine the stage of spermatogenesis. Using this approach, changes in the germ cell production due to environmental factors could be detected on a cellular basis.

Based on necropsies on marine mammals of the HELCOM area conducted over the last years, key health parameters for each species will be identified. First propositions which should be further verified and discussed are:

Harbour seal:

The lung is the target organ in harbour seals. They are most susceptible to lesions due to parasites and bacteria. As such, they show most of the pathological lesions in all necropsied animals. Parasitic infection of the lung is one of the major criteria for natural selection after weaning up until the age of 18-24 months (Fig. 1a). The lung is also the target organ during epidemics caused by morbilli and influenza viruses (Fig. 1b). Immune suppression due to chemical pollution and chronic stress by different anthropogenic activities leads to an increase of pulmonary lesions.

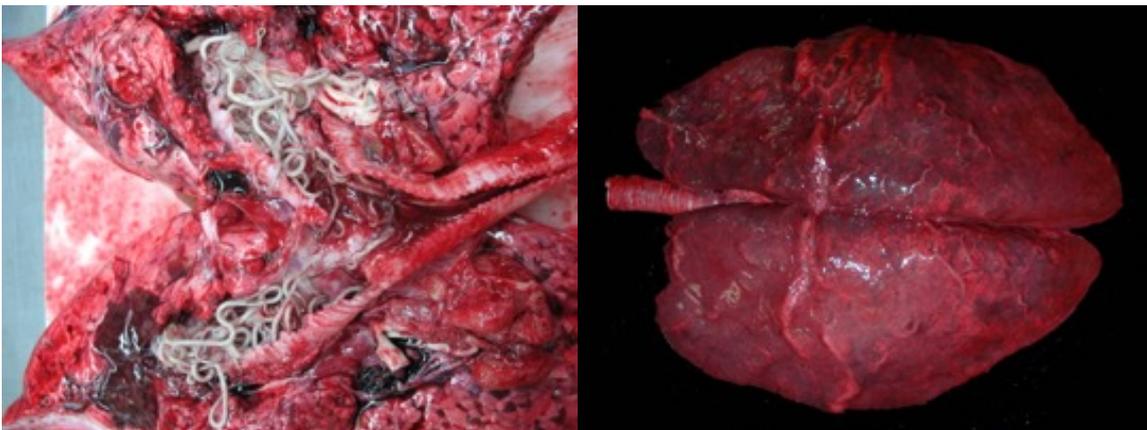


Figure 1a (left): Heavy parasitic infection in the lung of a harbour seal; 1b (right): Bronchopneumonia in a harbour seal due to Influenza A virus.

Grey seal:

Contrary to the findings in the 70 and 80s, lesions of the reproductive organs have become rare and could only be observed in very old females. First analyses give indications that over the last years the colon and distal part of the small intestine has become the target organ and best indicator for health assessments. Mostly associated with acanthocephalans infection, grey seals show hyperplasia, but also ulceration and sometimes even perforation of the

intestinal walls (Figure 2a + b). The pathologies appear to be similar to Morbus Crohn, but the etiology of these lesions is not yet fully understood.



Figure 2a (left): Ulceration in the colon wall of a grey seal; 2b (right): Hyperplasia in the colon wall of a grey seal.

Harbour porpoises:

The organ with the majority of lesions and the most health impacting lesions for harbor porpoises is the lung. It can be considered as the target organ in harbour porpoises. In contrast to harbour seals, harbour porpoises can develop severe pulmonary lesions during their entire life span. Lungs are most susceptible to lesions caused by parasites and bacteria. Harbour porpoises from the Baltic Seas show a higher frequency of parasitic lung infection and bronchopneumonia when compared to individuals from areas with less human pressure (Fig 3a + b). Immune suppression due to chemical pollution and chronic stress by different human activities also leads to an increase of lung lesions.



Figure 3a (left): Heavy parasitic infection in the lung of a harbour porpoise; 3b (right): Bronchopneumonia with abscessation in a harbour porpoise due to bacterial infection.

Ringed seal:

Data from necropsies of ringed seals from the southern HELCOM area are too scarce to give indications for target organs. Recent data on ringed seals from the Gulf of Finland are also missing even though the population appears to be declining rapidly already.

A systematic assessment of seal and porpoise health based on the health database will act as an early warning tool when seal or porpoise health is deteriorating. It will also be necessary to conduct detailed necropsies on a set number of animals in each species every set number of years to monitor changes in the target organs.

Monitoring guidelines for both dead animals and live catches will be revised and further developed.

Projects to support future development have started in Denmark and Germany including also partners from Poland. Work in Sweden and Finland is initiated. Reliable structures in Russia, Estonia, Latvia and Lithuania are still missing. Further work will be coordinated by the HELCOM Health Team.