Document title	Suggestion for the development of an additional measure for the 'Nutritional status of marine mammals' indicator
Code	6-2
Category	CMNT
Agenda Item	6 – Core indicators and other activities under the Seal Expert Group teams
Submission date	23.11.2015
Submitted by	Sweden

Background

This document contains a suggestion to use the weaning weight and condition of grey seal pups as an additional measure for assessing the status of the core indicator 'Nutritional status of marine mammals'. This measure is suggested to be a complementary measure alongside with the routine monitoring of hunted and by-caught seals.

Action required

The Meeting is invited to consider the suggestion.

Suggestion for the development of an additional measure for the ''Nutritional Status of Seals'' indicator

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Nutritional status of seals is currently measured from blubber thickness of hunted, by-caught and stranded seals in the age 1-3 years old. Sample sizes are limited and depend partly on the size of the annual hunting quota. We suggest a complementary measure to be developed alongside with the routine monitoring of hunted and by-caught seals. Weaning weight and condition of grey seal pups can be measured in the field with non-invasive techniques such as weighting and measuring.

Several published studies confirm that annual mean weight of pups is highly variable and can provide a good assessment of female nutritional status and reflect environmental conditions such as food availability, crowding and type of breeding habitat. Pup weight at the time of weaning is critical for first year pup survival (Hall et al. 2001, Jussi et al 2008, Harding et al 2005). A recent long-term study on the Canadian Sable Island shows that pups that have lower weaning weights also have lower survival up to reproductive age, and were smaller as adults (Bowen et al. 2015).

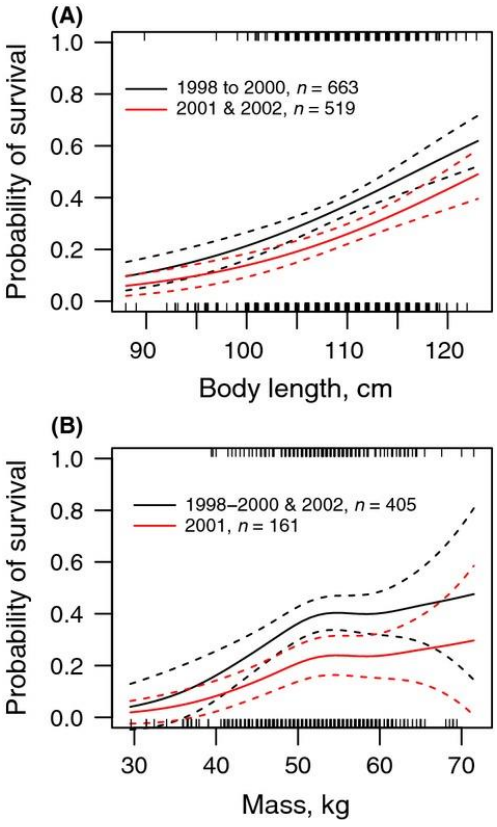

Figure 1 Mass and body lengths at weaning are correlated to the probability to survive (Bowen et al 2015).

Baltic grey seals are facultative ice breeders and warmer winters cause an increasing proportion of females to breed on land, resulting in lower weaning weights (See Table 1, from Jussi et al. 2008). This may eventually lead to decreasing population growth rates. Thus, pup weaning weights can provide an "early warning" of declining rates of increase.

Table 1. Weaning weights (Stage classes 3.5 and 4.0 combined, see text) of Baltic grey seal pups from land breeding sites and ice. Weaners on ice were significantly heavier than pups at land breeding sites.

Habitat	Group	Weaning weight in kg ± SD (n)
Land	Males	38.1 ± 7.5 (42)
	Females	36.8 ± 7.8 (48)
	Pooled	37.4 ± 7.7 (90)
Ice	Males	50.1 ± 8.4 (35)
	Females	47.2 ± 7.6 (54)
	Pooled	48.3 ± 8.1 (89)

Availability of base line data:
1, Jussi et al 2008 and
2, unpublished data at the Swedish Museum of Natural History.
3. During 2011-2013 a total of 175 pups on ice in the Baltic were weighed and classified into developmental stages 0-5. Pups of stage 3,5-4 (n=43), had a mean weight of 38,2kg (SD+/-8,1kg) (Karlsson 2013). This value can be compared to the study by Jussi et al from 2008, where the mean weaning weight of ice breeding grey seals in the Baltic in the 1990's were 48,3 kg (SD+/- 8,1 kg). This is an indication that mean weaning weight of icebreeding Baltic grey seals has dropped more than 10 kg since the 1990's suggesting that weaning weight also is capable of reflecting the observed reduction in mean blubber thickness reported among subadult and adult female grey seals.

Feasibility: Weaned pups can be weighed at all land breeding sites in the Baltic, as well as in the breeding ice, which permit temporal and spatial resolution.

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