



## Baltic Marine Environment Protection Commission

*Ad hoc* Seal Expert Group

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### Background

This document contains information on 2018 aerial survey of ringed seals in the Russian part of the Gulf of Finland.

### Action requested

The Meeting is invited to take note of the information.

## Aerial survey of ringed seals (*Pusa hispida botnica*) in the Gulf of Finland in 2018

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Currently the Gulf of Finland is inhabited by an isolated population of ringed seals (*Pusa hispida botnica* Gmelin, 1788) [3]. Abundance of this population has been falling over a long time period. By 1980s the seal numbers have dropped from 3-4 thousand individuals to 200-300 individuals in the turn of the century. Aerial surveys carried out in the past seven years indicate that the general abundance in the Eastern part of the gulf, involving sea areas of three countries: Estonia, Russia and Finland is extremely low and does not exceed some 100 individuals in the whole area. The results of aerial surveys carried out by us in the previous year are presented in the Table 1.

Table 1. Results of the ringed seal censuses in the Russian part of the Gulf of Finland in 2010-2018.

Year	Survey length (km)	Area of survey sq.km	Ice area sq.km	% of surveyed ice	Ringed seals	
					Seen	Estimated number
2010	347,5	278	1193	23.3	6	16–34
2012	642,2	517	3916	13,2	12	72–94
2017	361,2	289	1640	17,7	9	44–57
	490,2	392	2451	16	13	71–90
2018	365,9	293	2081	14	10	64–76
	200	160	1191	13	13	89–101

The counts of ringed seals in the Russian sea area have been carried out according to the method of [2] and the HELCOM recommendation from 2014 [1]. Accordingly, the results of 2010, 2012, 2017 and 2018 are comparable amongst each other and with the results obtained by other researchers in the Baltic Sea area who use the same methodology.

General information. The survey was carried out in 2018 in 14th and 18th of April using aircraft Cessna 182. In the survey period the snow lairs of seals had collapsed and all the seals were assumed to be visible on open ice. Total ice extent left in the Russian sea area was involved in the study.

The survey was carried out using strip transects which were laid in meridional direction. The distance between the transects were approximately 5 kilometers. In analysis the distances were based on GPS-measured coordinates. Flight altitude (90 meters), steady speed and distance to neighboring transect was controlled by the pilot using the onboard instruments. The average speed during flight was 190-220 km/h. Total observation strip is 800 meters at the altitude of 90 meters. Every observed seal was photographed with a digital camera with GPS location for each picture. The species was identified from the photography using the coloration of the pelt, form of the neck area, pose of the animal in the picture and ice conditions, in comparison to the grey seal *Halichoerus grypus* (Fabricius 1791) which can be met in the ice area.

Results of the aerial survey: According to the agreement between Russian, Estonian and Finnish specialists the main survey in the Russian sea area where most of the ice was, supplementary surveys were performed in Finland and Estonia. As the Russian Survey aircraft could not cross national borders but ringed seal distribution is determined by spring ice, it was important to cover the total ice area to get an estimate of the haul-out population.

Russia: On the 14th of April from 05:25 to 10:26 (UTC) 2018, 33 sq.km of ice was observed; length of the survey strip was 365.980 km. The total of 16 transects or meridional direction were flown; average distance between the transects was 5.68 km. The observed area was 293 sq.km which corresponds to the number of elementary segments of survey 81 sq.km each). During the survey seven seals were seen from the right side and four seals from the left side of the aircraft- total being thus 11 animals. Though, one observation was omitted from the density calculations as it was seen outside of the observation strip. As a result, 10 individuals were used to calculate seal densities. Relative density of ringed seals in one segment (= 1 sq.km) was  $0.034 \pm 0.01$  (mean  $\pm$  SE, 95% CI = 0.0196, SD = 0.18). Expected number of ringed seals, rounded to full individual was 70 seals with the 95% CI from 64 to 76 individuals, i. e. with an error of 5% the number is not lower than 64 or higher than 76.

On the 18th of April from 11:57 to 16:06 (UTC) second survey was carried out and 1191 sq.km. of ice was covered by 200 km of observation transect. Altogether the survey was divided into 11 meridional transects which were in an average 5.94 kilometers apart. The total observed area was 160.39 sq.km which corresponds to the number of elementary segments of the survey. During the survey 12 seals were observed from the right and 11 from the left side, totaling 23 individuals. Though, from the density calculations 10 individuals were omitted as they were seen outside the survey strip. So the calculations were based on 13 individuals. Relative density of ringed seals in a segment (=1 sq.km.) was  $0.08 \pm 0.02$  (mean  $\pm$  SE, 95% CI = 0.039, SD = 0.27). Expected number of ringed seals, rounded to full animals, in the covered area was 95 individuals, with 95% CI from 89 to 101 seals, i.e. with 5% error 89 to 101 individuals in the survey area.

Estonia: In Estonia the survey was carried out by Pro Mare. The flight in Estonia was planned to match the survey at Russian side to avoid double counts of seals in the border area or drifting ice fields.

According to the observed ice situation some alterations to the method was allowed to achieve maximum visual observation coverage. Namely:

1. The flight altitude was maintained at standard minimum allowed flight altitude of 150 meters (1000 ft.) to increase the field of sight as very few seals were expected to be on ice in the area.
2. The main planned scheme of meridional courses and distances between neighboring transects was kept, but as the ice had become loose in large floes extensive coverage of open water was avoided to shorten the flight time.
3. To achieve maximum possible coverage of visual observations the observation was continuous covering also turns and transfers. The sectors were omitted and the whole visual range was scanned.

Visibility allowed to detect seals from far as determined by the visibility of waterfowl and ice structures, but no seals were seen during the flight. To check the known ringed seal site, Põhja Uhtju for potential animals a loop was flown around the reefs but no animals were detected there.

Finland: The Finnish survey was carried out in the ice area adjacent to Russian water close to Kotka. The flights on 12th and 13th of April 2018 were planned according to the HELCOM methodology in good weather conditions, but the short flight distances and compact ice-field allowed almost whole potential sea ice area covered. Full coverage of the area leads to total census rather than calculated estimate from seal densities. The result is: on the 12 of April - 9 seals, on the 13 of April - 4 seals, in total -13 ringed seals have been seen in the Finish part of the Gulf of Finland.

Conclusions. As a result of the aerial survey the estimated abundance of ringed seals in the Russian sea area was between 89 and 101 individuals. This is higher than the result from 2012 when the population was estimated to 72–94 individuals. In 2010 the result was four times lower, about 16-34 ringed seals. Still according to our opinion the one day survey in 2010 led to underestimate. As learned from 2017 survey, the difference between two surveys in one year can be 1.5 -2 times. In comparison to 2017 (Table 1) the estimate of 2018 is slightly higher but it remains at the level of 95-100 ringed seals in the Russian waters and 13 seals in Finish part of the Gulf of Finland, maximum 113 ringed seals in total. In this way, the comparison with year 2012 indicates that the population is at a stable low level. Further monitoring is needed to establish the spatial distribution patterns of ringed seals in the Eastern part of the Gulf of Finland.

We suggest in warm winters with lack of snow to make the survey to earlier dates for estimation of population reproduction rates, counting pups on ice are.

The supplementary surveys in Russia, Finland and Estonia show that the core distribution of the ringed seals is in Russian waters of the Gulf of Finland in years of limited ice cover. Observation of 13 seals in Finland and no seals in Estonia is confirming the findings from telemetry studies that seals leave Southern shores to breed on ice on the Northern coasts of the Gulf of Finland where suitable ice forms annually.

Gratitude for participating in Gulf of Finland ringed seal flights in Estonia : Ivar Jüssi (Pro Mare) in Finland: Antti Halkka (WWF), Maiju Lanki (Metsähallitus) and Petteri Tolvanen (WWF).

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