

A survey of Baltic grey seal pups in the West-Estonian Archipelago
after the extremely mild winter in 1990

by

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Abstract

The Baltic grey seal is traditionally considered a typical ice-breeding pinniped. Yet it can also breed on land if ice is lacking due to extremely mild winters. This was confirmed during several surveys from air and land in the spring of 1990 by finding three whelping colonies on the islets and reefs of the West-Estonian Archipelago. Whelping of grey seals on land allows, for the first time, the conduct of a rather complete census of pups, at least of those which were born in the East Baltic. The total number of pups counted, more or less simultaneously, in three breeding colonies was ca. 400 individuals. Approximately 31% of them were found dead. The rains and strong waves due to stormy weather are suspected as the main factors of pup mortality. The health status of pups born on islets was worse than previously recorded for pups born on ice. Whelping on the islets of the West-Estonian Archipelago started in late February and ended at the beginning of April, with a peak in the second week of March. The total number of pups born in 1990 in the East Baltic is estimated to be at least 400-450. Such unexpectedly great pup production indicates a previous underestimation of the Baltic grey seal stock, not only in the East Baltic but also in the whole Baltic Sea. On the basis of the outcome of reproduction in the spring of 1990, the present stock of grey seals in the East Baltic is estimated at 1500-2000 specimens.

Introduction

The Baltic grey seal, *Halichoerus grypus baltica* Nehring, 1886, is considered a typical ice-breeding pinniped. Breeding generally occurs on ice flows in the Gulfs of Bothnia, Finland and Riga as well as in the northern part of the Baltic proper (Hook and Johnels, 1972). The coverage and location of suitable drift ice varies from year to year. A census of the pups under such conditions is extremely difficult and scientific data on real pup production of the Baltic grey seal is almost lacking. Only a few theoretical calculations for the reproductive outcome have been made (Olsson 1977; Almkvist *et al.* 1980; Helle and Stenman, 1988).

It is believed that the Baltic grey seal gives birth on rocky islets only under exceptional cases (Curry-Lindahl, 1965). Yet we have heard several narrations from local fishermen and former seal hunters

that in the West-Estonian (W-E) Archipelago, seals give birth on islets quite often after mild winters. References concerning whelping of both grey and ringed seals on land can also be found in some Estonian papers (Leis, 1960; Aruste, 1962; Soosaar, 1976). Indications about possible seal breeding on islets after the mild winter of 1989 were also received. The following winter was even warmer. The ice cover did not form at all in the Gulf of Riga and in the coastal waters of the W-E Archipelago. A thin ice cover of restricted area was formed only in the Bay of Parnu. It was decided to survey the islets of the W-E Archipelago during the whelping season in order to check the narrations about seal breeding on islets as well as to do a pup census, if they would be found.

Study area and methods

The study area includes the West-Estonian Archipelago in the eastern part of the Baltic Sea. It consists of four big islands and more than 400 isles and islets. To find those areas where pupping could take place, we first interviewed local fishermen and former seal hunters. Four islets and reefs (Allirahu, Innarahu, Laevarahu and Selgrahu) were mentioned as the main possible breeding grounds (Figure 1).

In order to inspect the potential breeding grounds as well as other islets of the W-E Archipelago, two aerial surveys by helicopter were performed. The breeding season of the Baltic grey seal lasts from late February until early April (Hook and Johnels, 1972). Therefore, one flight was performed at the beginning of the whelping season (on March 6) and another one at the end of this period (on March 29). The number of pups was estimated from direct counts performed by one (on the first survey) or two observers (on the second survey). All breeding colonies were also visited from the land in order to judge the plausibility of the air census as well as to estimate pup mortality and to tag pups. Small boats were used to reach those islets where whelping was found. The age of grey seal pups handled for tagging operations was estimated using the illustrated aging instruction compiled by Staffan Soderberg (1978). The "Jumbo Rototags" were used.

Results and discussion

Three breeding colonies of the Baltic grey seal were found on the islets of the W-E Archipelago (Fig. 1) during seal surveys in March and April 1990. Results of pup counts on these breeding grounds are given in Table 1. Additionally, 4 females with pups were observed on Nootama (Fig. 1) during the second aerial survey. Two pups were found on Salava, a neighboring island of Nootama, as well as several pups on the coast of Saaremaa according to information given by local fishermen. Obviously most of the additionally found pups can be regarded as grey seals, considering that the breeding of ringed seals occurs on small stretches of ice in the Bay of Parnu - their traditional breeding place. Nevertheless, it is possible that some of the pups found in the W-E Archipelago could be ringed seals. Pups found on the Latvian coast were of both species. For example, of the 9 pups brought to the Riga Zoo, 4 were grey and 5 were ringed seals.

The greatest numbers of grey seal pups were counted during the second aerial survey. The most accurate results were obtained during censuses performed on Allirahu, the breeding ground which consists of a main islet (in Table 1 marked with "A") and several reefs. Pups were found on two of them (marked with "B" and "C"). This was also the most populous breeding colony where the presence of more than 200 pups, by combined censuses from air and land, was revealed. A total of approximately 200 pups was also found in two other breeding colonies: on the islets Innarahu and Lombimaa. Thus the greatest number of grey seal pups, counted almost simultaneously on three breeding colonies in the W-E Archipelago, was approximately 400 individuals. Of these 400 pups,

124 or ca. 31% were found dead. 114 or ca. 28% of the total or ca. 40% of the living pups were tagged during subsequent surveys on land.

Our data confirm previous narrations about seal whelping on islets in the W-E Archipelago. The ability to breed both on ice and/or land is essential for seals in the East Baltic since mild winters and therefore lack of ice are a rather common phenomenon there. Whelping on land occurs in the same way as on ice, i.e., mainly in colonies. Our observations allow us to state that the Baltic grey seal shows the same wide variability in the choice of breeding grounds as this species does in the whole breeding range (see e.g., Bonner 1981). This applies at least to that part of the Baltic grey seal population which inhabits the waters of the East Baltic. In iceless conditions, the grey seals give birth on the same islets and reefs in the W-E Archipelago which serve as their traditional haunts (see Figure 1). Only the pattern of use of these islets and reefs is different during the breeding and non-breeding seasons. Outside the breeding season grey seals, as a rule, haul out on rocks, a little above or under the water level, which are situated around the islets and reefs. Very seldom do seals haul-out in large aggregations on the flat ground of reefs. On the contrary, during the whelping season grey seals, at least pups and females with pups, were found lying in disperse colonies over more or less the entire territory of islets and reefs, even far from the coastline and rather high above water level. For example, the flat tops of all three islets which served as breeding grounds were some 1.0-1.7 m above the water level. Pups lying in the middle of the islets were situated 10-20 m from the coastline. All three islets are composed mainly of pebbles. Some parts of the beach on Allirahu and Lombimaa are sandy. One reef (B) near Allirahu is entirely sandy. On another reef (C) and on part of Allirahu itself, there are a lot of big rocks, also. Only a few pups were lying among these rocks. Only Innarahu has low shrubbery on its top. During the land survey, most of the pups already moulted were found lying under these shrubs. There are no rocks suitable for hauling out around Innarahu. Grey seals do not haul out here from late spring until early autumn. They gather on Innarahu mainly during the winter months, when stormy weather prevails and rocks round the other islets are not suitable for hauling out. Stormy and rainy weather seems to be the main reason for the pup mortality in the spring of 1990. Great waves rolling onto the beaches can drown, wash into the sea, or hit the pups against the stones, especially those several days old which are situated close to the coastline. Young pups were exposed to cooling due to large waves and rainy weather, which may also cause death. The pup mortality rate was much greater on Innarahu than on the other breeding grounds (Table 2). This could be explained by the topography of that islet. Innarahu has comparatively steeper beaches than the other islets and they are more exposed to great waves due to its geographical location. Some dead pups found on this islet were even partly buried under pebbles. It is quite possible that some pups have been washed into the sea, so the pup mortality there could be even greater than recorded.

Some pups handled during the tagging operations were found to have signs of external injuries and illness. Infected eyes, abscesses, diarrhoea and starvation were recorded. These observations are in great contrast with those of O.Hook and A.G.Johnels (1972), who did not record ill or dead pups among those which were born on the ice. Our observations confirm the statement of these authors that breeding on ice in the cold has beneficial effects upon the pup's health. On which breeding grounds - ice or land - the survival of pups is greater, it is hard to state at present as the mortality rate of pups born on ice is unknown. Stormy weather destroying ice could also create a high pup mortality. The pup mortality rate recorded on the islets of the W-E Archipelago in spring 1990 is comparable to that recorded for the Eastern Atlantic grey seal stock which breeds on rocky shores (see e.g., Bonner 1975; Summers *et al.*, 1975).

An absence of pups on the other two potential breeding grounds (reefs Laevarahu and Selgrahu) was directly due to stormy weather during the seal breeding season. Both reefs were almost completely under the water level. The water level in the spring of 1990 was about 1 m higher than usual at this

time in the W-E Archipelago due to very strong westerly winds. Approximately 80 full-grown grey seals (obviously mainly immature animals) were observed during the second aerial survey on Selgrahu, the most northern seal islet in the W-E Archipelago, when the water level had already partly subsided. Where did grey seals inhabiting this region breed in spring 1990 is still an open question. It seems more possible that they migrated northward to find suitable ice rather than southward to find a suitable islet for pupping. The first possibility is indirectly indicated by the fact that in this region in 1986 and 1988 two grey seal yearlings were found drowned in bag-nets. These seals were tagged as pups on the ice near the Finnish coast. Although the movement of grey seals from one Baltic region to another is documented by tagging (see e.g., Almkvist *et al.*, 1980) it seems that the W-E Archipelago is inhabited by a rather stable local subpopulation. It is possible that within this local subpopulation several groups or herds clustering at the same traditional haunts can be recognized. According to Tiit Aruste (1962), three groups of the grey seal breed in the East Baltic: one on or near Selgrahu, another one on or near Innarahu, and a third in the Gulf of Riga. Nevertheless we cannot ignore the possibility that part of the grey seal stock from the Swedish coast of the Baltic Proper migrates every winter to the East Baltic searching for suitable ice for breeding. These seals, when suitable ice is lacking, can also breed on islets in the Western part of W-E Archipelago.

The results of the pup censuses indicate that our surveys cover more or less all the breeding season. Pups were found only on two islets and in rather small numbers during the first survey on March 6. The whelping obviously first started on Innarahu. The first pups, according to the visual observations from the coast of Saaremaa, appeared there approximately on February 20 (Arvo Kullapere, pers.comm.). This means that during the first survey all pups born on Innarahu were still on this islet. Pups appeared also on other islets and reefs and their total number increased sixfold by March 29, when the second aerial survey was performed. Two days before this survey, pups were counted from land and tagged on Allirahu. Most of the pups were some 10-17 days old at this time. This means that the peak of pupping there and quite possibly on other breeding grounds also coincides approximately with the second week of March. Some pups on Innarahu have to moult and could have left this islet by the time of the second aerial survey. Nevertheless, it seems that the number of such pups could not be great. The reason is the high pup mortality on Innarahu. The survey from the land revealed very many several-day-old pups which could have died due to strong storms in late February and at the beginning of March. All these dead pups were reportedly counted during the second aerial survey.

The last surveys from the land indicated that the pupping ended during the first week of April. Only some 12-20 pups together on all breeding colonies were younger than two weeks, i.e., born after the second aerial survey. It can be stated that the second aerial survey happened to be in the period when the maximum number of pups was on the islets, and the number of pups counted during this survey more or less coincided with the total number of pups born in the three breeding colonies. We can suppose that the total pup production of grey seals in the East Baltic reached at least 400-450 individuals in the spring of 1990, as some pups could have left the breeding colonies before and some were born after the second aerial survey, others were born outside the main breeding colonies. The results obtained are highly surprising. The number of grey seal pups born in the spring of 1990 turned out to be much greater than could have been expected not only for the East Baltic, but also exceeded the theoretical calculations about pup production in the whole Baltic. Previously (Pilats, 1989a) it was stated that the yearly pup production of grey seals could reach about one hundred in the Gulf of Riga. Now it turns out to be twice as much. The stock of grey seals in the W-E Archipelago was estimated to be about 500-700 specimens (Pilats, 1989b; Jussi *et al.*, in press). Such a stock of course cannot produce more than 400 pups even if some additional seals for whelping arrived from other Baltic regions.

The whole present grey seal population in the Baltic is estimated at some 2000 animals (Stenman, 1988). Unfortunately the exact number of pups produced by the Baltic grey seal population is unknown. Two different models are used to calculate the theoretical pup production of the Baltic grey seal population. The first simple model for the reproductive outcome was built on the assumption that 80% of the females have reproductive failure due to contamination with PCBs (Olsson, 1977). According to this model, the yearly reproductive outcome for a population of 2000 grey seals is only 160 pups (Almkvist *et al.*, 1980). Later it was stated that the reproductivity of the Baltic grey seal is not yet so low or has partly recovered, and therefore the yearly outcome for a population of 2000 animals can be estimated at the level of 340-400 pups (Helle and Stenman, 1988). So the number of grey seal pups born in the East Baltic in 1990 exceeded the theoretical grey seal pup production for the whole Baltic Sea in both calculations.

The reason for such a discrepancy could be only one: the number of grey seals in the East Baltic, as well as in whole Baltic Sea, is underestimated. Knowing the pup production, we can calculate the grey seal stock in the East Baltic. If we use a multiplier of 3.5 suggested for the Atlantic grey seal by H.Hewer (1964) with our pup counts (400-450 individuals), the total stock of grey seals in the East Baltic can be estimated at 1400-1600 specimens. Using the same simple model as E. Helle and O. Stenman (1988), which considers the Baltic grey seal contamination with PCBs, corresponding numbers reach the level of some 2200-2400 specimens. Obviously the true number lies within these extremes and closer to the first one, as among females whelping in the East Baltic could be specimens arriving from other regions. So, considering certain discretions it can be assumed that the present stock of grey seals in the East Baltic comprises some 1500-2000 specimens.

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Table 1 Number of Grey seal pups in breeding colonies

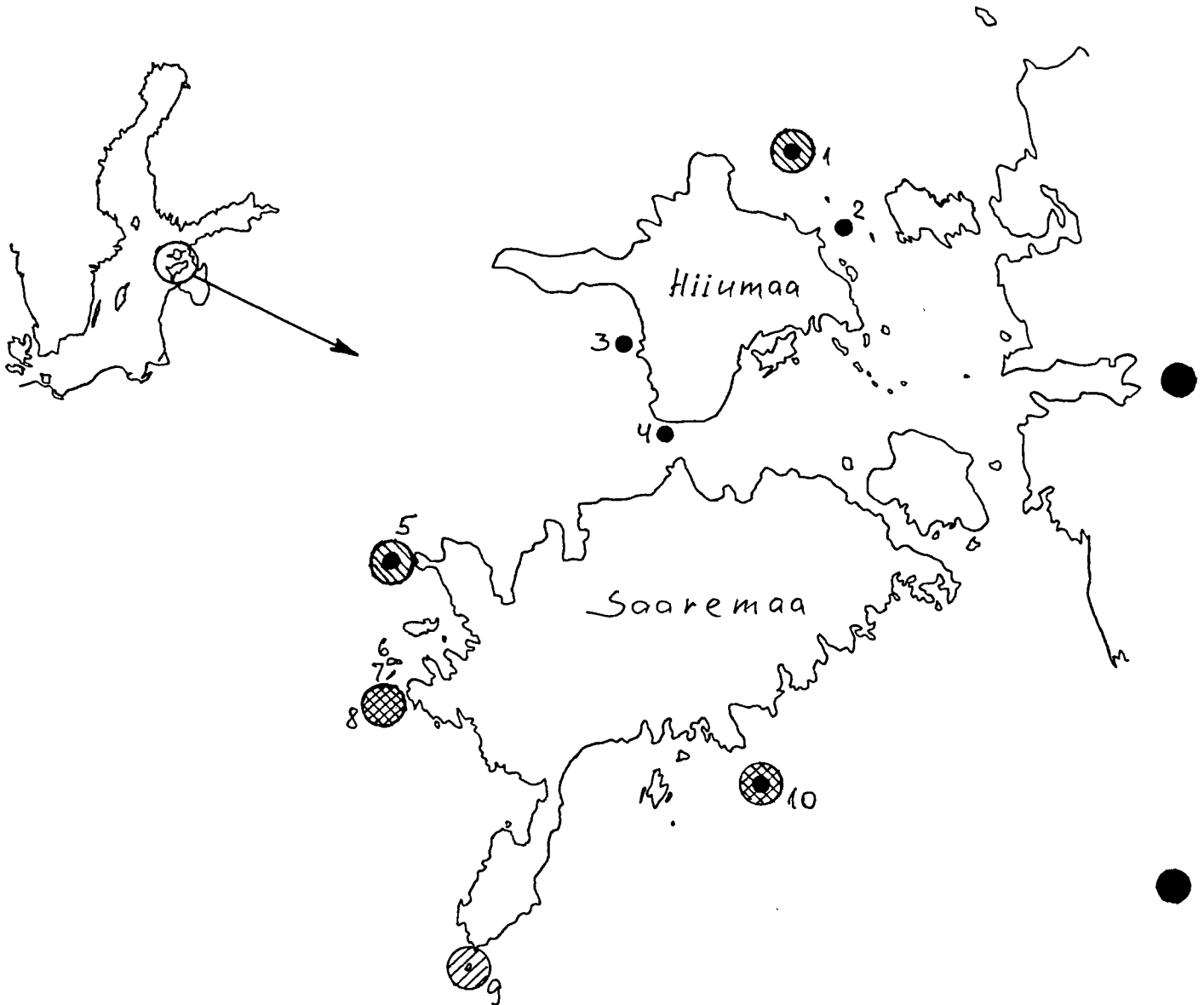
BREEDING COLONIES	ALLIRAHU						total	LOMBIMAA		INNARAHU		great total
	A		B		C			alive	dead	alive	dead	
DATE	alive	dead	alive	dead	alive	dead		alive	dead	alive	dead	
6.03 *	10		—		—		10	—		ca 50		ca 60
27.03 **	143 (21)	15	30	4	?	?	207					ca400
29.03 *	ca120		30		15			ca 50		ca 150		
11.04 **	19 (17)	11 (1)	15 (13)	4	7 (6)	3						
12.04 **								23 (21)	4			
13.04 **										36 (36)	83	

* counts from helicopter
 ** counts from land
 () number of tagged pups
 A,B,C seperated rookeries

Table 2 Mortality rates of Gray seal pups in breeding colonies

Breeding colonies	Number of pups		Pup mortality %
	all	dead	
ALLIRAHU	207	37	18
LOMBIMAA	ca 50	4	ca 8
INNARAHU	ca 150	83	ca 55
total	ca 400	124	ca 31

Figure 1 Study area



- 1 Selgrahu
- 2 Kadakalaid
- 3 Klaasirahu
- 4 Raudrahu
- 5 Laevarahu
- 6 Nootama
- 7 Salava
- 8 Innarahu
- 9 Lombimaa
- 10 Allirahu

- largest traditional haunts of grey seals during late spring-early autumn period
- ◐ potential breeding grounds
- ◑ breeding grounds where whelping occurs in 1990