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SOME INFLUENCES ON THE VOCAL ACTIVITY OF HARP SEALS *(PAGOPHILUS GROENLANDICUS)*

K. Ronald, College of Biological Science, University of Guelph, Guelph, Ontario, Canada
J. M. Terhune, Department of Biology, University of New Brunswick, Fredericton, New Brunswick, Canada

Abstract

Harp seals have a distinct underwater vocabulary during the breeding season. The animal appears close to mute for the remainder of the year. Attempts were made to monitor the change of call pattern over the period 77 03 06 to 77 03 16. An artifact, a sealing vessel, produced changes in recordings. Suggestions are made as to the possible significance of man-made noises on the harp seal.

Introduction

An examination of harp seal *(P. groenlandicus)* underwater vocalization patterns in 1975 (Terhune and Ronald 1976) indicated that the seals are vocally active all night and less active at daybreak and in the early afternoon. This study was continued in the Gulf of St. Lawrence during March of 1977. A few days after the recording equipment had been deployed, a 'sealing' vessel, the Nadine, a 36.5 m steel stern trawler, entered the area (on 77 03 09) accompanied by an ice breaker, which subsequently left, leaving the Nadine within 2 km of the apparatus. This unplanned presence of the Nadine precluded a full determination of the normal daily or monthly vocal behavioural patterns. A change in the night-time calls which has been noted may have been a direct result of the presence of the vessel.

Table I

Levels (dB re arbitrary reference level) of high frequency vocalizations of harp seals during March 1977. Note: N denotes boat-motor noise which precluded detection of the seal calls, bracketed values were obtained from one minute duration recordings and blank spaces indicate times when recorder was not operating.

	TIME OF DAY (HOURS)																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
March																								
6														19	19	20	22	21	21	21	21	22	22	23
7	21	22	23	22	23	24	25	27	25	23	20	19	(19)			22	23	23	22	20	21	21	20	21
8	22	22	22	20	21	23	24	24	23	22	21	20	(19)											
9	Nadine cruising 5 km away							N	N	N	18	N	N	N	N	N	21	18	19	19	19			
10	Sealing taking place from Nadine within 3 km of recorder.																							
11																	N	N	N	18	19	18	17	18
12	17	17	18	18	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	15	15
13	17	17	N	15	15	N	Very few adults on ice some killing of young around box.																	
14	Killing near box						N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	13	12
15	12	12	14	14	13	N	Killing near box		N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
16	N	N	N	N	N	N	N	N	N	N	N	9764 pelts loaded on Nadine.												

Materials and Methods

A hydrophone and cassette recorder were left on the ice near the edge of a herd of harp seals. Every hour the recorder was operated for 150 ± 20 sec (Table I). The average intensities of high (4 kHz) frequency calls over each 2.5 min period were later determined. The levels are expressed as decibels (dB) relative to an arbitrary reference (Table I). The average intensity level was determined for each hour of the day before and after the arrival of the vessel (Fig. 1). Except for the treatment of the intensity measures, the materials and methods were similar to those of Terhune and Ronald (1976).

Results

The daily vocalization pattern of the 'undisturbed' seals (Møhl, Terhune, Ronald 1976) (March 6-8) indicates that the calls were emitted throughout the 24 h period with the lowest activity during the early afternoon. This finding is similar to the 1975 data. The earlier study indicated a peak in the activity around midnight and a lull at sunrise. This year a peak occurred just after sunrise.

Further studies in boat-free and boat-operating waters would be required before this difference could be totally assessed, but some assumptions can be made.

It was not possible to determine the daytime vocal activity of the seals after the arrival of the vessel. The close proximity of the vessel to the recording apparatus resulted in the seal calls being completely masked by the motor noises. On four of the recordings, the motor noise of the boat was greatly reduced during the night and it was possible to measure the intensities of the seal vocalizations during these times. At night, a change occurred in the call levels, particularly from 23:00 to 05:00 (Fig. 1). The latter were well below any of those which occurred during the 'undisturbed' time.

In 1975 an overall increase in the vocalization levels at the middle of the month (2 weeks post-parturition) was recorded. This appeared to be related to the onset of courtship and mating. In 1977, pupping in the Gulf began about February 20 and continued on until after March 1. Although the onset of mating may also have been spread out over a 2+ week period, it should still have been occurring throughout this study. The decrease in vocal activity from 23:00 to 5:00 was therefore not likely to have been a result of a change in normal breeding activity.

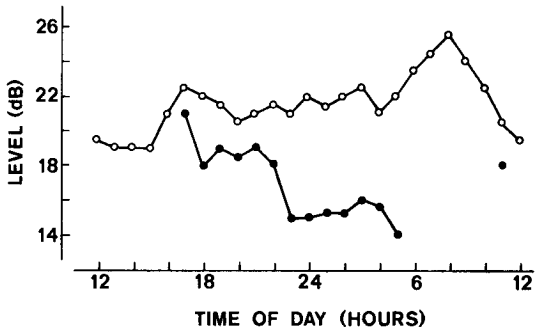

Fig. 1. Levels of high frequency vocalizations of harp seals during March 1977, before (open circles) and after (closed circles) arrival of the sealing vessel.

Discussion

As other observations were being made on the seal herd it is known that up to March 9 the arrival of the vessel was the only major disruptive factor in the recording area. During earlier studies on harp seal calls (Møhl, Terhune and Ronald 1975) it was noted that a moving vessel could be detected at distances greater than 5 km. There is no doubt that the seals could also hear such a vessel. The close proximity of the vessel would have prohibited vocal communication between the seals throughout most of the day. The overall vocal reduction, when there were few acoustic artifacts present, may have been a result of this disturbance.

It is not yet possible to link a reduction in vocal activity to a significant behavioural change on the part of any segment of the seal population. We have no evidence which would suggest that the noise of the vessel was detrimental to the general well-being of the herd. The interruption of a channel of communication however, would be expected to have some effect on any group of social animals especially those that may only vocalize during the breeding season (Møhl, Terhune and Ronald 1975). Bearing in mind the limitations of the present data, the following may be hypothesized as to the seal's response to the vessel noises.

The location of the harp seal females within the herd is determined by the presence and position of her pup. Until it is weaned, the female is believed to stay in the proximity of its pup, returning at least daily. The males and non-lactating females are not fixed to any one region. It is possible that the reason for the decreased number of calls after the arrival of the vessel was simply that many of the nearby males and non-lactating females had moved to a quieter area. The lactating females may have been disturbed, but not enough to cause them to desert their pups.

While it may never be possible to test the hypothesis, it is important to remember that the presence of a loud sound source did appear to alter at least one aspect of the behaviour of the seals. The effect of noise pollution must be considered in environmental impact studies, on shipboard population counts, and in radio tracking studies, etc. The majority of the harp seal phonations are used only at breeding time. If they were occluded or inhibited by mechanical and/or physical visual noise, it may well be that this artifact will be of some significance in the future potential of the breeding animals.

Summary

Recordings of harp seal calls were obtained in the Gulf of St. Lawrence throughout a number of 24 h periods during the breeding season. After a vessel arrived in the area, a marked decrease in the night-time seal vocalizations occurred. These observations were made only when the boat noise was greatly reduced. During the day, the noise of the ship was much louder than the seal calls and interanimal acoustical communication would have been severely hampered.

An explanation for the reduced vocal activity may be that a number of the seals (males and non lactating females) left that area of the herd.

Acknowledgements

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