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Research on harp seals in 1978

by

D. E. Sergeant

Arctic Biological Station
Fisheries and Marine Service
Department of Fisheries and the Environment
Ste. Anne de Bellevue, Quebec H9X 3L6

Abstract

Age samples from 8 sites totalling about 1900 animals obtained in 1978 continue to show strong representation of all age-classes onward from 1972, the year an effective quota on catching of harp seals was put into force. Their high representation contrasts with most pre-quota year classes.

From samples of female harp seals taken in January, when pregnant females are near full-term, median age at first pregnancy is about 4.9 years. This contrasts with about 4.6 years obtained from early season females in 1976. The difference is doubtless due to non-implantation and other intra-uterine loss. Fertility rates of mature animals for the same reasons fall from about 96 to about 90%.

Females whelping in Gulf and Front areas were compared for distribution of pelage types using percent of dark saddled animals as the most objective criterion. There was no significant difference between areas. Between areas there was also no significant difference in age-specific maturity rates. Since hunting has been intense on the Front and light in the Gulf since 1972, differences in both features should result if subpopulations had remained distinct. It is concluded that mixing between the two subpopulations is at a high level. There is some direct evidence from recent tagging recoveries available, up to 3 years

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of age, that the rate of mixing from Gulf to Front has increased in the period since 1972 when catching has been biased to the Front.

Tagging

Large-scale tagging was carried out in both subareas (Table 1) for the purpose of estimating production, using a method described by Sergeant (1977) which will utilise the mixed recaptures of young-of-the-year in their first summer and winter. These results should be available within a year for estimates of production in the two subareas.

Immediate recaptures (Table 1) fall into expected patterns. The majority of recaptures of Gulf-tagged seals were around the Magdalen Is. from a fishery in progress when tagging was carried out. Since attempts were made to tag seals that would likely not be caught, and because some restraint was shown in leaving tags by the fishermen, no immediate analysis is possible from the Magdalen Is. catch of 24,669 young seals, nor was one planned. Recaptures from other areas are too low to be useful. Eight tagged seals drifted to Notre Dame Bay in NE Newfoundland, presumably after passing north, since recoveries were all in May. Two recoveries, also in May and June, from St. Mary's Bay in SE Newfoundland were unusual; as was one from the Gulf of Maine. Twenty-one typical recoveries came from the northern Gulf, where catches were evidently small.

Successful tagging by helicopter on the Labrador coast was unusual and was due to the existence of a patch, one of three in all, that whelped on rough shore ice inaccessible to both ships and landmen. Immediate recoveries from this tagging were extremely low (Table 1), although some of the recovered seals had drifted as far south as Trinity Bay, Newfoundland.

Age samples

Age samples totalling about 2000 animals (Table 2) were obtained from the usual sites (Table 3). The North Shore net fishery (samples 2 and 3) was unusually large for recent years, whereas a very small sample only was obtained from moulters from shipboard in the Gulf and none from moulters at the Front. The small Gulf sample was obtained by M.V. Gadus atlantica from the end of March to early April. On

17 April many moulting seals came on to fast ice near the shore in NE Prince Edward Island, and were reported as mostly bedlamers. One tag from the small catch was from a one-year-old; the age composition was probably much as in Gadus atlantica's catch.

Overall samples (Fig. 1) show all year classes from 1972 to 1977 well represented. The same is true in the more homogeneous landmen's catches of moulting seals (samples 6 and 7 in 1978). Comparison of the samples collected in 1974 through 1978 (Fig. 2) shows a consistent high representation for year classes 1972 to 1977 (the latest analysable) but not of earlier year classes. These data demonstrate the effectiveness of the quotas to date in allowing good survival rates.

The absence of an equivalent number of surviving females of older age classes to the number of survivors of year classes 1972-1977 is due to the fact that only net fisheries (samples 2, 3 and 5) take adults unselectively; all shooting fisheries take younger age groups with high selectivity whether in the water or on ice.

Maturation rates

Tabulations of age-specific fecundity are shown in Table 4 for Gulf and Front separately and combined. The samples were obtained from females in late pregnancy between December and March and are compared in the Table with a sample obtained from females in early pregnancy at the Front in mid-April 1976 (Sergeant MS 1976). The new figures should be used in calculations of yield, since there is some intra-uterine loss of corpora lutea (indicating loss of foetus) demonstrated through pregnancy. The increase in median age at first pregnancy is from 4.6 to 4.9 years; the decrease in fertility of fully mature females from 97% to about 90%. Some uncertainty in this last figure comes from the nature of the new samples, which were mostly purchased from fishermen. If there is a discrepancy between tooth age and maturity status, and the relation is highly improbable, the data are discarded; but if it is weakly probable, the judgment cannot be made. Apparently immature animals aged 7 and 8 in Table 4 for the Gulf fit this category. Median age at maturity is not affected by such possible errors.

Mixing of subpopulations

From 1972 to 1976, there was no ship catching in the Gulf and landmen's catches at the Magdalen Islands were very low. The Front population absorbed the whole quota catch plus increasing landmen's catch of mainly young and immature seals.

Under these conditions, if the Gulf subpopulation were largely distinct due to homing of adults (immatures remain rather randomly mixed--Sergeant 1977), then it should show a greater percentage of younger mature females aged 5 and 6 in 1978. Moreover, if it were largely separate in this way, a higher density might be expected leading to a higher age at first reproduction than at the Front.

In 1976, 1977 and 1978 various observers noted the percentage of adult females of different pelt types at the whelping patches. These were classified as spotted, light-saddled and dark-saddled. While some subjectivity is unavoidable, either the spotted or the dark saddle category can be fairly well separated.

Table 5 compares percentages in the two areas in 1976-1978. There are also data from 1964 for the Gulf, but no earlier data for the Front. The early data, during a period of heavy exploitation in both subareas, show a greatly reduced percent of spotted females indicating reduced recruitment to the whelping female population in 1964. The new data show a much improved recruitment in both subareas. They also show comparable percentages of spotted, and of dark saddled females in the two subareas. The evidence from this source, therefore, favours mixing of the two subpopulations.

The maturity data (Table 4) are rather deficient for the Front area, but they support the null hypothesis that maturation rates do not differ between the two subareas.

Discussion

Table 6 updates recoveries of harp seals tagged and branded in the Gulf of St. Lawrence between 1966 and 1977, and at the Front in 1966 and 1973.

Much cross-over had already been detected from immatures and as far as the volume of tagging can show, this moves in both directions.

New and reliable information is now available showing a movement of 2 Gulf-born young to the Front as adults at 9 years old, both of them

to Notre Dame Bay, in March and April, 1978. Both were recorded as adults, one an adult male. This confirms a less reliable report of 2 tags from two adults in the same area at 8 years, in 1977.

Before 1972, catching of young harp seals by ships was fairly equally distributed between Gulf and Front areas. From 1972 to 1977, all or practically all catching by ships took place at the Front ice, at a rather heavy rate. This imbalance would tend to increase the net movement of Gulf-born animals to the Front, one would suppose. In Table 6 a lag of two years (to 1974) is allowed for such an increased movement to occur. Analysis of the results is made difficult by a higher intensity of tagging, use of better tags, and increased escapement due to lessened hunting in the Gulf, in the later period, but the analysis suggests an increased rate of movement from Gulf to Front in the later period for years 1, 2 and perhaps 3 of recovery after tagging or branding. There is also a suggestion that the rate of movement of animals tagged on the Front into the Gulf is less than the converse movement, although until 1977 the number of animals effectively marked on the Front was small.

Conclusions

The age frequency data support the validity of present quota levels.

The evidence of considerable mixing between the two subareas supports the view that the total quota is more important than its distribution between Gulf and Front areas.

Acknowledgments

Field work on tagging was carried out in 1978 by W. Hoek, B. Beck (now with the Marine Fish Division, Bedford Institute, Dartmouth), B. Petolas, R. Greendale and K. Hay.

Maturity samples from some N. Shore animals were collected at the Dildo Sealing Plant by W. Sampson of the St. John's Biological Station, and by R. Greendale. To all these people I am very grateful.

References

- Sergeant, D. E. 1976. Studies on harp seals of the western North Atlantic population in 1976. ICNAF Res. Doc. 76/X/124, 32 pp.
- _____ 1977. A new approach to estimating harp seal production. ICNAF Res. Doc. 77/XI/56, 8 pp.

Table 1. Tagging and recaptures of harp seals in spring, 1978.

Area of tagging	Gulf		Front	
	4-T	2-J	4-T	2-J
No. Tagged	4,378	5,000		
No. Recovered in Subarea				
2S			3	
3K	8	25		
3L	3	18		
3P	13			
4-R	17			
4-S	10			
4-T	208			
4-Vn	12			
5-Y	1			
Total Recovered	272	46		
Surviving Tags (assuming no natural mortality)	4,106	4,954		

Table 2. Age samples of harp seals 1978.

Age (yrs)	Sample No.										Total	
	1	2	3	4	5	6	7	8	9	10		
1	6	5		22	116	138	90	22				399
2	12	54	1	44	79	51	80	1				322
3	21	115	4	55	36	23	41					295
4	15	190	9	36	49	13	29					251
5	10	108	5	18	42	4	18					205
6	4	50	9	12	31	6	11					123
7	1	21	1	6	15		4					48
8		24	4	6	11	1	6					52
9		16	4	1	13			1				35
10	2	15	6		13	1	3					40
11		8			7		1					16
12		8	1		6		1					16
13		2	1		5		2					10
14		5			9							14
15		1			5		2					8
16		4			7							11
17				1	8							9
18				1	5	1						7
19		1		1	5							7
20		2			3	1						6
21		1			1	1						3
22					2		1					3
23			1		1							2
24		1			1							2
25					2		1					3
26		1	1		1							3
27			1		2							3
28					1							1
29												
30 or +		1										1
Totals	71	543	48	203	476	240	289	25				1,895

Table 3. Key to sampling localities, seasons and fishing methods of age samples, 1978. N = nets, S = shooting

Sample No.	Location	Type	Months
1	Port Hope Simpson, Labrador	*	XII
2	La Tabatière, Quebec N. Shore	N	XII-I
3	Harrington Harbour, Quebec N. Shore	N	XII-I
4	Saguenay area, Quebec N. Shore	S	I-IV
5	St. Anthony, N.E. Newfoundland	N	I-IV
6	Little Bay Is., N.E. Newfoundland	S	I-III
7	Pt. Leamington, N.E. Newfoundland	S	I-III
8	Gulf moulters, M.V. <u>Gadus atlantica</u>	S	IV

* assumed taken with nets.

Table 4. Age-specific pregnancy rates of near-term pregnant Harp Seals, Gulf & Front. Appended for comparison are figures for early pregnancy, indicating the status that would result at term if no intra-uterine losses occurred.¹

Age (yrs)	Area & date			Gulf, Jan 1978			Front, Jan-Mar, 1977 and 1978			Total, Gulf & Front			Front April 1976 ¹			
	Imm.	Preg.	Non P	%P	Imm.	Preg.	Non P	%P	Imm.	Preg.	Non P	%P	Imm.	Preg.	Non P	%P
1	6				8				14							
2	13				10				23				34			
3	32				8				40				11			
4	39	1		2.5	14				53	1		1.9	9	1		10
5	15	23		60.5	3	2		(40)	18	25		58.1	4	8		67
6	2	18		90.0		2		(100)	2	20		90.9	1	10		91
7	3	6				2			3	8				5		
8	1	7	2			2			1	9	2			14		
9		8	1			2				10	1			8		
10		7				3				10						
11		3				2				5						
12		1				1				2		87.1				
13		2				1				3		to				
14		2				1				3		92.9				
15		2				3				5		Mean:				
16		1		89.1				100		1		90.0	62	3		96.6
17						1				1						
18																
19		1				1				2						
20						1				1						
21																
22						1				1						
23			1			1				1	1					
24																
25						1				1						
26		1	1							1	1					
27																
Subt.	111	83	5		43	27			154	110	5		59	108	3	170
Totals		199				70				269						

Table 5. Distribution of adult female pelage, Gulf and Front areas.

	Observer	Year	Date	Spotted		Light Saddle		Dark Saddle		Total	
				No.	%	No.	%	No.	%	No.	%
FRONT	B. Emmett	1976	14-18/III	49	17	121	42	118	41	288	100
	R. Greendale	1977	11-14/III	22	16	44	31	75	53	141	100
	W. Hoek	1978	17-18/III	39	11	111	33	191	56	341	100
	Front, total	1976-1978		110	14	276	36	384	50	770	100
GULF	W. Hoek	1977	27/II-4/III	121	23	172	33	234	44	527	100
	W. Hoek	1978	26/II-8/III	95	15	179	27	375	58	649	100
	Gulf, total	1977-1978		216	18	351	30	609	52	1,176	100
	A. W. Mansfield	1964	1-11/III	56	7	91	12	632	81	779	100

Table 6. Harp seals tagged or branded in (a) Gulf of St. Lawrence, (b) Front Ice and recovered in winter and spring in the Gulf (ICNAF Subarea 4) or the Front Subareas 2 and 3.

Year of Marking	Year of Recovery																		
	1		2		3		4		5		6		7		8		9		
	G	F	G	F	G	F	G	F	G	F	G	F	G	F	G	F	G	F	
1966	7	12	1	1	-	-	-	-	1	-	2	-	-	-	-	-	-	-	-
1968	3	7	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1969	2	10	2	-	2	-	-	-	-	-	-	-	-	-	-	2	-	2	-
1970	2	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1972	-	1	-	-	4	1	2	-	1	-	1	-	-	-	-	-	-	-	-
1973	-	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1974	2	2	1	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-
1975	1	19	1	8	2	9	-	-	-	-	-	-	-	-	-	-	-	-	-
1976	-	10	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1977	2	33	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Recoveries:																			
-up to 1973, no.		14	31	3	3	3	-	-	-	1	-	2	-	-	-	-	-	-	-
-percent Front		68.8	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-after 1973, no.		5	65	4	11	7	10	4	-	1	-	1	-	-	-	2	-	2	-
-percent Front		92.8	73.3	58.8	0	(0)	(0)	(0)	(0)	(0)	(0)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)
Front	Year of Marking	1		2		3		4		5									
		G	F	G	F	G	F	G	F	G	F								
	1966	-	-	-	2	-	1	-	1	-	-								
	1973	-	11	-	-	1	3	-	-	-	1								
	-total	-	11	-	2	1	4	-	-	-	-								
-percent Front		100	100	80	(100)	(100)	(100)	(100)	(100)	(100)	(100)								

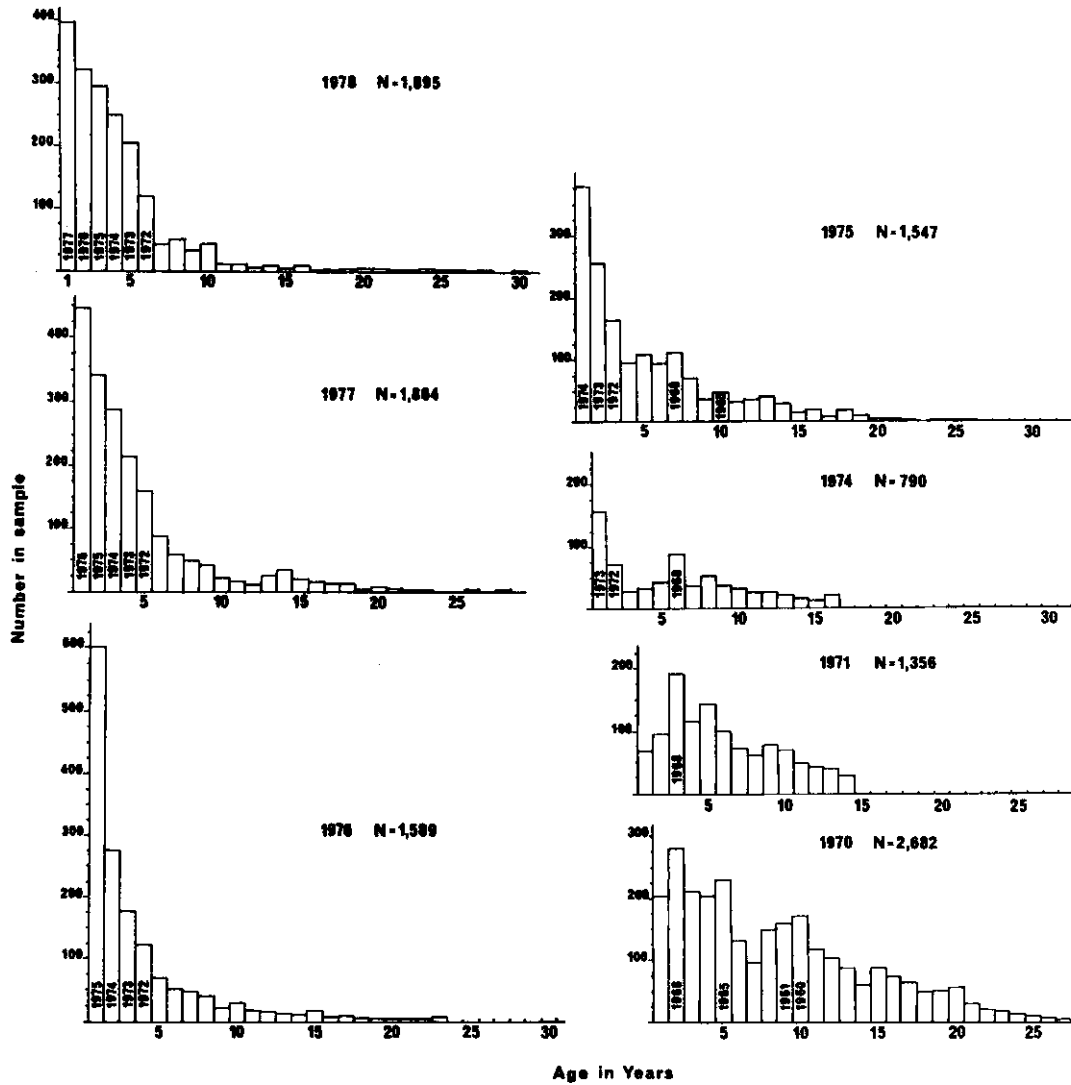


Figure 1. Combined age samples of harp seals from southern Labrador, Quebec North Shore, northeastern Newfoundland and the Gulf of St. Lawrence.

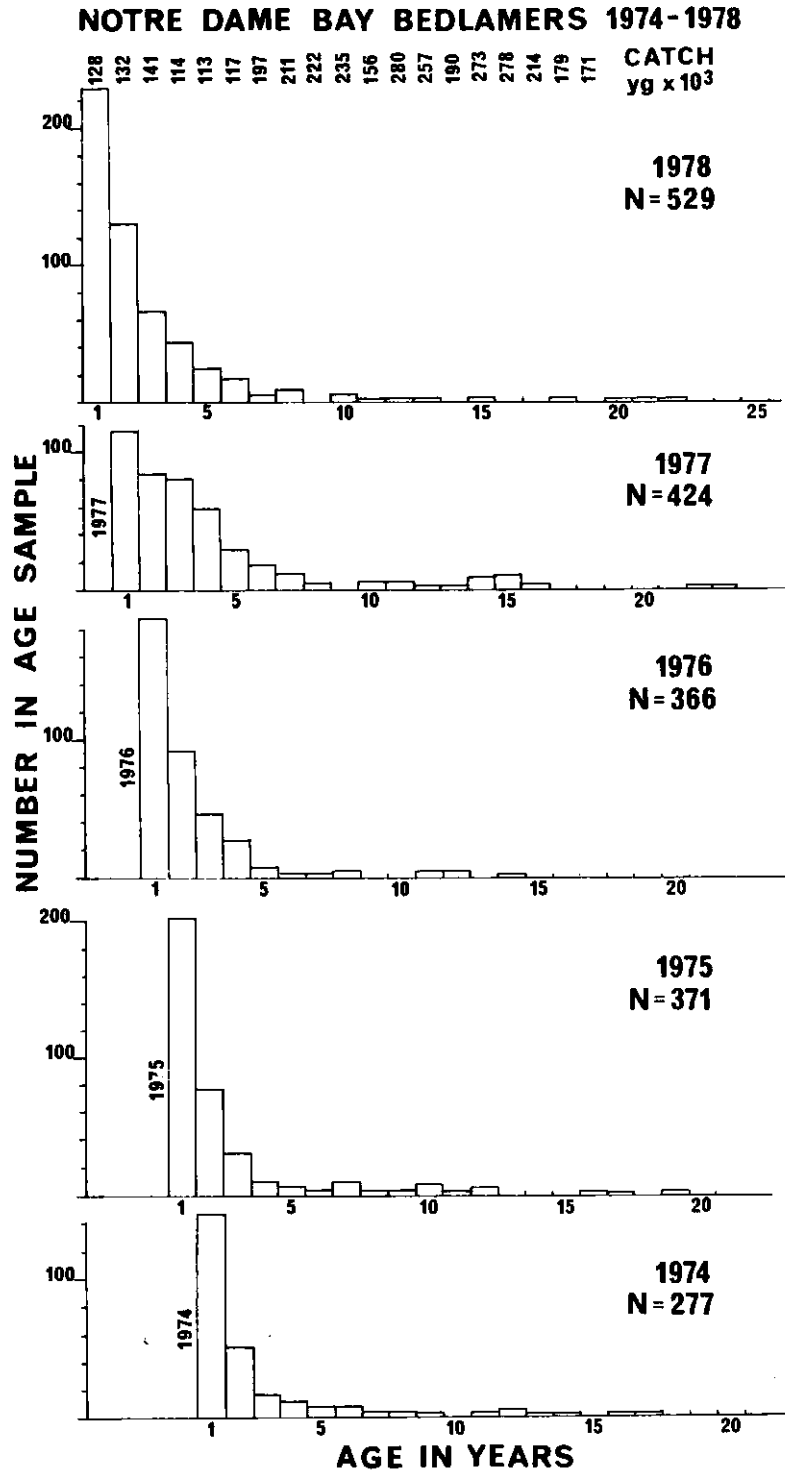


Figure 2. Age samples of harp seals from the landsmen's catches in Notre Dame Bay, Newfoundland.

