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Results of research on harp seals in 1975 with an estimate of production

by

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Introduction

Studies in 1975 included (1) a photographic aerial survey of whelping harp seals in Gulf and Front areas using standard techniques; (2) tagging and branding of pups in the Gulf; (3) analysis of age frequencies collected at a number of shorebased fisheries in Labrador, northern Quebec and northeast Newfoundland.

Recent aerial censuses, age analyses, tag and brand recaptures and catch statistics are here used to assess recent trends in the population of harp seals of the western herds.

Aerial Photo Surveys, 1972-1975

Table 1 gives a summary of census results for adults, Gulf and Front in 1975. Table 2 shows a summary of results of surveys from 1972 to 1975. Number of adults were converted to numbers of young by a factor obtained by comparing our result for adults in the Gulf in 1975 with that obtained by Dr. Lavigne for young using ultra-violet sensing (Lavigne et al. MS 1975). A downward trend averaging 12.5% per annum is seen for the four year period. The decrease appears to have been particularly sharp between 1972 and 1973, and while this may not be real owing to inaccuracies in the surveys, nevertheless very heavy catches in 1966 and 1967 which led to low recruitment of those year classes (Figure 1) would first have affected production in a major way in 1973 when the females of these cohorts reached 6 and 7 years, nearly full maturity.

Age Frequencies

Samples of harp seal jaws for age analysis were obtained from net fisheries from the following sites (Figure 1):

- (a) Port Hope Simpson, Labrador in December. These southward migrating seals showed a preponderance of 2 and 3 year old animals.
- (b) La Tabatière, Quebec north shore net fisheries, December-January. A major representation of 5 to 8 year old animals is shown. Five year olds are typically dominant here.
- (c) St. Anthony, Newfoundland net fishery, December-March. This fishery is heterogeneous, taking southward-moving young animals mainly 1 and 2 years old in December-January and adults later. The fishery for young animals is much affected by date of freeze-up. In 1975, freeze-up was late and this part of the catch

(d) Pt. Leamington and Little Bay Is., Notre Dame Bay. These fisheries take principally young animals in February.

The composite frequency, added crudely, refers to 1,529 animals.

A comparable set of samples in 1974 totalled 790 animals.

The last roughly comparable sets of samples were obtained in 1970, totalling 2,682 animals and in 1971, with 1,356 animals. These four composite samples are shown together in Figure 2.

The samples are consistent in showing poor representation of age classes 1969-1971 with catches in excess of 200,000 young harp seals annually. Survival after the 1968 catch of 155,000 young is a useful yardstick for comparison of later survival. Beginning with the 1974 sample, good survival is shown of year classes 1972 and 1973 following imposition of the 150,000 quota; the 1975 sample continues this trend showing that the 1974 age class is equally well-represented. Mean catches of young in 1972-1974 were 110,000.

Cross over from Gulf to Front

Analyses of all recoveries of harp seals tagged and branded in the Gulf and recovered in winter and spring give an indication of degree of cross-over to the Front. Recoveries in winter (Dec.-Feb) are mainly from net fisheries (Table 3). These show a 50% cross-over at age 1, declining to 33% at age 2 to 20% at age 3, and 0% at age 6. More brand recoveries in the next few years should improve quantification.

Spring recoveries, from ships and landsmen, are biased by the much larger spring catch on the Front (although the data for large ships refer only to recoveries up to 1971, when there was some catch in the Gulf by these ships). Nevertheless the data again show a high rate of return to the Gulf at 3 years and a probably complete return at 5 years, the age of sexual maturity.

Catch Statistics and Synthesis

Figures for 1975 show the following catches of young harp seals:

Canada	89,011
Norway	<u>51,618</u>
	140,629

of which 7,550 were taken in the Gulf of St. Lawrence, leaving 133,079 taken on the Front.

There was good agreement by two observers: Canadian fisheries officer Mr. T. Curran, and Mr. K. Karlsen of the industry, that there was a small escapement at the Front in 1975. As a rough figure, therefore, production on the Front was about 150,000.

Production in the Gulf was estimated rather accurately by Dr. D. Lavigne at $46,000 \pm 5,000$ young (Lavigne et al. MS 1975).

Dr. Lavigne's estimate for the Front has wider confidence limits and his median figure is lower than catch totals. Some check on the conclusion given above can, however, be obtained by scaling up our estimate of adults at the Front by the same ratio that our adult count in the Gulf bears to Dr. Lavigne's count of pups, namely $\frac{23,226}{46,300} = 0.502$

The result is $\frac{70,750}{0.502} = 140,936$ for a total production of 187,235.

The result, though still approximate, confirms that production is now of the order of 200,000, a decrease from estimates of 300,000 in 1967 and 278,500 in 1970. The decrease seems therefore to be of the order of 15,000 young per annum. This trend is supported by the results of aerial estimates of adults (Table 2) which indicate a downward trend of the same order, about 12% per year.

The downward trend occurred in the Gulf component alone. In 1971, catch statistics showed nearly 72,000 newborn animals caught in the Gulf by ships and shoremen around the Magdalen Islands with a few dozen survivors only found by researchers carrying out branding. The decrease to 46,000 in 1975 represents a linear annual decrease of 10%. This decrease, having occurred in spite of virtual protection of animals in the Gulf, can be accounted for either by the high kill of immatures which cross to the Front (see below), or by a mixing of the two component herds.

Escapement in 1975 must have been approximately 200,000 - 140,000 = 60,000, or one third of production; clearly not enough to sustain recruitment under any reasonable estimate of natural mortality. The rather high representations of year classes 1972 to 1974 shown by the age samples in Figure 2, judging from the catch statistics and estimates of production in these years, represent mean survival rates after the catch of young of about 50%. High selectivity for young immatures in many age samples may have biased these apparent survival rates above the true ones.

Summary

The production of western North Atlantic harp seals in 1975 is estimated at close to 200,000 of which 150,000 on the Front. The estimated annual decrease in production since 1970 are 12.5% for the herd as a whole, 15% for the Front component, and 10% for the Gulf component. Adults and young of the latter have been virtually protected in winter and spring since 1971 but many immatures of this herd are vulnerable to all types of hunting at 1-3 years on the Front.

References

Lavigne, D. M., S. Innes, K. Kalpakis and K. Ronald. MS 1975. An aerial census of western Atlantic harp seals (*Pagophilus groenlandicus*) using ultra-violet photography. Document presented to FAO/ACMRR Working Party on Marine Mammals ad Hoc Group III, Sept. 1-6, 1975, Seattle, Washington.

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Table 1

1975							
Patch	Location	Time	Date	# Seals	Area of Patch (km ²)	% Area Photographed	Density Seals/km ²
* 1	Gulf	1705-1730	10 Mar	23,226	18.7 km ²	7	1242/km ²
2	Front N	1110-1143	15 Mar	50,722	10.6 km ²	30	4785/km ²
3	Front S	1304-1322	17 Mar	19,670	4.4 km ²	32	4471/km ²
4	Front	1121-1123	17 Mar	358	1.8 km ²	93	199/km ²

* Average density/photo 10 March ~ 1700 hrs. = 58.5
 11 March ~ 1100 hrs. = 59.3

Table 2

Summary of Aerial Photo Census 1972-1975. Number of adults converted to number of young by dividing by 0.502, unless otherwise stated.

Year	Gulf		Front		Total
	Date of survey (March)	No.	Date of survey	No.	
1972	10	86,075	11	201,878	267,953
1973	5 ¹	59,924	10	154,892	214,816
1974	13	51,872	14	[155,000] ²	[206,872]
1975	10	46,266	11	140,936	187,202

¹ Corrected additionally for early date of survey.

² Visual estimate, since survey incomplete.

Table 3

Recoveries in Gulf and Front regions of harp seals tagged and branded in the Gulf as young. (a) Winter (b) Spring recoveries.

(a) Winter

Age at Recovery	Recovered		% Gulf
	Front (subareas 2 & 3)	Gulf (subarea 4)	
1	4	4	50
2	1	2	66
3	1	4	80
4	-	-	--
5	-	-	--
6	-	1	100

(b) Spring recoveries

(large ships up to 1971 only)

1	56	14	20
2	7	3	20
3	1	5	83
4	-	-	--
5	-	1	100

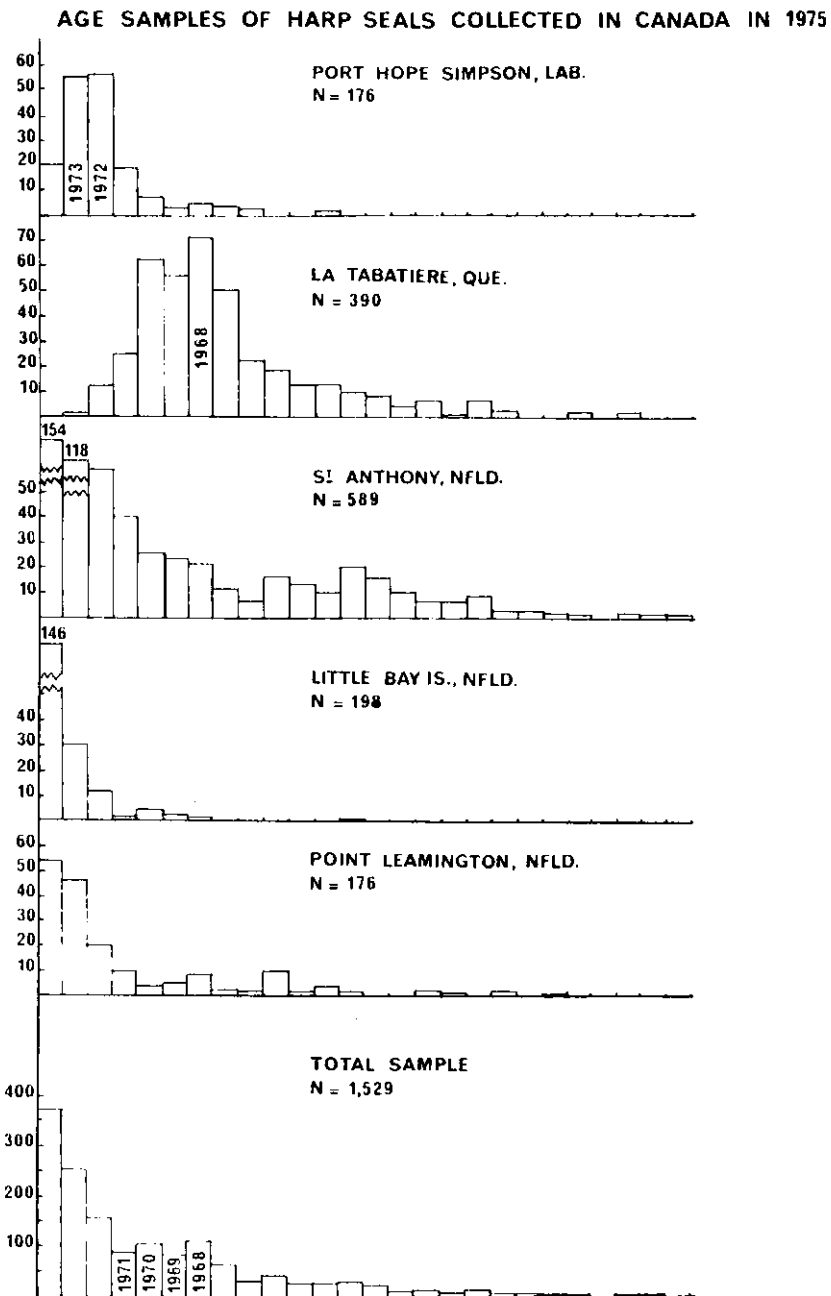


Fig. 1. Component and composite age samples of harp seals taken from shore fisheries in eastern Canada in early months of 1975.

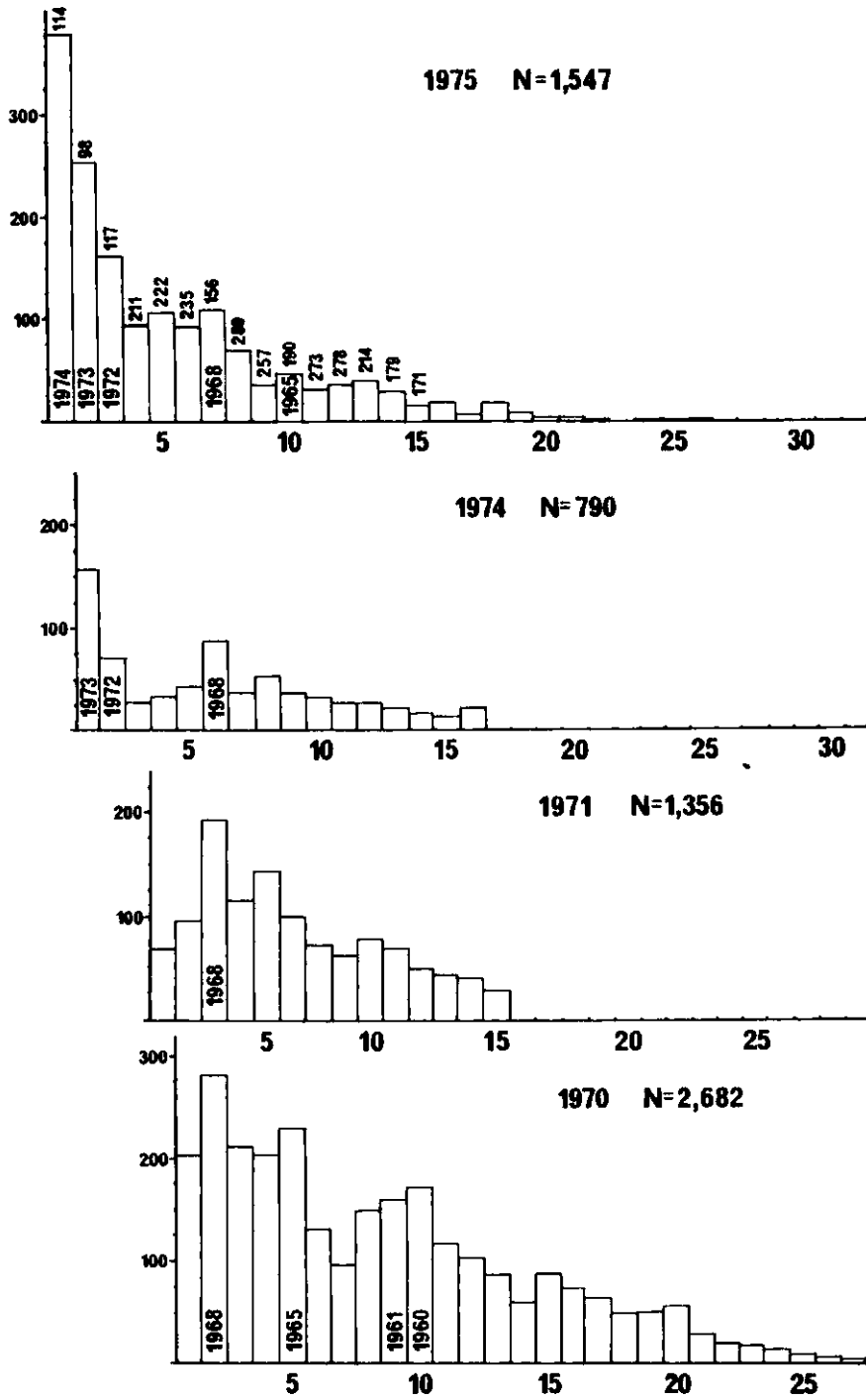


Fig. 2. Composite age samples for 1970, 1971, 1974, and 1975.