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Age Structure of Northwest Atlantic Harp Seal Catches
from 1952 to 1980

by

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INTRODUCTION

Several methods are used to hunt harp seals, *Pagophilus groenlandicus*, in the Northwest Atlantic each with different hunting selectivities. Seals captured in nets along the shores of southern Labrador and Quebec and in the area of St. Anthony, Newfoundland, consist mainly of mature individuals. Seals shot from small boats and larger vessels up to 20 m in length are generally immature animals known as bedlamers. The large vessel catch taken in breeding and moulting patches consists of a more representative mixture of immature and mature animals. For this reason, the age distribution of the total annual catch of seals age one year and older (1+) must combine the catch structure of individual hunts in their proper proportions. Lett and Benjaminsen (1977) produced the first comprehensive age structure of total annual harp seal catches from 1952 to 1977. This paper updates the data base to 1980, corrects certain inconsistencies in the previous analysis and attempts to remove a bias in the age compositions of the landsmen catch which leads to an overestimation of the kill of mature individuals.

Age Sampling of the Catch:

Biological sampling of harp seal catches began in about 1952 and has continued to the present. Samples used to produce the age compositions of the 1+ catch in the Newfoundland area are given in Table 1. The data are taken from the following sources: Sergeant and Fisher (1960), Sergeant (1971, 1976, 1977, 1978, pers. comm.), Øritsland (1971, pers. comm.), Benjaminsen and Øritsland (1975), and Bowen and Winters (1979). The net catches are well represented with samples available from one or all of St. Anthony, Newfoundland, La Tabatière, Quebec, and Labrador for this entire period. Age samples of seals shot by landsmen from small boats and longliners were collected first in 1974 and annually since then. During 1952-54 and in 1958, samples of jaws were collected from catches of the large vessels. Annual sampling of this component of the hunt improved after 1961 with the exception of 1972.

Age compositions of the West Greenland hunt were obtained from Kapel (1977, 1979, pers. comm.) (Table 2). From 1952 to 1971, only two age samples of this hunt are available, one taken in 1953 and another in 1962. Kapel used these samples with data on the relative frequency of pelage types provided by lists of game to construct a separate composite age structure of the catch for the periods 1954-62 and 1963-71. From 1972 yearly age samples of the West Greenland catch have been collected. Age samples of the Canadian Arctic catch are available in 1967, 1969, 1976, and 1977 (Sergeant, pers. comm., Stewart, pers. comm.) (Table 3).

Catch-at-Age:

Total annual catches of harp seals were taken from Statistical Bulletins of the International Commission for Northwest Atlantic Fisheries and supplemented by more recent estimates of present and historical West Greenland harvests (Kapel, pers. comm.) and estimates of the Canadian Arctic kill (Smith and Taylor, 1977; Sergeant, pers. comm.) (Table 4).

The age composition of the total annual catch of harp seals in the Newfoundland area (Table 5) was constructed in the following manner. For each year the appropriate age sample was applied to the total 1+ catch of each component of the hunt to produce the estimated catch-at-age for that hunt. In cases where samples were not available generally an average value was used. These instances are described below. It was also necessary to establish a convention to deal with individuals in age samples for which a definite age could not be determined by the author. These individuals were generally reported as for example 15+ or indeterminate 15 indicating that in the author's opinion the animal was at least this age. I have followed Lett and Benjaminsen (1977) in reporting an individual listed as 15+ as age 15 in Table 1. Since the number of such cases is small, this action should not result in serious bias. No age samples of the large vessel catch were available from 1955 to 1957 and in 1959 and 1960. For these years the average of the 1952-54 and 1958 samples was used to prorate the large vessel catch. However, this convention may introduce serious error, as Lett and Benjaminsen (1977) have pointed out, since the catch of age one and older seals by large vessels during this period represented between 87% and 96% of the total 1+ catch. Although the large vessel sample in 1972 was small ($n = 135$) only 1,646 1+ seals (9% of total catch) were taken that year by large vessels and thus the effect of biased sampling on the overall structure of the 1+ catch will be unimportant.

In previous analyses (Lett and Benjaminsen, 1977; Lett et al., 1979) the landsmen catch included seals caught in nets and those shot from small boats and longliners. However, as indicated previously the seals taken in nets are mainly mature individuals, while primarily bedlamers are shot from small vessels. If this entire landsmen catch is prorated using net samples only, then the proportion of mature animals killed will be overestimated. From 1952 to 1961, most of the 1+ catch was taken by nets (Table 4) and thus no serious bias will have resulted from using net samples alone. However, the small vessel proportion of the landsmen catch increased to 88% of the total in certain years between 1962 and 1980 and regularly comprised 50% to 75% of the total landsmen catch. Using net samples only for this period introduces significant bias in the landsmen catch-at-age data.

In the present analysis, the landsmen net and shot harvests are treated separately. Estimates of the total net catch were obtained from fishermen and Fisheries Officers in the St. Anthony area, the Economics and Intelligence Branch, Department of Fisheries and Oceans, Canada, and seal statistics provided by the province of Quebec. Based on these sources I assumed that an average 5,000, 2,500, and 2,000 1+ seals were taken in the St. Anthony area in the 1950's, 1960's, and 1970's, respectively. Yearly estimates of this catch are available only for 1978, 1979, and 1980. The Quebec northshore net catch from 1967 to 1980 has been highly variable, but has shown no trend over time (Fig. 1). Therefore, the mean value for 1967-80 of 4,034 was used as an estimate of the yearly harvest from 1952 to 1966. No estimates of the net catch in Labrador were available, but as they are thought to number only in the several hundreds of animals, they were not considered.

In contrast to the net catch, which is well sampled, age samples of seals shot by landsmen are available for the period 1974-80 only. However, since the selectivity pattern of these samples has shown no trend over time, the unweighted average age composition was used to determine the age structure of landsmen shot catches prior to 1974. Unfortunately, all of these shot samples only represent the period after the quota was set in 1972. Prior to this bedlamers (the focus of this hunt) likely constituted a smaller proportion of the population and hence recent age samples may not be totally representative of this earlier period.

The Canadian Arctic catch was considered to be constant at 1,784 animals from 1952 to 1980 on the basis of data obtained from Smith and Taylor (1977) and Sergeant (pers. comm.) (Table 6). The age compositions of the West Greenland catch from 1952 to 1978 are shown in Table 7. These are based on the composite age distributions developed by Kapel (pers. comm.) for the periods 1954-62 and 1963-71 and annual age samples from 1972 to 1978.

DISCUSSION

The age composition data presented here differ in several respects from that produced by Lett and Benjaminsen (1977). The major departure is the way in which the landsmen catch is treated. Separating the landsmen net and shot catch reduces the bias which resulted in an overestimation of the kill of mature seals. Another difference is that animals age 26 and older have been included in the catch data, whereas Lett and Benjaminsen (1977) truncated the age distribution to age 25. Finally, age compositions of the West Greenland catch have been incorporated into the total catch-at-age matrix.

It is important to point out that biases most likely still exist in these data. For example, recent work by Doubleday and Bowen (1980) indicates that there is substantial error associated with age determination in harp seals so that above the age of 12 age compositions are little better than random numbers. The lack of adequate sampling of the landsmen shot catch from 1962 to 1973, and small sample sizes used to estimate age compositions of certain components of the hunt may also introduce some bias.

Equal confidence cannot be placed on all parts of this 28 year data set. Age sampling of the catch has improved over time and particularly from 1966. Also, estimates of the actual catch of the various hunts have steadily become more accurate. Consequently, the estimated age composition of the catches between 1952 and say, 1965, are the least reliable, while considerable confidence may be placed on the data from 1974 onward. The period from 1966 to 1973 may be considered as a period of gradual improvement in the quality of the estimates. One component of the hunt is still poorly understood, the Canadian Arctic. We have little information on both the age composition and the level of kill in the area. Future research should attempt to fill this gap in our knowledge.

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Table 1. Age samples of harp seals from large vessel and different landsmen hunts from 1952 to 1980.

Age	1952				1953				1954			
	Vessel > 150 GRT		Landsmen		Vessel > 150 GRT		Landsmen		Vessel > 150 GRT		Landsmen	
	A	F	Freq.	%	Total	%	Freq.	Freq.	Total	%	Freq.	Freq.
1	10	4.42	8	2.46	419	30.72	3	10	13	0.98	233	37.52
2	24	10.62	34	10.46	124	9.09	20	22	42	3.16	90	14.49
3	15	6.64	38	11.69	104	7.62	44	64	108	8.13	26	4.19
4	11	4.87	39	12.00	61	4.47	59	65	124	9.33	36	5.80
5	13	5.75	41	12.62	62	4.55	74	90	164	12.34	18	2.90
6	25	11.06	26	8.00	48	3.52	72	71	143	10.76	24	3.86
7	17	7.52	24	7.38	43	3.15	57	61	118	8.88	21	3.38
8	17	7.52	18	5.54	48	3.52	57	30	87	6.55	20	3.22
9	12	5.31	19	5.85	47	3.45	46	32	78	5.87	13	2.09
10	14	6.19	17	5.23	39	2.86	45	24	69	5.19	20	3.22
11	12	5.31	14	4.31	51	3.74	44	14	58	4.36	8	1.29
12	3	1.33	17	5.23	28	2.05	38	23	61	4.59	18	2.90
13	3	1.33	6	1.85	22	1.61	36	12	48	3.61	18	2.90
14	5	2.21	0	-	17	1.25	22	9	31	2.33	9	1.45
15	9	3.98	6	1.85	33	2.42	18	16	34	2.56	12	1.93
16	3	1.33	4	1.23	37	2.71	26	3	29	2.18	16	2.58
17	5	2.21	2	0.62	26	1.91	17	5	22	1.66	7	1.13
18	4	1.77	2	0.62	16	1.17	15	5	20	1.50	2	0.32
19	2	0.88	4	1.23	12	0.88	12	2	14	1.05	8	1.29
20	12	5.31	6	1.85	50	3.67	5	10	15	1.13	4	0.64
21	2	0.88	0	-	32	2.35	12	4	16	1.20	2	0.32
22	0	-	0	-	18	1.32	6	3	9	0.68	2	0.32
23	1	0.44	0	-	12	0.88	5	1	6	0.45	5	0.81
24	3	1.33	0	-	9	0.66	0	2	2	0.15	1	0.16
25+	4	1.77	0	-	6	0.44	18	0	18	1.36	8	1.29
Total	226	99.98	325	100.02	1364	100.01	751	578	1329	100.00	621	100.00
											375	344
											719	100.02

Age	1955				1956				1957				1958			
	Vessel > 150 GRT		Landsmen		Vessel > 150 GRT		Landsmen		Vessel > 150 GRT		Landsmen		Vessel > 150 GRT	Landsmen		
	A	F	A	F	A	F	A	I	A	F	D	A	F	%		
1	28.13	48	9.52		28.13	11	1.64		28.13	10	4.27	40	14.04	14	2.28	
2	10.14	77	15.28		10.14	59	8.78		10.14	15	6.41	15	5.26	17	2.77	
3	6.57	96	19.05		6.57	62	9.23		6.57	20	8.55	19	6.67	62	10.10	
4	5.13	41	8.13		5.13	55	8.18		5.13	23	9.83	20	7.02	97	15.80	
5	4.45	58	11.51		4.45	37	5.51		4.45	12	5.13	18	6.32	71	11.56	
6	4.33	35	6.94		4.33	35	5.21		4.33	10	4.27	11	3.86	70	11.40	
7	3.69	30	5.95		3.69	42	6.25		3.69	16	6.84	11	3.86	42	6.84	
8	3.77	39	7.74		3.77	54	8.04		3.77	16	6.84	9	3.16	45	7.33	
9	3.25	13	2.58		3.25	45	6.70		3.25	13	5.56	9	3.16	31	5.05	
10	3.69	14	2.78		3.69	33	4.91		3.69	11	4.70	19	6.67	30	4.89	
11	3.29	12	2.38		3.29	23	3.42		3.29	16	6.84	11	3.86	28	4.56	
12	2.52	12	2.38		2.52	30	4.46		2.52	10	4.27	14	4.91	20	3.26	
13	Avg.		2.04	1.20	Avg.	2.04	2.38		Avg.	2.04	10	4.27	8	2.81	19	3.09
14	1.48	4	0.79		1.48	27	4.02		1.48	12	5.13	6	2.11	15	2.44	
15	2.88	4	0.79		2.88	13	1.93		2.88	7	2.99	18	6.32	7	1.14	
16	2.72	2	0.40		2.72	20	2.98		2.72	6	2.56	12	4.21	3	0.49	
17	1.76	3	0.60		1.76	15	2.23		1.76	5	2.14	6	2.11	6	0.98	
18	0.92	4	0.79		0.92	23	3.42		0.92	5	2.14	1	0.35	5	0.81	
19	1.00	1	0.20		1.00	18	2.68		1.00	4	1.71	3	1.05	3	0.49	
20	3.08	4	0.79		3.08	24	3.57		3.08	4	1.71	11	3.86	5	0.81	
21	1.68	3	0.60		1.68	3	0.45		1.68	1	0.43	6	2.11	0	0.00	
22	1.00	2	0.40		1.00	4	0.60		1.00	2	0.85	5	1.75	1	0.16	
23	0.80	1	0.20		0.80	6	0.89		0.80	0	-	2	0.70	3	0.49	
24	0.68	0	-		0.68	7	1.04		0.68	1	0.43	4	1.40	3	0.49	
25+	1.00	1	0.38		1.00	2	0.30		0.61	9	1.45	4	0.52	17	2.77	
Total	100.00	504	100.00		100.00	672	100.01		100.00	234	100.01	285	100.00	614	100.00	

Age	1959				1960				1961				1962					
	Vessel > 150 GRT		Landsmen		Vessel > 150 GRT		Landsmen		Vessel > 150 GRT		Landsmen		Vessel > 150 GRT	Landsmen				
	A	F	A	F	A	F	A	I	A	F	D	A	F	D + F				
1	28.13	9	3.41		28.13	34	5.05		122	37.08	16	2.58	201	26.27	6	20	26	2.92
2	10.14	23	8.71		10.14	107	15.90		34	10.33	65	10.50	245	32.03	15	50	65	7.31
3	6.57	25	9.47		6.57	202	30.01		25	7.60	100	16.16	61	7.97	16	74	90	10.12
4	5.13	18	6.82		5.13	67	9.96		30	9.12	126	20.36	56	7.32	30	95	125	14.06
5	4.45	23	8.71		4.45	47	6.98		11	3.34	39	6.30	39	5.10	21	95	116	13.05
6	4.33	26	9.85		4.33	62	9.21		13	3.95	52	8.40	17	2.22	7	33	40	4.50
7	3.69	25	9.47		3.69	41	6.09		15	4.56	43	6.95	15	1.96	14	46	60	6.75
8	3.77	22	8.33		3.77	19	2.82		9	2.74	27	4.36	16	2.09	16	42	58	6.52
9	3.25	21	7.95		3.25	14	2.08		8	2.43	28	4.52	17	2.22	13	29	42	4.72
10	3.69	17	6.44		3.69	18	2.67		17	5.17	24	3.88	6	0.78	16	18	34	3.82
11	3.29	10	3.79		3.29	13	1.93		10	3.04	15	2.42	8	1.05	10	14	24	2.70
12	2.52	7	2.65		2.52	12	1.78		3	0.91	20	3.23	13	1.70	3	17	20	2.25
13	Avg.	5	1.89		Avg.	6	0.89		4	1.22	16	2.58	6	0.78	11	11	22	2.47
14	1.48	9	3.41		1.48	9	1.34		6	1.82	7	1.13	9	1.18	8	13	21	2.36
15	2.88	8	3.03		2.88	4	0.59		1	0.30	12	1.94	12	1.57	23	21	44	4.95
16	2.72	2	1.14		2.72	5	0.74		5	1.52	5	0.81	4	0.52	10	7	17	1.91
17	1.76	4	1.52		1.76	3	0.45		4	1.22	3	0.48	12	1.57</td				

Table 1 (continued)

Age	1963						1964						1965						
	Vessel > 150 GRT			Landsmen			Vessel > 150 GRT			Landsmen			Vessel > 150 GRT			Landsmen			
	A	D	F	D + F	B	D	F	D + F	A	D	F	D + F	A	D	F	D + F	A	%	
	Freq.	%	Freq.	Total	%	Freq.	%	Freq.	Total	%	Freq.	Total	%	Freq.	%	Freq.	Total	%	
1	111	8.88	26	18	44	3.97	3	2.36	43	10	53	5.90	32	19.16	4	4	8	1.18	
2	121	9.68	83	52	135	12.18	6	4.72	42	31	73	8.12	13	7.78	10	17	27	3.99	
3	106	8.48	54	86	140	12.64	8	6.30	50	74	124	13.79	13	7.78	24	45	69	10.19	
4	55	4.40	33	90	123	11.10	11	8.66	32	64	96	10.68	15	8.98	34	72	106	15.66	
5	46	3.68	26	80	106	9.57	7	5.51	32	65	97	10.79	23	13.77	24	71	95	14.03	
6	61	4.88	21	56	77	6.95	12	9.45	42	40	82	9.12	22	13.17	18	66	84	12.41	
7	67	5.36	8	32	40	3.61	6	4.72	29	27	56	6.23	7	4.19	15	39	54	7.98	
8	66	5.28	10	36	46	4.15	5	3.94	35	11	46	5.12	2	1.20	16	32	48	7.09	
9	63	5.04	12	22	34	3.07	5	3.94	23	10	33	3.67	2	1.20	4	18	22	3.25	
10	72	5.76	15	25	40	3.61	8	6.30	27	6	33	3.67	5	2.99	5	9	14	2.07	
11	70	5.60	14	24	38	3.43	4	3.15	18	11	29	3.23	1	0.60	5	10	15	2.22	
12	51	4.08	10	20	30	2.71	4	3.15	21	5	26	2.89	7	4.19	6	12	18	2.66	
13	57	4.56	9	11	20	1.81	3	2.36	20	6	26	2.89	0	-	7	16	23	3.40	
14	56	4.48	14	17	31	2.80	3	2.36	21	3	24	2.67	5	2.99	7	8	15	2.22	
15	42	3.36	11	22	33	2.98	5	3.94	7	4	11	1.22	4	2.40	10	8	18	2.66	
16	54	4.32	9	15	24	2.17	4	3.15	11	2	13	1.45	2	1.20	6	6	12	1.77	
17	36	2.88	11	13	24	2.17	5	3.94	12	4	16	1.78	1	0.60	5	5	10	1.48	
18	24	1.92	4	9	13	1.17	8	6.30	6	1	7	0.78	3	1.80	4	2	6	0.89	
19	18	1.44	12	4	16	1.44	4	3.15	14	0	14	1.56	3	1.80	4	6	10	1.48	
20	18	1.44	10	10	20	1.81	0	-	6	2	8	0.89	1	0.60	1	3	4	0.59	
21	17	1.36	6	5	11	0.99	4	3.15	6	0	6	0.67	2	1.20	2	3	5	0.74	
22	12	0.96	8	5	13	1.17	2	1.57	3	2	5	0.56	1	0.60	1	1	2	0.30	
23	9	0.72	10	4	14	1.26	2	1.57	5	0	5	0.56	0	-	0	2	2	0.30	
24	8	0.64	6	2	8	0.72	3	2.36	2	0	2	0.22	0	-	2	1	3	0.44	
25+	10	0.80	14	14	28	2.53	5	3.94	12	2	14	1.56	3	1.80	4	3	7	1.03	
Total	1250	100.00	436	672	1108	100.01	127	99.99	519	380	899	100.02	167	100.00	218	459	677	100.03	
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1966						1967						1968						1969	
Age	Vessel > 150 GRT			Landsmen			Vessel > 150 GRT			Landsmen			Vessel > 150 GRT			Landsmen			
	A	D	F	D + F	B	A + B	A	B	A + B	D	E	F	D + E + F	A	B	E	F	G	D + E + F + G
	Freq.	%	Freq.	Total	%	Freq.	Freq.	Total	%	Freq.	Freq.	Freq.	Total	Freq.	Freq.	Freq.	Freq.	Total	%
1	120	17.73	1	10	11	2.83	176	55	231	24.06	6	17	12	18	2.30				
2	100	14.77	2	29	31	7.97	61	31	92	9.58	11	14	42	53	6.77				
3	39	5.76	3	42	45	11.57	18	5	23	2.40	17	1	46	63	8.05				
4	40	5.91	5	44	49	12.60	18	6	24	2.50	24	9	37	61	7.79				
5	45	6.65	7	42	49	12.60	29	19	48	5.00	30	11	58	88	11.24				
6	45	6.65	5	50	55	14.14	46	22	68	7.08	25	21	72	97	12.39				
7	44	6.50	4	33	37	9.51	40	19	59	6.15	27	26	64	91	11.62				
8	31	4.58	0	19	19	4.88	30	13	43	4.48	14	21	43	57	7.28				
9	15	2.22	4	14	18	4.63	23	5	28	2.92	10	26	31	41	5.24				
10	17	2.51	2	8	10	2.57	16	8	24	2.50	9	16	27	36	4.60				
11	23	3.40	1	10	11	2.83	23	13	36	3.75	11	21	14	25	3.19				
12	17	2.51	0	5	5	1.29	18	6	24	2.50	5	14	15	20	2.55				
13	15	2.22	0	7	7	1.80	14	5	19	1.98	6	16	10	16	2.04				
14	17	2.51	0	7	7	1.80	19	10	29	3.02	7	15	16	23	2.94				
15	14	2.07	0	7	7	1.80	20	10	30	3.13	7	13	12	19	2.43				
16	14	2.07	1	7	8	2.06	14	6	20	2.08	6	17	4	10	1.28				
17	10	1.48	2	3	5	1.29	18	8	26	2.71	3	12	9	12	1.53				
18	17	2.51	0	1	1	0.26	20	9	29	3.02	4	9	7	11	1.40				
19	10	1.48	2	1	3	0.77	21	9	30	3.13	6	8	4	10	1.28				
20	11	1.62	0	2	2	0.51	15	4	19	1.98	4	11	5	9	1.15				
21	8	1.18	0	1	1	0.26	8	4	12	1.25	4	3	3	7	0.89				
22	3	0.44	1	1	2	0.51	8	1	9	0.94	0	2	4	4	0.51				
23	7	1.03	0	1	1	0.26	8	3	11	1.15	1	3	3	0	1	0.13			
24	4	0.59	0	0	0	-	4	2	6	0.63	2	5	2	4	0.51				
25+	11	1.62	2	3	5	1.29	12	8	20	2.08	4	4	3	7	0.89				
Total	677	100.01	42	347	389	100.03	679	281	960	100.02	243	315	540	783	100.00				
<hr/>																			
<hr/>																			
1968						1969						1968						1969	
Age	Vessel > 150 GRT			Landsmen			Vessel > 150 GRT			Landsmen			Vessel > 150 GRT			Landsmen			
	A	B	A + B	E	F	E + F	A	B	A + B	D	E	F	G	A	B	E	F	G	D + E + F + G
	Freq.	Freq.	Total	%	Freq.	Freq.	Total	%	Freq.	Freq.	Freq.	Total	Freq.	Freq.	Freq.	Freq.	Total	%	
1	84	219	17.11	7	11	18	2.65	62	371	433	42.41	5	87	9	37	138	12.37		
2	77	151	11.80	8	48	56	5.24	2	42	44	4.31	4	13	20	14	51	4.57		
3	48	90	7.03	8	68	76	11.18	6	34	40	3.92	29	13	49	21	112	10.04		
4	20	47	3.67	8	56	64	9.41	1	30	31	3.04	18	13	69	10	110	9.86		
5	17	30	4.77	5	39	44	6.47	2	39	41	4.02	11	11	71	11	104	9.32		
6	23	20	4.36	9	54	63	9.26	4	28	32	3.13	6	10	49	2	67			

Table 1 (continued)

Age	1970								1971								1972			
	Vessel>150 GRT				Landsmen				Vessel>150 GRT				Landsmen				Vessel>150 GRT		Landsmen	
	A	B	A + B	D	E	F	G	D+E+F+G	A	D+E+F	A	D+E+F	A	%	D+E+F	%	A	%	D+E+F	%
1	105	132	237	24.92	21	41	5	31	98	4.38	239	47.14	63	5.88	12	8.89	12	4.29		
2	98	109	207	21.77	60	41	12	69	182	8.14	66	13.02	89	8.30	9	6.67	28	10.00		
3	11	33	44	4.63	67	15	32	89	203	9.08	43	8.48	164	15.30	9	6.67	20	7.14		
4	17	30	47	4.94	63	25	55	45	188	8.41	19	3.75	95	8.86	24	17.78	32	11.43		
5	18	29	47	4.94	68	23	77	40	208	9.31	18	3.55	113	10.54	9	6.67	17	6.07		
6	12	15	27	2.84	44	19	38	16	117	5.23	11	2.17	69	6.44	10	7.41	18	6.43		
7	15	18	33	3.47	24	14	35	8	81	3.62	10	1.97	49	4.57	13	9.63	9	3.21		
8	8	26	34	3.58	22	43	64	12	141	6.31	8	1.58	48	4.48	9	6.67	11	3.93		
9	13	15	28	2.94	25	49	66	8	148	6.62	17	3.35	44	4.10	6	4.44	6	2.14		
10	18	22	40	4.21	24	39	82	8	153	6.85	15	2.96	68	6.34	6	4.44	7	2.50		
11	13	13	26	2.73	13	24	61	4	102	4.56	10	1.97	41	3.82	4	2.96	15	5.36		
12	20	7	27	2.84	8	28	42	4	82	3.67	11	2.17	40	3.73	5	3.70	13	4.64		
13	12	6	18	1.89	8	26	37	1	72	3.22	7	1.38	40	3.73	2	1.48	7	2.50		
14	6	11	17	1.79	5	19	30	0	54	2.42	2	0.39	25	2.33	1	0.74	15	5.36		
15	11	8	19	2.00	10	29	32	2	73	3.27	4	0.79	25	2.33	4	2.96	8	2.86		
16	13	11	24	2.53	2	30	27	1	60	2.68	4	0.79	19	1.77	3	2.22	4	1.43		
17	7	3	10	1.05	9	20	30	0	59	2.64	2	0.39	19	1.77	2	1.48	8	2.86		
18	7	6	13	1.37	6	12	21	1	40	1.79	3	0.59	15	1.40	2	1.48	10	3.57		
19	7	6	13	1.37	6	18	17	1	42	1.88	3	0.59	12	1.12	0	-	5	1.79		
20	6	4	10	1.05	6	22	16	3	47	2.10	1	0.20	14	1.31	3	2.22	14	5.00		
21	4	5	9	0.95	1	10	10	1	22	0.98	1	0.20	7	0.65	0	-	9	3.21		
22	5	2	7	0.74	1	5	9	0	15	0.67	2	0.39	4	0.37	1	0.74	5	1.79		
23	3	2	5	0.53	3	7	4	0	14	0.63	1	0.20	4	0.37	0	-	4	1.43		
24	3	0	3	0.32	1	5	5	0	11	0.49	0	-	2	0.19	0	-	3	1.07		
25+	3	3	6	0.63	0	5	18	0	23	1.03	10	1.97	3	0.28	1	0.74	0	-		
Total	435	516	951	100.03	497	569	825	344	2235	99.98	507	99.98	1072	99.98	135	99.99	180	100.01		

1973							1974								
Age	Vessel > 150 GRT			Landsmen			Vessel > 150 GRT			Vessel < 150 GRT			Landsmen		
	A	B	A + B		E		B		C		E	F	E + F		
	Freq.	Freq.	Total	%	Freq.	%	Freq.	%	Freq.	%	Freq.	Freq.	Total	%	
1	4	171	175	10.80	6	1.92	360	31.66	152	54.68	8	0	8	1.56	
2	5	232	237	14.63	14	4.49	227	19.96	55	19.78	18	0	18	3.51	
3	0	188	188	11.60	16	5.13	86	7.56	18	6.47	7	2	9	1.75	
4	5	173	178	10.99	9	2.88	65	5.72	15	5.40	10	5	15	2.92	
5	6	293	299	18.46	11	3.53	67	5.89	11	3.96	12	17	29	5.65	
6	0	81	81	5.00	11	3.53	88	7.74	11	3.96	19	61	80	15.59	
7	1	67	68	4.20	16	5.13	21	1.85	4	1.44	13	20	33	6.43	
8	6	79	85	5.25	15	4.81	21	1.85	3	1.08	18	30	48	9.36	
9	0	42	42	2.59	21	6.73	36	3.17	1	0.36	17	19	36	7.02	
10	4	35	39	2.41	17	5.45	20	1.76	0	-	20	15	35	6.82	
11	3	44	47	2.90	24	7.69	12	1.06	1	0.36	18	8	26	5.07	
12	0	27	27	1.67	27	8.65	19	1.67	2	0.72	14	11	25	4.87	
13	0	32	32	1.98	22	7.05	20	1.76	2	0.72	17	6	23	4.48	
14	0	17	17	1.06	21	6.73	13	1.14	1	0.36	17	2	19	3.70	
15	1	22	23	1.42	18	5.77	12	1.06	0	-	16	2	18	3.51	
16	1	17	18	1.11	15	4.81	10	0.88	1	0.36	21	2	23	4.48	
17	1	8	9	0.56	11	3.53	10	0.88	1	0.36	13	4	17	3.31	
18	1	4	5	0.31	10	3.21	8	0.70	0	-	10	1	11	2.14	
19	1	10	11	0.68	6	1.92	6	0.53	0	-	7	2	9	1.75	
20	0	12	12	0.74	6	1.92	2	0.18	0	-	6	1	7	1.36	
21	0	0	0	-	3	0.96	2	0.18	0	-	8	0	8	1.56	
22	0	0	0	-	13	4.17	4	0.35	0	-	7	0	7	1.36	
23	0	2	2	0.12	0	-	2	0.18	0	-	3	1	4	0.78	
24	0	2	2	0.12	0	-	5	0.44	0	-	2	0	2	0.39	
25+	0	23	23	1.42	0	-	21	1.85	0	-	2	1	3	0.58	
Total	39	1581	1620	100.02	312	100.01	1137	100.02	278	100.01	303	210	513	99.95	

Age	1975										1976									
	Vessel > 150 GRT			Vessel < 150 GRT			Landsmen				Vessel > 150 GRT			Vessel < 150 GRT			Landsmen			
	A	B	C	D + E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
Freq.	%	Freq.	%	Freq.	Freq.	Freq.	Freq.	Total	%	Freq.	Freq.	Total	%	Freq.	Freq.	Freq.	Freq.	Total	%	
1	464	37.42	201	53.74	177	0	177	15.14	298	277	575	40.69	188	51.37	115	0	115	19.60		
2	223	17.98	77	20.59	178	1	179	15.31	109	94	203	14.37	92	25.14	75	0	75	12.82		
3	102	8.23	33	8.82	116	12	128	10.95	61	36	97	6.86	45	12.30	71	1	72	12.31		
4	67	5.40	11	2.94	59	26	85	7.27	37	42	79	5.59	28	7.65	46	13	59	10.09		
5	57	4.60	8	2.14	37	62	99	8.47	24	32	56	3.96	4	1.09	26	16	42	7.14		
6	57	4.60	7	1.87	29	57	86	7.36	14	30	44	3.11	1	0.27	23	15	38	6.50		
7	28	2.26	10	2.67	27	71	98	8.38	18	26	44	3.11	1	0.27	11	19	30	5.13		
8	23	1.85	2	0.53	15	50	65	5.56	13	20	33	2.34	2	0.55	16	13	29	4.96		
9	29	2.34	2	0.53	10	21	31	2.65	11	20	31	2.19	0	-	4	9	13	2.22		
10	17	1.37	10	2.67	18	19	37	3.17	7	15	22	1.56	0	-	10	14	24	4.10		
11	28	2.26	1	0.27	14	14	28	2.40	5	7	12	0.85	2	0.55	6	8	14	2.39		
12	17	1.37	4	1.07	13	14	27	2.31	5	12	17	1.20	2	0.55	5	4	9	1.54		
13	20	1.61	2	0.53	20	10	30	2.57	7	18	25	1.77	0	-	3	5	8	1.37		
14	15	1.21	0	-	18	9	27	2.31	4	19	23	1.63	1	0.27	4	4	8	1.33		
15	15	1.21	0	-	10	5	15	1.28	5	9	14	0.99	0	-	13	3	16	2.74		
16	13	1.05	2	0.53	7	7	14	1.20	5	15	20	1.42	0	-	4	1	5	0.89		
17	13	1.05	1	0.27	7	1	8	0.68	5	13	18	1.27	0	-	5	1	6	1.01		
18	10	0.80	0	-	9	7	16	1.37	3	10	13	0.92	0	-	4	0	4	0.64		
19	8	0.65	2	0.53	4	2	6	0.51	2	9	11	0.78	0	-	4	0	4	0.64		
20	6	0.50	0	-	4	0	4	0.34	1	10	11	0.78	0	-	5	0	5	0.89		
21	5	0.40	1	0.27	3	0	3	0.26	1	14	15	1.06	0	-	1	0	1	0.17		
22	7	0.57	0	-	0	0	0	-	2	10	12	0.85	0	-	1	0	1	0.17		
23	5	0.40	0	-	2	1	3	0.26	1	9	10	0.71	0	-	3	0	3	0.31		
24	6	0.50	0	-	2	0	2	0.17	0	9	9	0.64	0	-	2	0	2	0.31		
25+	5	0.40	0	-	1	0	1	0.09	0	19	19	1.34	0	-	2	0	2	0.31		
Total	1240	100.03	374	99.97	780	389	1169	100.01	638	775	1413	99.99	366	100.01	459	126	585	99.80		

Table 1 (continued)

Age	1977										1978									
	Vessel >150 GRT			Vessel <150 GRT			Landsmen				Vessel >150 GRT			Vessel <150 GRT			Landsmen			
	A	B	C	D + E	F	G	D+E+F	Total	%	B	C	D	E	F	G	Total	%			
1	232	28.12	117	27.73	92	3	95	15.65		129	14.74	228	43.10	116	11	44	171	12.52		
2	122	14.79	85	20.14	116	10	126	20.76		150	17.14	131	24.76	79	67	45	191	13.98		
3	95	11.52	80	18.96	93	11	104	17.13		132	15.08	64	12.10	36	140	55	231	16.91		
4	78	9.45	59	13.98	65	0	65	10.71		108	12.34	42	7.94	49	124	36	209	15.30		
5	76	9.21	27	6.40	32	16	48	7.91		94	10.74	22	4.16	42	123	18	183	13.40		
6	37	4.48	15	3.55	20	10	30	4.94		51	5.83	17	3.21	31	63	12	106	7.76		
7	20	2.42	10	2.37	20	6	26	4.28		26	2.97	4	0.76	15	23	6	44	3.22		
8	17	2.06	5	1.18	25	3	28	4.61		31	3.54	7	1.32	11	28	6	45	3.29		
9	31	3.76	1	0.24	10	2	12	1.98		26	2.97	0	-	13	20	2	35	2.56		
10	10	1.21	3	0.71	4	2	6	0.99		22	2.51	4	0.76	13	23	0	36	2.64		
11	8	0.97	3	0.71	6	1	7	1.15		9	1.03	1	0.19	7	8	0	15	1.10		
12	10	1.21	2	0.47	4	0	4	0.66		11	1.26	1	0.19	6	9	0	15	1.10		
13	15	1.82	2	0.47	7	1	8	1.32		11	1.26	2	0.38	5	3	0	8	0.58		
14	17	2.06	5	1.18	8	1	9	1.48		11	1.26	0	-	9	5	0	14	1.02		
15	9	1.09	6	1.42	7	0	7	1.15		10	1.14	2	0.38	5	1	0	6	0.44		
16	13	1.58	2	0.47	5	0	5	0.82		9	1.03	0	-	7	4	0	11	0.80		
17	9	1.09	0	-	1	0	1	0.16		11	1.26	0	-	8	0	1	9	0.66		
18	5	0.61	0	-	5	0	5	0.82		9	1.03	1	0.19	5	0	1	6	0.44		
19	3	0.36	0	-	1	0	1	0.16		6	0.68	0	-	5	1	1	7	0.51		
20	2	0.24	0	-	5	0	5	0.82		4	0.46	1	0.19	3	2	0	5	0.37		
21	4	0.48	0	-	1	0	1	0.16		4	0.46	1	0.19	1	1	0	2	0.15		
22	2	0.24	0	-	3	0	3	0.49		1	0.11	1	0.19	2	0	0	2	0.15		
23	5	0.61	0	-	5	0	5	0.82		5	0.57	0	-	1	1	0	2	0.15		
24	3	0.36	0	-	3	0	3	0.49		2	0.23	0	-	1	1	0	2	0.15		
25+	2	0.24	0	-	3	0	3	0.49		3	0.34	0	-	6	4	1	11	0.80		
Total	825	99.98	422	99.98	541	66	607	99.95		875	99.98	529	99.97	476	662	228	1366	100.00		

Age	1979										1980										
	Vessel >150 GRT			Vessel <150 GRT			Landsmen				Vessel <150 GRT			Landsmen							
	A	B	C	E	G	E + G	Freq.	Total	%	C	E	Freq.	%	Freq.	%	Freq.	%				
1	173	30.78	113	55.39	142	18	160	14.26		382	46.14	35	8.52	9	3.46						
2	85	15.12	43	21.07	168	48	216	19.25		167	20.17	33	8.03	21	8.08						
3	51	9.07	18	8.82	112	45	157	13.99		92	11.11	45	10.95	57	21.92						
4	47	8.36	10	4.90	83	44	127	11.32		46	5.56	49	11.92	33	12.69						
5	41	7.30	7	3.43	84	31	115	10.25		30	3.62	46	10.97	35	13.46						
6	27	4.80	4	1.96	58	23	81	7.22		26	3.14	25	6.08	35	13.46						
7	26	4.63	2	0.98	31	15	46	4.10		16	1.93	26	6.33	20	7.69						
8	21	3.74	1	0.49	22	4	26	2.32		10	1.21	23	5.60	14	5.38						
9	9	1.60	1	0.49	21	4	25	2.23		9	1.09	15	3.65	6	2.31						
10	10	1.78	0	-	12	5	17	1.52		4	0.48	8	1.95	2	0.77						
11	15	2.67	0	-	14	2	16	1.43		7	0.85	6	1.46	8	3.08						
12	12	2.14	0	-	14	4	18	1.60		7	0.85	10	2.43	3	1.15						
13	8	1.42	0	-	17	1	18	1.60		5	0.60	9	2.19	1	0.38						
14	4	0.71	1	0.49	7	1	8	0.71		8	0.96	8	1.95	1	0.38						
15	5	0.89	1	0.49	9	0	9	0.80		6	0.72	11	2.68	1	0.38						
16	5	0.89	0	-	7	1	8	0.71		5	0.60	10	2.43	3	1.15						
17	4	0.71	0	-	14	0	14	1.25		4	0.48	9	2.19	2	0.76						
18	6	1.07	0	-	12	1	13	1.16		1	0.24	1	0.24								
19	3	0.53	0	-	9	1	10	0.89		2	0.24	2	0.48								
20	3	0.53	0	-	4	1	5	0.44		1	0.12	8	1.95	2	0.76						
21	3	0.53	0	-	5	0	5	0.44				7	1.70								
22	0	-	0	-	8	0	8	0.71				7	1.70								
23	2	0.36	0	-	1	1	2	0.18				1	1.70								
24	0	-	0	-	3	0	3	0.27				17	4.14	1	0.38						
25+	2	0.36	3	1.47	15	0	15	1.34				6	2.31								
Total	562	99.99	204	99.98	872	250	1122	99.99		828		411			260						

Table 2. Percent frequency of ages in West Greenland catch samples.

Age	% Frequency								
	1954-62 ¹	1963-71 ¹	1972	1973	1974	1975	1976	1977	1978
0	59	58	57	55	64	63	62	79	44
1	16	11	12	22	18	23	22	10	28
2	5	7	8	8	7	6	8	4	12
3	4	4	4	4	1	2	4	2	6
4	3	3	5	1	2	1	2	1	2
5	2	3	2	2	-	-	-	1	2
6	2	2	2	1	1	-	-	-	2
7	1	2	2	-	-	1	-	1	-
8	1	1	-	1	-	-	-	-	1
9	1	1	-	-	-	1	-	-	-
10+	6	9	7	6	5	2	2	2	3

¹ Kapel (pers. comm.)

Table 3. Age samples of the Canadian Arctic catch and available estimates of yearly harvest.

Age	Source				Total	%	Year	Catch
	Sergeant ¹	Stewart ¹						
	1967	1969	1976	1977				
0	-	-	24	6	30	3.39	1962-71 ²	1728 (\bar{x})
1	5	9	25	19	58	6.56	1974 ³	1117
2	11	23	46	25	105	11.88	1975 ³	2513
3	25	11	61	20	117	13.24	1976 ³	2017
4	13	19	28	19	79	8.94	1977 ³	1508
5	9	23	7	8	47	5.32		
6	17	12	10	4	43	4.86		
7	20	17	6	3	46	5.20		
8	14	14	3	2	33	3.73		
9	10	9	4	1	24	2.71		
10	14	19	4	2	39	4.41		
11	9	14	1	3	27	3.05		
12	14	11	1	3	28	3.17		
13	8	9	0	0	17	1.92		
14	10	8	0	2	20	2.26		
15	12	17	6	1	36	4.07		
16	7	5	3	2	17	1.92		
17	7	6	4	2	19	2.15		
18	6	5	0	3	14	1.58		
19	2	5	3	5	15	1.70		
20	5	10	4	4	23	2.60		
21	4	3	0	4	11	1.24		
22	3	1	1	4	9	1.02		
23	2	3	1	2	8	0.90		
24	1	6	0	2	9	1.02		
25+	2	4	0	4	10	1.13		
Total	230	263	242	149	884			

¹ personal communication

² Smith and Taylor (1977)

³ Sergeant (pers. comm.)

Table 4. Harp seal catches¹ from 1952 to 1980.

Year	Vessel >150 GRT		Vessel <150 GRT		Landsmen		Nets		Canadian ²		West Greenland		Total		Total Kill
	Pups	1+	Pups	1+	Pups	1+	Pups	1+	Pups	1+	Pups	1+	Pups	1+	
1952	172185	98378			25878	1667	9000		60	1724	9676	6724	207799	117493	325292
1953	147090	66823			50885	-	8100		9676	6724	11160	7753	207711	83371	291082
1954	125353	83939			49681	-	5443		9113	6332	261470	9859	186254	9859	285113
1955	231700	75671			20597	-	5401		6430	4468	34887	54205	89129	350598	350598
1956	299745	42585			41652	-	5428		7565	5257	173123	87023	402492	402492	402492
1957	137721	76437			27777	-	3605		9859	6849	150915	165363	244111	165363	260146
1958	80430	137227			60566	10563	9000		5219	3626	165729	129460	316278	316278	316278
1959	22212	77304			11620	-	3998		9430	6554	165729	129460	86652	86652	330763
1960	131649	114534			24590	-	6648		7013	4873	175892	125644	295189	295189	295189
1961	154286	13170			14533	-	5877		4946	3438	212094	118063	201536	201536	201536
1962	164625	99513			42463	6888	6500		5803	4200	276282	77547	330157	330157	330157
1963	207818	57094			62601	8029	6500		5302	3838	271744	80843	353829	353829	353829
1964	210089	60348			56293	8433	6500		5365	3886	188183	57105	352587	352587	352587
1965	121398	33757			5225	748	56135	10490	6500		4078	2591	255273	76339	245288
1966	209145	59384			2665	470	39325	5670	6500		2446	1769	280256	60099	331612
1967	252837	41361			542	2945	24371	5800			4076	2950	160594	40912	340356
1968	125236	30328			6083	924	25139	-	4986		3702	2681	239083	59447	201506
1969	202685	44940			2717	185	29919	1632	8285		3583	2595	221074	44383	298530
1970	184192	26225			11999	862	21240	3046	9931		3214	2326	213883	17357	182147
1971	169426	14343			10106	811	31047	625	4608		3392	2560	120262	17357	238290
1972	104109	1646			4295	2535	8406	5774	3118		5039	4123	103434	31344	137619
1973	63369	15081			10717	1731	24249	5282	3403		4479	2520	119364	37054	134778
1974	85387	21828			5194	1904	24244	4365	4713		3780	2220	144478	37669	156418
1975	109832	10992			15107	9027	15699	4503	9203		N/A	N/A	132518 ³	30667 ³	163185 ³
1976	93939	4576			17181	17789	20965	3865	6687		6557	1743	133601	31628	165229
1977	92904	2048			18970	15525	15110	7555	3033		7900	2100	124150	49954	174104
1978	63669	3884			11188	16640	41333	16540	9066		N/A	N/A	132518 ³	30667 ³	163185 ³
1979	96926	1011			8799	9238	26733	13820	4274		N/A	N/A	133197 ³	381083	171305 ³
1980	91349	1521			19512	17196	22276	14039	5352						

¹ from ICNAF Statistical Bulletins² average for the period of available data³ excluding West Greenland catch

Table 5. Age composition of annual harp seal catches by large vessel, nets and landsmen between 1952 and 1980.

Age	1952			1953			1954			1955		
	Large vessel > 150 GRT	Nets	Landsmen < 150 GRT	Large vessel > 150 GRT	Nets	Landsmen < 150 GRT	Large vessel > 150 GRT	Nets	Landsmen < 150 GRT	Large vessel > 150 GRT	Nets	Landsmen < 150 GRT
0	172,185	0	25,878	147,090	0	50,885	125,353	0	49,681	231,700	0	20,597
1	4,348	221	766	20,528	79	31,494	151			21,286	514	
2	10,448	941	370	6,074	256	12,163	424			7,673	825	
3	6,532	1,051	198	5,092	659	3,517	432			4,972	1,029	
4	4,791	1,080	126	2,987	756	4,868	757			3,882	439	
5	5,657	1,136	61	3,040	1,000	2,434	500			3,367	622	
6	10,881	720	42	2,352	872	3,240	469			3,277	375	
7	7,398	664	24	2,105	719	2,837	492			2,792	321	
8	7,398	499	15	2,352	531	2,703	333			2,853	418	
9	5,224	526	4	2,305	475	1,754	257			2,459	139	
10	6,090	471	13	1,911	420	2,703	205			2,792	150	
11	5,224	388	6	2,499	353	1,083	167			2,490	129	
12	1,308	471	8	1,370	372	2,434	189			1,907	129	
13	1,308	166	6	1,076	292	2,434	99			1,544	11	
14	2,174	0	6	835	189	1,217	99			1,120	43	
15	3,915	166	7	1,617	207	1,620	212			2,179	43	
16	1,308	111	4	1,811	177	2,166	30			2,058	22	
17	2,174	56	2	1,276	134	949	68			1,332	32	
18	1,741	56	1	782	122	269	68			696	43	
19	866	111	2	588	85	1,083	38			757	11	
20	5,224	166	1	2,452	92	537	295			2,331	43	
21	866	0	2	1,570	7	269	38			1,271	32	
22	0	0	1	882	55	269	15			757	22	
23	433	0	0	588	36	680	38			605	11	
24	1,308	0	0	441	12	134	08			515	0	
25+	1,741	0	2	294	110	1,083	60			757	0	
Age	1956			1957			1958			1959		
	Large vessel > 150 GRT	Nets	Landsmen < 150 GRT	Large vessel > 150 GRT	Nets	Landsmen < 150 GRT	Large vessel > 150 GRT	Nets	Landsmen < 150 GRT	Large vessel > 150 GRT	Nets	Landsmen < 150 GRT
0	299,745	0	41,652	137,721	0	27,777	430	0	60,566	227,212	0	11,620
1	11,979	89		21,502	154		19,267	205	4,856	21,746	136	
2	4,318	477		7,751	231		7,218	249	2,348	7,839	348	
3	2,798	501		5,022	308		9,153	909	1,254	5,079	379	
4	2,185	444		3,921	354		9,633	1,423	802	3,966	273	
5	1,895	299		3,401	185		8,673	1,041	384	3,440	348	
6	1,844	283		3,310	154		5,297	1,026	267	3,347	394	
7	1,571	339		2,821	247		5,297	616	151	2,853	379	
8	1,605	436		2,882	284		4,336	660	97	2,914	333	
9	1,384	364		2,484	200		4,336	454	24	2,512	318	
10	1,571	267		2,821	169		9,153	440	82	2,853	257	
11	1,401	186		2,515	247		5,297	410	39	2,543	152	
12	1,073	242		1,926	154		6,783	293	54	1,948	106	
13	869	129		1,559	154		3,856	278	39	1,577	76	
14	630	218		1,131	185		2,895	220	39	1,144	136	
15	1,226	105		2,201	108		8,673	103	43	2,226	121	
16	1,158	163		2,079	92		5,777	44	24	2,103	46	
17	749	121		1,345	77		2,895	88	10	1,361	61	
18	392	186		703	77		480	73	5	711	30	
19	426	145		764	62		1,441	44	10	773	46	
20	1,312	194		2,357	62		1,180	73	5	2,381	30	
21	715	24		1,284	16		2,895	0		1,299	0	
22	426	33		764	31		2,401	14	5	773	0	
23	341	48		611	0		0,961	44	0	618	15	
24	290	56		520	43		1,921	44	0	526	0	
25+	426	81		764	77		3,376	249	15	773	15	
Age	1960			1961			1962			1963		
	Large vessel > 150 GRT	Nets	Landsmen < 150 GRT	Large vessel > 150 GRT	Nets	Landsmen < 150 GRT	Large vessel > 150 GRT	Nets	Landsmen < 150 GRT	Large vessel > 150 GRT	Nets	Landsmen < 150 GRT
0	131,649	0	24,590	154,286	0	14,533	164,625	0	42,463	207,818	0	62,601
1	32,218	336		4,883	152		26,142	190	3,166	5,070	258	3,690
2	11,614	1,057		1,360	617		31,874	475	1,531	5,527	791	1,784
3	7,525	1,995		1,001	950		7,931	658	818	4,842	821	952
4	5,876	662		1,201	1,198		7,284	915	523	2,512	721	609
5	5,097	464		440	370		5,075	849	251	2,101	621	292
6	4,959	612		520	494		2,209	292	174	2,786	452	203
7	4,226	405		601	408		1,950	439	98	3,060	235	115
8	4,318	187		361	256		2,080	424	63	3,015	270	74
9	3,722	138		320	266		2,209	307	16	2,878	200	
10	4,226	178		681	228		776	248	54	3,289	235	63
11	3,768	128		400	142		1,045	176	25	3,197	223	30
12	2,886	118		120	190		1,692	146	35	2,329	176	41
13	2,336	59		161	152		776	160	25	2,603	118	30
14	1,695	89		240	66		1,174	153	25	2,558	182	30
15	3,299	39		40	144		1,562	322	28	1,918	194	33
16	3,115	49		200	48		517	124	16	2,466	141	18
17	2,016	30		161	28		1,562	95	7	1,644	141	8
18	1,054	30		80	19		647	110	3	1,096	76	4
19	1,145	00		120	0		517	051	7	822	94	8
20	3,528	39		80	66		1,174	117	3	822	118	4
21	1,924	0		0	0		129	22	7	776	64	8
22	1,145	10		80	0		517	81	3	548	76	4
23	916	0		40	19		0	29	0	411	82	0
24	779	0		0	9		129	22	0	365	47	0
25+	1,145	20		80	85		517	95	10	457	164	11

Table 5 (continued)

Age	1964			1965			1966			1967		
	Large vessel > 150 GRT	Nets	Landsmen < 150 GRT	Large vessel > 150 GRT	Nets	Landsmen < 150 GRT	Large vessel > 150 GRT	Nets	Landsmen < 150 GRT	Large vessel > 150 GRT	Nets	Landsmen < 150 GRT
0	210,189	0	56,293	121,398	0	61,360	209,145	0	41,990	252,837	0	24,913
1	1,424	384	3,877	6,468	77	5,165	10,529	184	2,822	9,951	150	4,020
2	2,848	528	1,875	2,626	259	2,497	8,771	518	1,365	3,962	440	1,944
3	3,802	896	1,001	2,626	662	1,333	3,421	752	729	993	523	1,038
4	5,226	694	640	3,031	1,017	853	3,510	818	466	1,034	506	664
5	3,325	701	307	4,648	911	409	3,949	818	223	2,068	731	318
6	5,703	593	213	4,446	807	284	3,949	919	155	2,928	805	221
7	2,848	405	120	1,414	519	161	3,860	618	88	2,544	755	125
8	2,378	333	78	405	461	103	2,720	317	56	1,853	473	80
9	2,378	238	19	405	211	26	3,18	301	14	1,208	341	20
10	3,802	238	66	1,009	134	88	1,491	167	48	1,034	299	68
11	1,901	210	31	203	144	42	2,019	184	23	1,551	207	32
12	1,901	188	43	1,414	173	57	1,491	84	31	1,034	166	45
13	1,424	188	31	0	221	42	1,318	117	23	819	133	32
14	1,424	174	31	1,009	144	42	1,491	117	23	1,249	191	32
15	2,378	79	34	810	173	46	1,229	117	25	1,295	158	36
16	1,901	94	19	405	115	26	1,229	134	14	860	83	20
17	2,378	116	8	203	96	11	879	84	6	1,121	99	9
18	3,802	51	4	608	58	05	1,491	17	3	1,249	91	40
19	1,901	101	8	608	96	11	879	50	6	1,295	83	9
20	0	58	4	203	38	5	962	33	3	819	75	40
21	1,901	44	8	405	48	11	701	17	6	517	58	9
22	947	36	4	203	20	5	261	33	3	389	33	40
23	947	36	0	0	20	0	612	17	0	476	8	0
24	1,424	14	0	0	29	0	350	0	0	361	23	0
25+	2,378	101	12	608	67	16	962	84	3	860	58	12
Age	1968			1969			1970			1971		
	Large vessel > 150 GRT	Nets	Landsmen < 150 GRT	Large vessel > 150 GRT	Nets	Landsmen < 150 GRT	Large vessel > 150 GRT	Nets	Landsmen < 150 GRT	Large vessel > 150 GRT	Nets	Landsmen < 150 GRT
0	125,236	0	31,222	202,685	0	32,636	184,192	0	33,239	169,426	0	41,153
1	5,189	132	425	19,059	1,025	835	6,535	435	1,797	6,761	271	660
2	3,579	411	205	1,937	379	404	5,709	808	869	1,867	382	319
3	2,132	557	110	1,762	832	216	121	902	464	1,216	705	170
4	1,113	469	70	1,366	817	138	130	835	297	538	408	109
5	1,113	323	34	1,807	772	66	130	925	142	509	486	52
6	1,019	462	23	1,407	497	46	745	519	99	311	297	36
7	1,729	388	13	1,627	601	26	910	360	56	283	211	20
8	1,826	396	9	2,202	594	17	939	627	36	227	206	13
9	1,280	242	2	1,627	423	4	771	657	9	480	189	3
10	1,280	242	7	1,276	438	14	110	680	30	425	292	11
11	970	176	3	1,146	379	7	716	453	14	283	176	5
12	710	198	5	750	253	9	745	364	20	311	172	7
13	734	117	3	926	230	7	496	320	14	198	172	5
14	995	117	3	1,011	163	7	469	240	14	56	107	5
15	807	139	4	1,011	208	7	525	325	16	113	107	6
16	758	125	2	616	163	4	663	266	9	113	82	3
17	616	139	1	1,101	163	2	275	262	4	56	82	1
18	1,019	81	0	706	104	8	359	178	18	85	65	7
19	876	73	1	836	75	2	359	187	4	85	52	1
20	640	37	0	706	52	8	275	207	18	29	60	7
21	379	37	1	485	62	2	249	97	4	29	30	1
22	522	51	0	310	27	8	194	67	18	56	17	7
23	285	14	0	395	15	0	139	63	0	29	17	0
24	212	7	0	175	15	0	84	49	0	0	9	0
25+	546	51	1	706	0	3	165	102	5	283	13	3
Age	1972			1973			1974			1975		
	Large vessel > 150 GRT	Nets	Landsmen < 150 GRT	Large vessel > 150 GRT	Nets	Landsmen < 150 GRT	Large vessel > 150 GRT	Nets	Landsmen < 150 GRT	Large vessel > 150 GRT	Nets	Landsmen < 150 GRT
0	104,109	0	12,701	63,369	0	34,966	85,387	0	29,438	109,832	0	30,806
1	146	134	3,820	1,629	65	3,224	6,911	74	3,428	4,113	1,393	7,271
2	110	312	1,847	2,206	153	1,559	4,357	165	1,240	1,976	1,409	2,786
3	110	223	986	1,749	175	832	1,650	82	406	905	1,008	1,193
4	293	356	627	1,657	98	532	1,249	138	339	594	669	398
5	110	189	302	2,784	120	255	1,286	266	248	506	779	290
6	121	200	210	754	120	177	1,689	735	248	506	677	253
7	158	100	119	633	175	100	404	303	90	248	771	361
8	110	123	76	792	164	68	404	441	68	203	512	72
9	73	67	19	391	229	16	692	331	23	257	244	72
10	73	78	65	363	185	55	384	321	0	151	292	361
11	49	167	31	437	262	26	231	239	23	248	221	37
12	61	145	45	252	294	36	365	229	46	151	213	145
13	24	078	31	299	240	26	384	212	46	177	237	72
14	12	167	31	160	229	26	249	174	23	133	213	0
15	49	89	34	214	196	29	231	165	0	133	118	0
16	36	45	19	167	164	16	192	212	23	115	110	72
17	24	89	8	84	120	7	192	156	23	115	63	37
18	24	111	38	47	109	32	153	101	0	88	126	0
19	0	56	8	103	65	7	116	82	0	71	47	0
20	36	156	38	112	65	32	39	64	0	55	31	0
21	0	100	8	0	33	7	39	74	0	44	24	37
22	12	56	38	0	142	32	76	64	0	63	0	0
23	0	45	0	18	0	0	39	37	0	44	24	0
24	0	33	0	18	0	0	96	18	0	55	16	0
25+	12	0	12	214	0	10	404	27	0	44	8	0

Table 5 (continued)

Age	1976			1977			1978			1979		
	Large vessel > 150 GRT	Nets	Landsmen < 150 GRT	Large vessel > 150 GRT	Nets	Landsmen < 150 GRT	Large vessel > 150 GRT	Nets	Landsmen < 150 GRT	Large vessel > 150 GRT	Nets	Landsmen < 150 GRT
0	93,939	0	38,146	92,904	0	34,078	63,669	0	52,521	96,926	0	35,532
1	2,137	1,315	11,124	576	475	6,400	1,073	1,012	14,300	287	697	13,104
2	782	857	5,444	303	630	4,648	493	1,163	8,216	116	825	4,987
3	437	823	2,663	236	520	4,348	358	1,402	4,015	95	547	2,087
4	265	675	1,657	194	325	3,227	252	1,378	2,634	68	406	1,159
5	172	480	236	187	240	1,477	252	1,315	1,380	59	410	811
6	100	435	58	92	150	819	200	749	1,065	44	286	464
7	129	343	58	50	130	547	230	363	252	52	154	232
8	93	332	119	42	140	272	158	311	438	36	107	116
9	79	148	0	77	60	55	53	265	0	15	103	116
10	50	274	0	25	30	164	72	287	252	18	60	0
11	36	160	119	20	35	164	117	120	63	27	68	0
12	36	103	119	25	20	100	94	120	63	22	68	0
13	50	92	0	37	40	108	64	64	126	15	85	0
14	29	92	58	42	45	272	41	112	0	8	34	116
15	36	183	0	22	35	328	53	48	126	11	43	116
16	36	57	0	32	25	108	30	88	0	8	34	0
17	36	69	0	22	5	0	23	64	0	6	68	0
18	22	45	0	12	25	0	41	40	63	8	60	0
19	14	45	0	7	5	0	53	48	0	12	43	0
20	7	57	0	5	25	0	30	40	63	6	21	0
21	7	11	0	10	5	0	31	16	63	6	26	0
22	14	11	0	5	15	0	0	16	63	0	38	0
23	7	25	0	12	25	0	24	16	0	5	4	0
24	0	23	0	7	15	0	0	16	0	0	17	0
25+	0	23	0	5	15	0	24	80	0	3	73	348

Age	1980		
	Large vessel > 150 GRT	Nets	Landsmen < 150 GRT
0	91,349	0	41,788
1	468	456	13,686
2	230	430	6,094
3	138	586	3,654
4	127	638	1,858
5	111	587	1,298
6	73	325	1,156
7	70	339	701
8	57	300	448
9	24	195	361
10	27	104	155
11	41	78	303
12	33	130	271
13	22	117	183
14	10	104	290
15	14	143	219
16	14	130	197
17	10	117	154
18	16	13	71
19	8	26	0
20	8	104	48
21	8	91	18
22	0	91	0
23	5	91	0
24	0	0	6
25+	5	222	39

Table 6. Average age composition of Canadian Arctic catch of harp seals from 1952 to 1979.

Age	Catch
0	61
1	117
2	212
3	236
4	159
5	95
6	87
7	93
8	67
9	43
10	79
11	54
12	57
13	34
14	40
15	73
16	57
17	38
18	28
19	30
20	46
21	22
22	18
23	16
24	18
25+	20

Table 7. Age compositions of total annual West Greenland catch of harp seals from 1952 to 1978.

Age	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965
0	9076	11160	9113	6430	7565	9859	5219	9430	7013	4946	5803	5302	5365	
1	2624	3026	2472	1743	2052	2674	1416	2557	1902	1341	1100	1005	1018	
2	820	946	772	545	641	835	442	799	594	419	700	640	648	
3	656	756	618	436	513	668	354	639	475	335	400	366	370	
4	492	492	463	327	385	501	265	480	357	252	300	274	278	
5	328	328	378	309	218	256	334	177	320	238	168	300	274	278
6	328	328	378	309	218	256	334	177	320	238	168	200	183	185
7	164	164	189	154	109	128	167	88	160	119	84	200	183	185
8	164	164	189	154	109	128	167	88	160	119	84	100	91	92
9	164	164	189	154	109	128	167	88	160	119	84	100	91	92
10	164	164	189	154	109	128	167	88	160	119	84	100	91	92
11+	820	820	946	773	545	641	835	443	799	594	419	700	640	648

Age	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
0	4078	2446	4076	3702	3583	2214	3392	5039	4479	3780	4836	6557	4400
1	774	464	773	702	680	609	714	2016	1260	1380	1716	830	2800
2	492	295	492	447	432	388	476	733	490	360	624	332	1200
3	281	169	281	255	247	222	238	366	70	120	312	166	600
4	211	126	211	191	185	166	298	92	140	60	156	83	200
5	211	126	211	191	185	166	119	183	-	-	-	83	200
6	140	84	140	128	124	111	119	92	70	-	-	-	200
7	140	84	140	128	124	111	119	-	-	60	-	83	-
8	70	42	70	64	62	55	-	92	-	-	-	-	100
9	70	42	70	64	62	55	-	-	-	60	-	-	-
10	70	42	70	64	62	55	-	-	-	60	-	-	300
11+	492	295	492	447	432	388	417	550	350	60	156	166	300

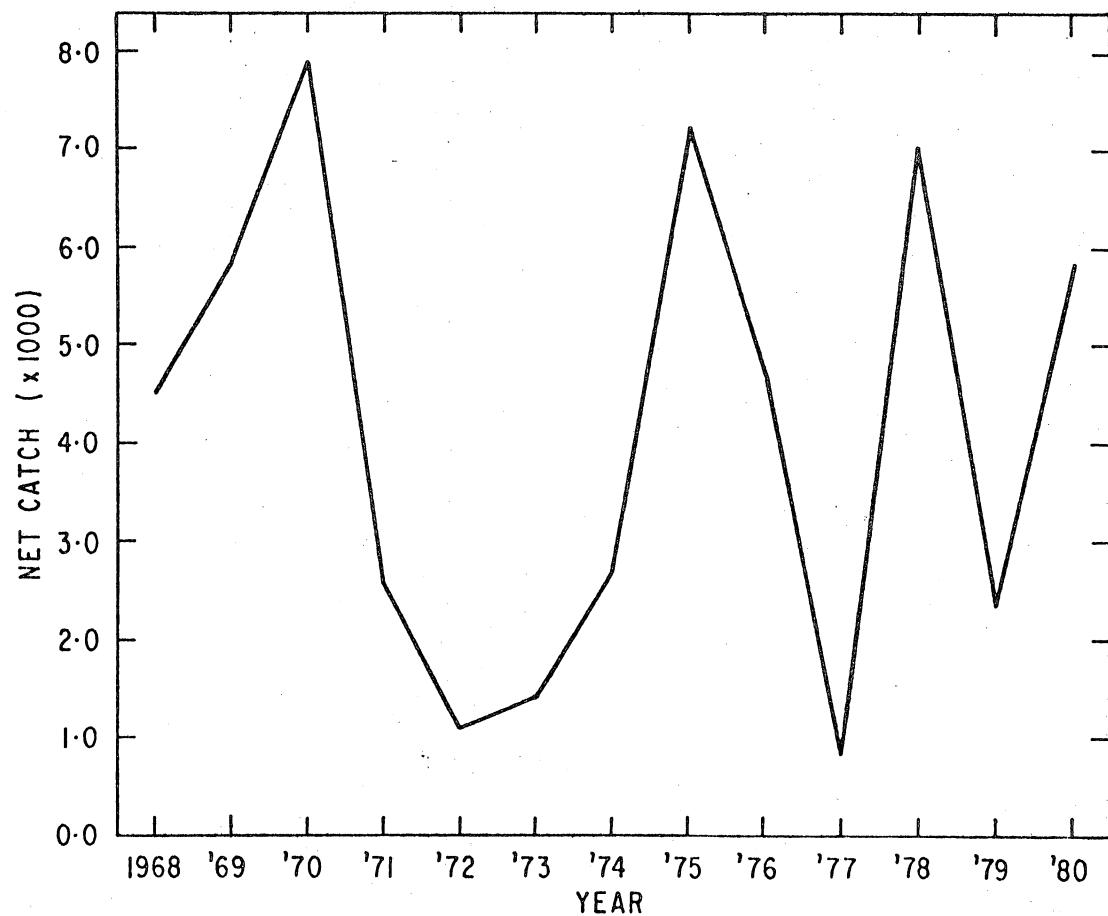


Fig. 1. Estimates of the Quebec northshore net catch of 1+ harp seals from 1968 to 1980.