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STUDIES OF HOODED SEAL IN GREENLAND 1970 - 1980

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ABSTRACT

Examination of catch statistics reveals that the decline in the hunting of hooded seal in Greenland during the first half of the twentieth century was followed by an increase during the late 1960s and the 1970s. In West Greenland the present landings of hooded seal are of the order 3,500 per year, and additional 2,000 animals are landed in South East Greenland.

Since 1970 more than three thousand jaws of hooded seal have been collected from the Greenland hunters. The present paper reviews the result of age determination of 2226 specimens from this material. The sex ratio is biased towards males: 66, 62 and 83% of the catches in South, South East and North West Greenland, respectively.

Very few young of the year are taken in Greenland, and also age group 1 is poorly represented in most catches. Age groups 2-8 are dominating the catches, with varying frequencies in different regions and with some variation between years.

Information obtained from the hunters indicates that the hooded seal in Greenland feeds mainly on larger benthic fishes, and shows seasonal and regional variation in the diet and feeding activity.

The relation between hooded seal occurring in Greenland and the various breeding and moulting areas is shortly discussed.

The present paper reviews the material of hooded seal collected in Greenland since 1970, tabulates the result of the age determinations carried out to date, and gives some preliminary estimates of the composition of catches in Greenland in addition to what has been given in previous papers.

MATERIAL AND METHODS

1. Information on hunting and catch levels

Description of seal hunting in Greenland, including hunting of hooded seal, are numerous in literature since the Danish colonization of Greenland.

An early example, and a very fine one, is Fabricius (1791). A detailed account of the occurrence and the hunting of hooded seal in different regions of Greenland can be found in Amdrup et. al. (1921). Some of this information was included in short reviews by the present author (1972, 1975b).

Collection of statistical information on the catch of marine mammals in Greenland was initiated more than one hundred years ago, and this material has been used in several publications (e. g. Anon., 1944; Anon., 1954-74; Rosendahl, 1961, and Kapel, 1975b). An additional, and often supplementary, source is the statistics of skins and other products purchased to KGH (Royal Greenland Trade Department).

The regional divisions used in this and previous publications are shown in Fig. 1. Information from the catch statistics ("List of game") on the catch of hooded seal in different regions of Greenland is given in Table 1 and Figure 2, and the seasonal and regional distribution appears from Figure 3 (from Rosendahl, 1961).

2. Collection of biological material

In 1970 the present author started collecting seal jaws in Greenland with the purpose of obtaining information on the age composition of the catches of harp and hooded seal. Using the information on the level and distribution of the hunting of hooded seal (Fig. 2 and 3), the sampling effort in respect to the hooded seal was concentrated in South East Greenland (Angmagssalik district) and South Greenland (Nanortalik and Julianehåb districts). Between 1970 and 1974 a sample of 290 and 898 was obtained from the two regions, respectively. Part of this material has been presented in previous documents (Kapel, 1972; 1974; 1975a & b), and all the resulting age determinations are shown in Tables 2 and 3 of the present paper. After 1974 collecting of hooded seal was discontinued in Angmagssalik district, whereas additional 788 jaws were collected from South Greenland in 1975-80. Unfortunately, it has not yet been possible to age this material, but the sections have been prepared.

In North West Greenland, where satisfactory samples of harp seal were obtained since 1972, the material of hooded seal was sparse in the first years, partly because the catch is rather small compared with the two other regions. Preliminary results were presented in a previous paper (Kapel, 1975a). In the present paper all the material collected between 1973 and 1980 is used for comparison with the results from South East and South Greenland (Table 4 and 5, Figure 4 - 6). Inclusion in this material (1040 specimen) of 70 jaws collected in 1971 and 1972 was not possible in time for this manuscript.

Together with the jaws the hunters provided information on the sex, length, and stomach contents of the animals, as well as date, locality, and method of hunting. Part of this information was included in previous papers (Kapel, 1972; 1974; 1975a & b), and the present paper gives supplementary data on the seasonal distribution of catches (Fig. 4 and 5), and on stomach contents (Tables 6 and 7).

An analysis of the material of female reproductive organs collected in South East and South Greenland in 1970 and 1971 is given in Born (1982). RESULTS

1. Trends in catch levels of hooded seal in Greenland

The information given in Table 1 and Figure 2 indicates a general increase in catches of hooded seal in all regions of Greenland since the early 1960s. The apparent decline in Central West, South West and South Greenland in recent years may not be as great as the preliminary data suggest, because the figures for 1978-80 do not include estimates of non-reported catches.

There is no detailed information on the hunting effort available, but the number of participating hunters has been almost constant over the time period in question, and it is unlikely that the introduction of outboard powered boats, or other recent changes in hunting technology, have improved the effectiveness of hooded seal hunting significantly, at least not in respect to the number of landed animals. (Loss rates may have changed, but this question has little relation to evaluation of trends in landed catches).

The increasing trend in the hunting statistics is, therefore, interpreted as an evidence of increased availability of hooded seal in Greenland waters.

It should, however, be born in mind, that the catches of hooded seal in Greenland showed a markedly decreasing trend prior to 1960, probably from a level of approximately 15,000 per year at the turn of the century (Kapel, 1978).

2. Age frequencies and sex ratio in the Greenland catches

i. South Greenland

Table 2 and Figure 4 add one more year to the previously published results of aged animals from the catch in South Greenland. The additional material does not change the general pattern significantly: Young of the year are almost completely absent, and one year old animals are weakly represented in the spring catch of hooded seal in South Greenland, which is dominated by 2-6 years old animals (app. 50% of the samples). Differences in age composition between one year and the next may at least partly be due to differencies in the sampling success at different localities within South Greenland, as discussed in previous papers (Kapel, 1972; 1974). Despite this variation it is considered reasonable to pool all years into the general age distribution for South Greenland presented in Table 5 and illustrated in Figure 6. The actual frequencies have been smoothed to the percentages given in the columns headed "corr.", taking into account the number of not sexed animals (nk).

The sex ratio is strongly biased towards males (66%) for all age groups.

ii. South East Greenland.

The material from South East Greenland (Table 3, Fig. 4) is much smaller than the above mentioned (288 and 898 specimen, respectively), and a general pattern of age frequencies accordingly less clear. By pooling the data from all five years and treating the actual frequencies as described for South Greenland the pattern shown in Table 5 and Figure 6 was obtained: Few youngs of the year (3%), and a somewhat different age distribution for males and females. Females seem to be fully recruited to the catches at age 1 or 2, males not before age 3-5. The age distribution indicated by this limited material does not appear to be different from that found at the moulting area in the **Denmark** Strait a month earlier, a few hundred miles northeast of Angmagssalik district. The main difference seems to be, that the males occur in fair number in the Denmark Strait at the age of 1 and 2, and to be fully recruited to this area at the age of 3.

The sex ratio in the catches in South East Greenland is almost as biased as in South Greenland (62% males), whereas it appears to be close to equality at the moulting patches in the Denmark Strait.

iii. North West and Central West Greenland.

The material from these regions (north of the Disko Bay area) was collected at a large number of localities between 69° and $75^{\circ}N$. Most of it, however, comes from Upernavik district $(73^{\circ}-75^{\circ}N)$. The question therefore arises, whether the age composition differs from one locality to the other. Although the sample size from several localities are too small to allow a full analysis of this question, the available material does not indicate significant differences or systematic variation between localities, and the samples were therefore pooled in Table 4 and Fig. 5.

A general feature of the samples from this region is, that males constitute an even greater part of the catch than in South East and South Greenland (more than 80% on the average, Table 5). Some variation in the relative importance of various age groups of males appear to exist between one year and the following. In one or two cases a certain year class is particularly strongly or weakly represented: The unusually high frequency of youngs of the year found in the 1974 sample corresponds to strong representation in later samples, particularly in 1977 and 1978. The 1980 sample includes more material (26 specimens) from the Disko Bay region (CW) than the other samples. This material, which was collected in April-May, consists mainly of young animals (50% 1-4 year old). It is, however, the general pattern that youngs of the year are only rarely caught, and also one year old animals are rather few in the samples. Age group 2-7 are dominating most samples and are found in almost equal numbers, with the reservation mentioned above of strong or weak year classes. For males, the last four samples (1977-80) seem to indicate a slight shifting in dominance from age group 2-6 to age group 4-8. The limited material of females does not indicate a significant difference in the frequencies of age group 0-7.

When pooling the samples from all eight years, the dominance of year class 1974 in the rather large sample 1978 results in a peak at 4 years, which will probably be less pronounced, when more material is added (Table 5 and Figure 6).

The age composition of hooded seal in North West Greenland is completely different from that of harp seal, where young of the year or immature animals are dominating at most localities (Kapel and Geisler, 1979).

3. Feeding of hooded seal in Greenland

Information on the feeding of hooded seal in Greenland is sparse in published literature. Winge (1902) states "mainly larger benthic fishes, such as redfish, cod and halibut, according to Fabricius; squid is also sometimes taken".

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The information obtained from the Greenlanders (Tables 6 and 7) confirms this general statement, and gives additional data on the variation in the diet. It appears that the feeding habits are changing through the year and/or from region to region. The high number of empty stomachs in South East Greenland in July-August relates to the fact, that the animals are still moulting, or have just finished moulting. Also in North West Greenland the number of empty stomachs is high in July, which agrees with the fact that moulting hooded seals are found rather often in this region (information from hunters and the author's own observation).

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CONCLUDING REMARKS

As stated above, a fair amount of material of hooded seal jaws collected in Greenland still awaits treatment, and this paper should be considered rather as a progress report of what has been possible to work up to date. A final analysis should include the material collected in South Greenland 1975-80.

On the other hand it is questionable whether the inclusion of the additional material will change the general pattern of the composition of the catches in Greenland significantly. On the basis of the information presented in this paper it is possible to calculate the catch at age of hooded seal in Greenland, using an average age composition for each main hunting area. It will probably not be possible to collect enough material to demonstrate any difference in age composition between one year and the following. The level of sampling obtained since 1970 (average 120, 160, and 60 for North West, South and South East Greenland, respectively) can hardly be improved significantly, and represent approximately 30%, 12%, and 6% of the catches in these regions.

Another problem is, how the material collected in Greenland can be used in relation to material obtained from other areas. It is obvious that the Greenland catches do not represent the population structure: The deficit in females and young animals is too pronounced. The relation between the catch in Greenland and the different breeding areas is, furthermore, an open question. Recoveries of tagged and/or branded animals (Table 8) demonstrate a connection between Newfoundland, Denmark Strait, and the hunting areas in South East and South Greenland. There are also two recoveries in North West Greenland of hooded seals tagged at Newfoundland. There are no recoveries in Greenland of hooded seals tagged at Jan Mayen (but a few harp seals, see Larsen and Kapel, 1979; 1980). It is not known whether the whelping patch in the Davis Strait contributes significantly to the catches in Greenland, but the fact that hooded seals do occur off Central and North West Greenland in spring and early summer, indicates that moulting takes place in other areas than the Denmark Strait, and it is likely that these animals come from the Davis Strait stock.

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YEAR)			West Grl.	East Grl.	KGH '
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1955	1	93	218	46	614	971	344	
1956	- 19	71	127	59	336	593	264	-
1957	5	90	77	58	567	792	412	
1958		168	118	42	518	846	365	-
1959	2	84	49	128	517	778	320	414
1960	3	110	195	97	560	962	331	773
1961	14	64	159	114	322	659	348	803
1962	3	83	97	88	274	542	326	988
1963	7	107	185	77	516	885	316	813
1964	3	500	229	138	1315	2182	545	366
1965	3	487	297	90	945	1819	318	
1966	8	368	279	100	1066	1813	304	748
1967	18	155	294	116	1025	1590	358	371
1968	12	220	221	128	851	1420	641	20
1969	5	153	210	394	1060	1817	411	-
1970	3	234	319	165	691	1409	713	-
1971	2	200	206	229	997	1632	744	-
1972	1 1	191	213	284	1594	2282	1827	-
1973	16	250	279	390	1719	2638	677	-
1974	41	362	380	552	1446	2740	1218	-
1975	143	305	941	463	1834	3692	1071	-
1976	108	266	455	1195	2206	4122	818	-
1977	102	586	481	561	2021	3649	2227	-
1978 ⁴⁾	71	721	216	671	1163	2771	2315	•
1979 ⁴¹	78	675	507	493	1048	2723	2316	-
1980	113	489 ⁺	227	637+	948	2301+	1807	
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TABLE 1 Catch of hooded seal in Greenland, 1954-1980 per district and region

a) Data from Thule district are of varying quality, and are therefore not included in the total for West Greenland.

b) West Greenland exclusive Thule.

c) The Royal Greenland Trade Department (KGH) arranged catching in the Denmark Strait between 1959 and 1968.

d) Figures for 1978-80 are provisional.

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d. able SAR SAR SE SE SE SE SE SE SE SE SE SE	$3.$ $197($ $0 \ 2$ $4 \ 2$ $6 \ 3$ $4 \ 2$ $4 \ 2$ $4 \ 2$ $4 \ 2$ $1 \ 2$ $1 \ 2$ $1 \ 1$ 1 1 1 1	Agg nk	e fre d 2 2 2 1 3 1 3 2 4 3 1 1 2 2 1	1971 9 2 2 4 3 4 3 1 1 2 1	cie	s in s in s 3 4 1 7 12 9 3 3 2 1 4 1 1 1 1	148 iample 972 9 nk 8 0 4 5 1 2 1 1 4		23 f hood 19 of Q 2 3 10 3 3 6 3 2 2 1 2 6 2 3 1 2 1 2 6 2 3 1 1 1 1 1 2 3 1 1 1 2 3 1 1 1 2 3 1 1 1 1 2 3 1 1 1 2 3 1 1 2 3 1 1 2 3 1 1 2 3 1 1 3 3 1 2 3 1 1 1 2 3 1 1 2 3 1 1 1 1 2 3 1 1 2 3 1 1 1 1 2 3 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	ded s	eeal 1 1 1 4 4 2 2 2 1 1 1 1 1	from 1974 2	Sout 4 nk 1	C C	ast G 1 f 1 f 1 f 1 f 1 f 1 f 1 f 1 f 1 f 1 f <	970 - 9 970 - 9 5 3 11 8 3 6 9 9 4 1 1 3 4 1 1 2 2 2 2 2	2 - 19 nk 1	197 74 107	96332588913096475121321

Table 2. Age frequencies in samples of hooded seal from South Greenland, 1970-74.

- 8

Age frequencies in samples of hooded seal from North West and Central West Greenland, 1973-1980. TABLE 4

1																																
	98.0	TOTAL		49	52	69	86	128	112	103	75	63	43	38	24	27	25	26	20	22	11	œ .,	6	8	4	4	4	S	15	7	1032	8
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Age distribution (%) in catches of hooded seal in Greenland for three different regions. TABLE 5

			lorth v	Vest G	reenlan	rc		South	Gree	nland		, v	with Eas	t Gree	puland		
				1973-8	0	5			970-7	4		\$ 	197	0-74	5		
	AGE	6	actua. Ŷ	ъ Ч	o, cor		ര്	actual 9	ź	ບັ <mark>ບ</mark> ີ	ਮ	ъ	actual	h	o, c	. 0+ H	
	0	3.3	1.4	-	3.4	1.1	1.			•	•	1.4	1.7		1.5	1.5	
		4.1	1.0		4 . 1	1.2	2.7	8.	.7	.	1 .0	4 ° 5	8.0		3.7	8.0	
	7	4.9	1.5	ŝ ŝ	5.1	1.4	7.8	3.7	°.	8.2	3.8	4.2	7.3		4.9	6.4	
	m	6.6	1.4	.4	6.9	1.0	7.1	5°2	1.0	8.7	5.9	5.9	2.8		9.9	4.8	
	4	10.0	1.7	8.	10°7	1.8	7.4	3.7	6.	7.4	4.7	8°3	4.5	۳.	8.5	3.7	
	ŝ	9.4	1.0	S.	8.9	1.4	6.1	3.2	.7	6°3	3. 9	6°9	2.1		7.0	2.9	
	و	8.4	1.0	.6	7.4	1.1	3.7	2.6	1.0	5.4	3.0	5.2	3.1		5.6	2.2	
	7	5.7	1.4	• 3	6.2	6.	4.7	2.5	S.	4.5	2.4	3°8	1.4	•	4.6	1.7	
	80	5.1		۳.	5.2		3.5	1.9	1.0	3.8	1 .9	2°4	. •		3.7	1.3	
	6	3.6	.2	.4	4.3	9.	4.0	1.3	°.	3°3	1.5	2.8	.		3.1	1.0	
	10	3.2	e.	.2	3.6	<u>.</u>	2.1	8.	9.	2°8	1.2	2 .8	1.0	.7	2°2	æ.	
	6 6	1.6	9.	.2	3.0	• 4	1.6	1.0	۳. ۳	2.4	1.0	2.1	1.4		2.0	9•	
	12	1.9	• 4	ŝ	2.5	° 4	1.3	٠٦	e.	2.0	8°	2.8	.		1 ° 7	°5	
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	15	1.6	m.	-	1.5	e.	6°	ຕູ	. ۳	1。2	ۍ ۲	2.4			6 °	•2	
	16	1.7	m.	• 5	1°2	e.	1.1	-	.2	1.0	•4	1.0	°٦		٤	•2	
	17	6.			1 ° 0	•2	•3	ຕູ		°۲		ŝ			9°	•	
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	24	.4	۰.		۳.	-						•			۰.	.2	
1 - L.	25+		8.		•	80.						ຕູ			.		
	30+		• 7		• 3	•2	•	· · · ·									
	MUS	79.5	15.8	4.8	83.5	16.5	58°9	30°9 1	0.2	65.6	34.4	-61°5	37.5	1.0	62.0	38.0	1.5
	NUMBE	R 820	163	49	0	•	528	277	16	•	•	177	108	m	•	•	
(samp]	e siz	(e)											· · · · · · · · · · · · · · · · · · ·				

- 10 -

	Sou 197	th Grl 0-78	•	Sout 1970	:h Eas)-74	t Grl.	Nortl Centi 1972	h West ral Wes -78	and t Grl
Stomach contents	No.	¥ ful	% l all	No.	% full	% . all	No.	¥ full	۹ all
Greenland halibut	13	1.5	1.1	2	6.7	0.9	278	60.3	45.3
Wolffish	28	3.3	2.3	1	3.3	0.4	49	10.6	8.0
Redfish	101	11.9	8.2	24	80.0	10.2	6	1.3	1.0
Gadidae	131	15.4	10.6	1	3.3	0.4	15	3.3	2.4
Capelin	58	6.8	4.7	1	3.3	0.4	26	5.6	4.2
Other spp.	15	1.8	1.2		-		22	4.8	3.6
Unspecified	482	56.7	39.0	1	3.3	0.4	5	1.1	0.8

Squid	6	0.7	0.5	· · ·	_		1	0.2	0.2
Decapods Other	14 2	1.6 0.2	1.1 0.2	-		-	4 55	0.9 11.9	0.7 9.0
Crustacean total	16	1.8	1.3	-	-	-	59	12.8	9.7
Sum (full stom.)	850	100	68.8	30	100	12.7	461	100	75.0
Empty stomachs	386	•	31.2	206	•	87.3	153	•	24.9
All records	1236	•	100	236	•	100	614	•	100
No information	284	•	•	55	•	•	44	• .	•
1									

30 100

l'ab**le 7**

Fish total

828

97.4 67.0

Seasonal variation in stomach contents of hooded seal caught in Greenland

87.0 65.3

401

12.7

		March	- June	July	August	September	October - Februar
SOUTH GREENLAND	ł.	140 .		110. 6	NO. S	NO. 8	NO. 8
Fish		828	66.8				
Squid		6	•2				
Crustaceans		16	1.3				- -
Empty stomachs		390	31.5				
						e Britania Altaria	
SOUTH EAST GREENLAND							
Fish		-	- 1	14 6.5			16 76.2
Squid		-	-				
Crustaceans		-	-			-	
Empty stomachs		-	-	201 93.5			5 23.8
NW + CW GREENLAND	de la terre de la composición						
Fish		54	74.0	26 50.0	216 63.5	66 62.3	39 76.5
Squid		_	-	1 1.9		· · · ·	
Crustaceans		2	2.7	3 5.8	37 10.9	14 13.2	3 5.9
Empty stomachs		17	23.3	22 42.3	87 25.6	26 24.5	9 17.6

		Sex	ð	°	ð	৽	٥		৽	¢	৽	ه	৽	ď	٥	٥	•	
		Age ^{C)}	2+0	1+1	3+2	2+4	++	1+3	1+0	3-5 ^{d)}	2+5	1+2	1+3	1+7	3+3	1+5	6+5	
D SEALS			(qNAN	HBG	JUL	ANG	NAN	NAN	JUL	JUL	ANG	NAN	ANG	UMK	NAN	ANG	NPV	
OR BRANDED HOODE		Locality	Augpilatoq	Amerdloq	Nunarssuit	Auluit	Off Nanortalik	Kap Egede	Egalugarssuit	Umánag Isl.	Isortog	Sagdliit	Ikáteg	Sermiarssuit	Sydprøven	Kap Dan	Naujat	
<i>(EENLAND OF TAGGED</i>	RECAPTURE	Position	60 ⁰ 08'N 44 ⁰ 18'W	66°54'N 53°40'W	60 ⁹ 40'N 48 ⁰ 00'W	65 ⁰ 31'N 37 ⁰ 19'W	60 ⁰ 05'N 45 ⁰ 15'W	60°10'N 46°00'W	60 ⁰ 37'N 45 ⁰ 55'W	60 [°] 65'N 46 [°] 10'W	65 ⁰ 30'N 39 ⁰ 00'W	60 ⁰ 17'N 45 ⁰ 28'W	65 ⁰ 38'N 37 ⁰ 58'W	70 ⁰ 34'N 52 ⁰ 00'W	60 ⁰ 23'N 45 ⁰ 40'W	65 ⁰ 34'N 37 ⁰ 10'W	73 ⁰ 13'N 56 ⁰ 20'W	
1981 IN G		Date	11/3-56	14/4-65	28/5-67	July 72	Apr.72	11/6-73	29/3-76	21/5-76	7/8-78	11/5-77	10/6-77	.27/10-78	10/6-79	12/8-80	4/8-81	
5 1956 -		Div.	ЗК	ЗК	ЗК	ЗК	3К	4T	4T	A VIX	4T	4 T	4T	4T bf	4T	4T	4T	
CAPTURE		Loc.	Front	=	-	2. 2.	=	Gulf	=	D.Str.	Gulf	E	2 2	=	=	= -	=	
R	TAGGING	Date	31/3-51	28/3-64	30/3-64	4/4-70	25/3-71	17/20/3-72	19/3-75	25/6-74	10/3-76	10/3-76	18-20/3-76	13/3-77	18/3-76	16/3-79	20/3-75	
		Nat.	Z	Z	z	N ()	N ()	U	с (;	N ()) c	C C	C (1	с С	v) C	с С	ບ ()	
ILE 8	AG	Type	disc.tail	=	=	rototag () (+ disc)	rototag (y	brand	rototag (1	<u>ح</u>	۲)	ξ)	τ) "	" (gr	ζ) "	IO) "	I)	
TAB	Ŧ	No.	s 230 ^{a)}	A 0143	A 0145	B 464 (A 0346)	B 526		976	D 0004	474	475	940	A 923	975	A 1414	982	

S 230. No. not readable at recapture. Original note state, "Augpilagtog Fjord", which could be further west and south. a)

UPV, UMK, HBG, JUL, NAN, and ANG refer to districts in West Greenland, Upernavik, Umanak, Holsteinsborg, Julianeh&b, Nanortalik) and East Greenland (Angmagssalik). q

Age in years + months. ົບ

This animal was tagged as immature (1-3 years old), all the others as pubs. q,



Fig. 1. Greenland main districts



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Figure 4. Age group frequencies in samples, and half-monthly distribution of the material of hooded seal collected in South and Southeast Green-land, 1970-1974.



Figure 5. Age group frequencies in samples, and half-monthly distribution of the material of hooded seal collected in Northwest Greenland, 1973-1980.

