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Catch-at-Age of Harp Seals in the Northwest Atlantic, 1952-1994

by

B. Sjare, G. B. Stenson and E. A. Perry

Science Branch, Department of Fisheries and Oceans
Northwest Atlantic Fisheries Centre,
St. John's, Newfoundland, Canada A1C 5X1

Harp Seal Catches

Total harp seal catches in the northwest Atlantic, including catches reported for the Front and Gulf Regions, the Canadian Arctic and west Greenland are summarized in Table 1.

Front and Gulf Region catch statistics (Table 2) for the years 1946-1974 were compiled from values reported to the International Commission for Northwest Atlantic Fisheries (ICNAF 1970, 1971-1976) and 1975 through 1987 were compiled from values reported to the Northwest Atlantic Fisheries Organization (NAFO 1977-1991). Catches in the Front and Gulf Regions for the years 1989 to 1994 were provided by DFO Statistics Branch, Ottawa, and R. Simon (pers. comm.) provided values for Quebec and Maritimes.

West Greenland catches for the years 1954 to 1987 were provided by F. Kapel (pers. comm.). There are no Greenland catch statistics for the years 1988 through to the present (Table 1). Canadian Arctic harp seal catches have not been well-documented. The only available values are those reported by Bowen (1982) and Roff and Bowen (1986) for the years up to and including 1982. These were based on an estimated annual average catch of 1,768 seals during 1962-1971 (Smith and Taylor 1977), values provided Sergeant (1974-77, pers. comm.) and Goodman (1978-82, pers. comm.). As there are no further Arctic catches available, the 1982 value presented by Roff and Bowen (1986) has been extended to the following years (Table 1).

Age Composition of catches

Gulf and Front Regions:

Catch of 0 age class were taken directly from the catch statistics. Catch at age frequencies for 1+ (animals 1 year of age and older) harp seals caught in the Gulf and Front Regions from 1984-1994 (Table 3) are based on age sampling conducted during our DFO Newfoundland and Labrador seal collection program. The proportion of 1+ animals for a given age was obtained from the age structure of catches taken by our collectors and then applied to the total harp seal catches for that year. The actual values of numbers at age for research catches (large vessel catches) were then added. Only animals collected by land-based sealers during normal hunting effort were included in the data base while the age structure of animals caught as bycatches in fishing gear were not.

An experienced reader determined ages by reading dentinal annuli viewed in transverse sections (Bowen, Sergeant and Oritsland 1983). The annual percent of each age class was applied to the total harp seal catches for that year.

Animals listed as unknown age were primarily from the Quebec North

Shore. In previous catch statistics these have been included as 1+ catch because they were composed of less than 5% young of the year (R. Simon, pers. comm.). The animals of unknown age have been included in the 1+ catch when calculating age frequencies.

Catch at age values for 1952-1984 are given in Bowen (1982) and Roff and Bowen (1986). These were used with the exception of 1979, 1980, 1982 and 1984 in which the total catch statistics have been revised. For these years the proportions at age provided by Bowen (1982) and Roff and Bowen (1986) have been applied to the revised total catches.

West Greenland:

Age frequencies of harp seals caught in west Greenland during 1984-1994 are given in Table 4. A weighted average was calculated for each age class, based on catch at age frequencies reported for 1978-1980 in Roff and Bowen (1986), and applied to the total catch statistics for the years 1984 to 1994, inclusive. Catch at age for previous years are given by Bowen (1986) and Roff and Bowen (1986). Because there has been no new catch data since 1987, the information from that year was carried forward to 1994.

Canadian Arctic:

As there are no recent reports of Arctic harp seal catch at age frequencies, we assumed that recent catches have remained at the proportions reported by Roff and Bowen (1986) (Table 5).

REFERENCES

- Anon. 1986. Seals and Sealing in Canada. Report to the Royal Commission, Volume 3. Minister of Supply and Services, Canada, Ottawa, Canada. p. 679.
- Bowen, W.D. 1982. Age structure of northwest Atlantic harp seal catches, 1952-80. NAFO Sci. Coun. Studies, 3: 53-65.
- Bowen, W.D., D.E. Sergeant and T. Oritsland. 1983. Validation of age estimation in the harp seal, *Phoca groenlandica*, using dentinal annuli. Can. J. Fish. Aquat. Sci., 40:1430-1441.
- ICNAF. 1970. Sealing statistics, 1937-1968. ICNAF Stat. Bull., 18: 124-140.
1971. Sealing statistics, 1969. ICNAF Stat. Bull., 19: 119-120.
1972. Sealing statistics, 1970. ICNAF Stat. Bull., 20: 109-110.
1973. Sealing statistics, 1971. ICNAF Stat. Bull., 21: 133-134.
1974. Sealing statistics, 1972. ICNAF Stat. Bull., 22: 215-216.
1975. Sealing statistics, 1973. ICNAF Stat. Bull., 23: 241-242.
1976. Sealing statistics, 1974. ICNAF Stat. Bull., 24: 253-254.
- NAFO. 1977. Sealing statistics, 1975. NAFO Stat. Bull., 25: 229-230.
1978. Sealing statistics, 1976. NAFO Stat. Bull., 26: 229-230.
1984. Sealing statistics, 1979. NAFO Stat. Bull., 29 (Revised): 291-292.
1984. Sealing statistics, 1980. NAFO Stat. Bull., 30 (Revised): 277-278.
1984. Sealing statistics, 1982. NAFO Stat. Bull., 32: 283-284.
1985. Sealing statistics, 1977. NAFO Stat. Bull., 27 (revised): 279-280.
1985. Sealing statistics, 1978. NAFO Stat. Bull., 28 (2nd revision): 293-294.
1985. Sealing statistics, 1981. NAFO Stat. Bull., 31 (Revised): 275-276.
1985. Sealing statistics, 1983. NAFO Stat. Bull., 33: 277-278.
1986. Sealing statistics, 1984. NAFO Stat. Bull., 34: 303-304.

1987. Sealing statistics, 1985. NAFO Stat. Bull., 35: 319-320.
1989. Sealing statistics, 1986. NAFO Stat. Bull., 36: 303-304.
1990. Sealing statistics, 1987. NAFO Stat. Bull., 37: 293-294.
1991. Sealing statistics, 1988. NAFO Stat. Bull., 38: 303-304.
- Roff, D.A. and W.D. Bowen. 1986. Further analysis of population trends in the northwest Atlantic harp seal (*Phoca groenlandica*) from 1967 to 1985. Can. J. Fish. Aquatic. Sci., 43: 553-564.
- Roff, D.A. and W.D. Bowen. 1983. Population dynamics and management of the northwest Atlantic harp seal (*Phoca groenlandica*). Can. J. Fish. Aquatic. Sci., 40: 919-932.
- Smith, T.G. and D. Taylor. 1977. Notes on marine mammal, fox and polar bear harvests in the Northwest territories 1940 to 1972. Fisheries and Marine Service, Tech. Rep. No. 694.

Table 1: Summary of harp seal catches in the Northwest Atlantic, 1952-1994.

	Front and Gulf ¹		Canadian Arctic ²		West Greenland ³		Northwest Atlantic TOTALS		
	0	1+	0	1+	0	1+	0	1+	TOTAL
1952	198063	109045	61	1739	9676	6724	207800	117508	325308
1953	197975	74911	61	1739	9676	6724	207712	83374	291086
1954	175034	89382	61	1739	11158	7754	186253	98875	285128
1955	252297	81072	61	1739	9113	6332	261471	89143	350614
1956	341397	48013	61	1739	6421	4462	347879	54214	402093
1957	165498	80042	61	1739	7562	5255	173121	87036	260157
1958	140996	156790	61	1739	9859	6849	150916	165378	316294
1959	238832	81302	61	1739	5219	3625	244112	86666	330778
1960	156168	121182	61	1739	9430	6554	165659	129475	295134
1961	168819	19047	61	1739	7013	4874	175893	25660	201553
1962	207088	112901	61	1739	4946	3438	212095	118078	330173
1963	270419	71623	61	1739	5803	4200	276283	77562	353845
1964	266382	75281	61	1739	5302	3838	271745	80858	352603
1965	182758	51495	61	1739	5365	3886	188184	57120	245304
1966	251735	72004	61	1739	4078	2951	255874	76694	332568
1967	277750	56606	61	1739	2446	1769	280257	60114	340371
1968	156458	36238	61	1739	4076	2950	160595	40927	201522
1969	233340	55472	61	1739	3702	2681	237103	59892	296995
1970	217431	40064	61	1739	3583	2595	221075	44398	265473
1971	210579	20386	61	1739	2214	2326	212854	24451	237305
1972	116810	13073	61	1739	3392	2500	120263	17312	137575
1973	98335	25497	61	1739	5039	4124	103435	31360	134795

	Front and Gulf ¹		Canadian Arctic ²		West Greenland ³		Northwest Atlantic TOTALS		
	0	1+	0	1+	0	1+	0	1+	TOTAL
1974	114825	32810	61	1739	4527	2546	119413	37095	156508
1975	140638	33725	61	1739	3750	2203	144449	37667	182116
1976	132085	32917	61	1739	4828	2959	136974	37615	174589
1977	126982	28161	61	1739	7850	2088	134893	31988	166881
1978	116190	45533	72	2057	4796	5744	121058	53334	174392
1979	132458	28083	128	3492	6614	6160	139200	37735	176935
1980	132421	37105	215	6135	3546	8724	136182	51964	188146
1981	178394	23775	158	4514	6041	7564	184593	35853	220446
1982	145274	23120	166	4715	7656	9588	153096	37423	190519
1983	50058	7831	166	4715	8320	10419	58544	22965	81509
1984	23840	7077	166	4715	7844	9823	31850	21615	53465
1985	13334	5701	166	4715	8190	10255	21690	20671	42361
1986	21888	4046	166	4715	6186	7746	28240	16507	44747
1987	33657	10378	166	4715	7128	8925	40951	24018	64969
1988	66950	27096	166	4715	7128	8925	74244	40736	114980
1989	53879	11195	166	4715	7128	8925	54173	24835	87955
1990	33188	25034	166	4715	7128	8925	40482	38674	79156
1991	42379	10186	166	4715	7128	8925	49673	23826	73499
1992	43861	24748	166	4715	7128	8925	51155	38388	89543
1993	16401	10602	166	4715	7128	8925	23695	24242	47937
1994	25223	36131	166	4715	7128	8925	32517	49771	82288

¹ Summarized from Table 2. ² See text for sources and explanation of values.
³ Catch values for 1954-1987 provided by F. Kapel (pers.comm.).

Table 2: Annual harp seal catches by large vessels and landsmen in the Front and Gulf regions, 1946-1994¹ (includes research catches).

Year	Large Vessel Catch			Landsmen Catch ²			Total Catches			
	0	1+	UNK	0	1+	UNK	0	1+	UNK	Total
1946	36161	17709	0	36839	11853	0	73000	29562	0	102562
1947	67513	64446	0	34781	9769	0	102294	74215	0	176509
1948	88052	83670	0	48617	10675	0	136669	94345	0	231014
1949	167469	55324	0	59702	14216	0	227171	69540	0	296711
1950	182086	47664	0	43683	9649	0	225769	57313	0	283082
1951	247956	113083	0	70670	23876	0	318626	136959	0	455585
1952	172185	98378	0	25878	10667	0	198063	109045	0	307108
1953	147090	66811	0	50885	8100	0	197975	74911	0	272886
1954	125353	83939	0	49681	5443	0	175034	89382	0	264416
1955	231700	75671	0	20597	5401	0	252297	81072	0	333369 ³
1956	299745	42585	0	41652	5428	0	341397	48013	0	389410
1957	137721	76437	0	27777	3605	0	165498	80042	0	245540
1958	80430	137227	0	60566	19563	0	140996	156790	0	297786
1959	227212	77304	0	11620	3998	0	238832	81302	0	320134
1960	131649	114534	0	24519	6648	0	156168	121182	0	277350
1961	154286	13170	0	14533	5877	0	168819	19047	0	187866
1962	164625	99513	0	42463	13388	0	207088	112901	0	319989
1963	207818	57094	0	62601	14529	0	270419	71623	0	342042
1964	210089	60348	0	56293	14933	0	266382	75281	0	341663
1965	121398	33757	0	61360	17738	0	182758	51495	0	234253

Table 2 cont'd...

Year	Large Vessel Catch			Landsmen Catch ²			Total Catches					
	0	1+	UNK	Total	0	1+	UNK	Total	0	1+	UNK	Total
1966	209145	59364	0	268509	42590	12640	0	55230	251735	72004	0	323739
1967	252837	41361	0	294198	24913	15245	0	40158	277750	56606	0	334356
1968	125236	30328	0	155564	31222	5910	0	37132	156458	36238	0	192696
1969	202685	44940	0	247625	30655	10532	0	41187	233340	55472	0	288812
1970	184192	26225	0	210417	33239	13839	0	47078	217431	40064	0	257495
1971	169426	14343	0	183769	41153	6044	0	47197	210579	20387	0	230966
1972	104109	1646	0	105755	12701	11427	0	24128	116810	13073	0	129883
1973	63369	15081	0	78450	34966	10416	0	45382	98335	25497	0	123832
1974	85387	21828	0	107215	29438	10982	0	40420	114825	32810	0	147635
1975	109832	10992	0	120824	30806	22733	0	53539	140638	33725	0	174363
1976	93939	4576	0	98515	38146	28341	0	66487	132085	32917	0	165002
1977	92904	2048	0	94952	34078	26113	0	60191	126982	28161	0	155143
1978	63669	3523	0	67192	52521	42010	0	94531	116190	45533	0	161723
1979	96926	449	0	97375	35532	27634	0	63166	132458	28083	0	160541
1980	91577	1563	0	93140	40844	35542	0	76386	132421	37105	0	169526
1981 ⁴	89049	1211	0	90260	89345	22564	0	111909	178394	23775	0	202169
1982	100568	1655	0	102223	44706	19810	0	64516	145274	21465	0	166739
1983	9529	1021	0	10550	40529	6810	0	47339	50058	7831	0	57889
1984 ⁵	95	549	0	644	23745	6528	0	30273	23840	7077	0	30917
1985 ⁵	0	1	0	1	13334	5700	0	19034	13334	5701	0	19035

Year	Large Vessel Catch			Landsmen Catch ²			Total Catches			
	0	1+	UNK	0	1+	UNK	0	1+	UNK	Total
1986	0	0	0	21888	4046	0	21888	4046	0	25934
1987 ⁶	2671	90	2	30986	10266	20	41272	10356	22	44035
1988 ⁶	0	0	0	66950	13493	13603	94046	13493	13603	94046
1989 ⁶	0	0	0	53879	5504	5691	65074	5504	5691	65074
1990 ⁵	48	44	0	33144	22087	2903	58134	22131	2903	58222
1991	0	0	0	42379	10186	0	52565	10186	0	52565
1992 ⁵	94	792	0	43767	23956	0	67723	24748	0	68609
1993 ⁵	8	111	0	16393	10491	0	26884	10602	0	27003
1994 ⁵	43	127	0	25180	36004	0	61184	36131	0	61354

¹ All values are from ICNAF, NAFO or DFO Statistics except where noted.

² Landsmen values include catches by small vessels (< 150 gr tons) and aircraft.

³ Addition error in NAFO Statistics Bulletin corrected.

⁴ NAFO values revised to include complete Quebec catch (Bowen 1982).

⁵ Large vessel catches represent research catches and may differ from NAFO values.

⁶ Total catch may differ from NAFO value. Maritime and Quebec catches from R. Simon (pers. comm.).

Table 3: Age frequencies of harp seal catches in the Gulf and Front regions, 1986-1992.

AGE	YEAR						
	1986	1987	1988	1989	1990	1991	1992
0	21888	33657	66950	53879	33188	42379	43861
1	1069	1497	6533	2570	4716	1816	6574
2	891	1376	6839	2366	3189	632	4362
3	875	1695	3815	1703	3467	1066	2350
4	398	1365	2631	1298	3259	1658	2304
5	165	638	1404	981	2982	1461	1724
6	130	550	1227	606	1387	789	1578
7	67	440	439	115	694	276	1183
8	48	297	482	58	138	158	525
9	48	308	306	58	416	158	805
10	29	176	87	86	278	158	373
11	29	220	87	86	623	316	305
12	29	99	133	86	486	276	161
13	16	121	263	86	556	276	151
14	29	110	176	29	208	118	155
15	16	154	220	86	416	198	82
16	12	121	263	86	138	40	297
17	6	121	176	29	278	118	359
18	22	77	263	145	208	118	218
19	16	67	350	29	0	80	433
20	22	132	350	86	348	40	74
21	25	77	87	58	0	0	73
22	12	22	43	202	138	79	6
23	16	88	87	86	208	0	143
24	16	88	220	86	0	79	74
25+	60	539	615	174	901	276	439
TOTAL	25934	44035	94046	65074	58222	52565	67723

Table 4: Estimated age frequencies of harp seal catches in West Greenland, 1984-1994.

AGE	YEAR			
	1984	1985	1986	1987-1994
0	7844	8190	6186	7128
1	4258	4445	3358	3869
2	2403	2509	1895	2183
3	1131	1180	891	1028
4	477	498	376	433
5	300	314	237	273
6	247	258	195	225
7	124	129	98	112
8	124	129	98	112
9	106	111	83	96
10+	653	682	515	594
TOTAL	17667	18445	13932	16053

Note: for the population model, catch at age frequencies reported by Roff and Bowen (1986) were applied to the 10+ age class to determine catches to 25+ yrs

Table 5: Estimated age frequencies of harp seal catches in the Canadian Arctic, 1984-1994 (based on a total catch of 4,881).

Age	0	1	2	3	4	5	6	7	8	9	10	11	12
1984 to 1994	166	320	580	646	436	260	237	254	182	132	215	149	155

Table of age frequencies con't

Age	13	14	15	16	17	18	19	20	21	22	23	24	25+
	94	110	199	94	105	77	83	127	61	50	44	50	55