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SCIENTIFIC COUNCIL MEETING – JUNE 2014

The Status of Harp and Hooded Seals in the North Atlantic

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The Joint NAFO/ICES Working Group on Harp and Hooded Seals (WGHARP)

The Joint ICES/NAFO Working Group on Harp and Hooded Seals (WGHARP) met during 26-30 August 2013 at the Knipovich Polar Research Institute of Marine Fisheries and Oceanography (PINRO, Murmansk, Russia. In attendance were 15 scientists representing Canada, Greenland, Norway, and Russia.

In September 2012 the Norwegian Royal Ministry of Fisheries and Coastal Affairs requested ICES to assess the status of the Greenland Sea and White Sea/Barents Sea harp and hooded seal stocks. Their key request was for the WG to:

a) Review results of 2012–2013 surveys

b) Provide quota advice to ICES/NAFO member states of their harvests of harp and hooded seals as follows (request from Norway):

- an assessment of status and harvest potential of the harp seal stocks in the Greenland Sea and the White Sea/ Barents Sea, and of the hooded seal stock in the Greenland Sea.
- assess the impact on the harp seal stocks in the Greenland Sea and the White Sea/ Barents Sea of an annual harvest of:
  - current harvest levels,
  - sustainable catches(defined as the fixed annual catches that stabilizes the future 1 + population),
  - catches that would reduce the population over a 10-years period in such a manner that it would remain above a level of 70% of current level with 80% probability.

c) Provide advice on other issues as requested

There were no requests for advice from NAFO related to the NW Atlantic stocks of harp or hooded seals.

The WG received presentations related to stock identity, catch (mortality) estimates, abundance estimates, and biological parameters of White Sea/Barents Sea, Greenland Sea and Northwest Atlantic Ocean harp and hooded seal stocks, and provided the requested updated catch options for northeast Atlantic harp and hooded seals.

Harp Seals have traditionally been managed as three breeding populations based upon whelping areas in the Greenland Sea, White Sea, and two connected areas along the coast of Newfoundland and

Labrador and in the southern Gulf of St Lawrence. Despite extensive study, phylogeographic relationships among populations remained uncertain. A new analysis that undertook a complete mtDNA coding-region genomes of 53 individuals from the four areas supports the White Sea, Greenland Sea, and Northwest Atlantic breeding areas as genetically distinct populations.

Figure 1. Locations of North Atlantic harp and hooded seal stocks. Green spots indicate the whelping areas for the White Sea (East Ice) stock of harp seals, the Greenland Sea (West Ice) stocks of harp and hooded seals, and the northwest Atlantic stocks (Front and Gulf areas) of harp and hooded seals. Dark blue indicates the entire distributional areas.

White Sea/Barents Sea harp seals:

A pup survey of White Sea/Barent Sea harp seal stock was flown during March 2013, but the results were not available during the meeting. Therefore, advice was based upon a population model was fitted to the same pup production surveys and reproductive rate information presented at WGHARP 2011 (ICES 2011). Harvest data were updated to 2013. The White Sea/Barent Sea harp seal stock population model estimates a 2013 abundance of 1 221 000 (1 069 800 – 1 372 200) 1+ animals and 198 800 (177 483 – 220 117) pups. Total estimate is 1 419 800 (1 266 910 – 1 572 690).

Harp seal body condition, estimated from samples taken during spring in 1992-2011, exhibited a slow increase from 1992 to 2001, followed by a significant decrease to a minimum in 2011. Analyses of relevant covariates indicated that high abundance of krill impacted the seal condition positively, emphasizing the ecological significance of krill as key food for harp seals during summer. High abundances of capelin, polar cod and cod had, however, a negative impact on seal condition. A linear correlation between annual pup production and blubber thickness indicated that recently observed declines in pup production may be associated with changes in body condition of the seals. Seemingly, indirect effects

such as competition between harp seals and prey for shared resources such as krill, may have resulted in negative effects on condition with subsequent implications for breeding success.

The original population model for the White Sea/Barents Sea harp seal population provides a poor fit to the pup production survey data. The lack of historical data on pregnancy rates makes the population model stiff, and unable to capture the dynamics of the survey pup production estimates. A decline in the reproductive status of females (as seen in the NW Atlantic) may explain the sudden decrease in pup production observed for the Barents Sea / White Sea harp seal population after 2003, and reducing fecundity in the population model did in fact produce estimates able to mimic the pup production changes observed. However, the current model projects future population size, assuming a fecundity rate of 64%, although the pup production data suggests that fecundity may be lower. If so, the model may be overestimating the future fecundity and underestimating the impact of catches.

Prior to 2011, the population model used was not considered appropriate and therefore catch options were based upon Potential Biological Removals (PBR). In 2011 the model was changed to include time-variant biological parameters and was then used by the WG to provide advice on the requested catch options. However, the last reproductive rates available are based on data from 2006, i.e. more than 5 years old. Based on the Precautionary Approach criteria adopted by ICES for advice on harp and hooded seals, this population should be classified as data poor. Therefore the PBR approach was also considered. At current catch levels, which are essentially 0, the model predicts a 13% increase in the 1+ population over the next 10 years. Equilibrium catch level is estimated to be 17 400 (100% 1+ animals). A catch level of 26 650 animals (100% 1+) will bring the population size down to N70 with probability 0.8 within 10 years. This catch level indicates a 8% decrease of the 1+ population in 10 years. The PBR removals are estimated to be 40 430 (14% pups). This catch option indicates a 16% reduction of the 1+ population in 10 years. The WG expressed concerns on the high removals and declining population resulting from the PBR estimations. The possible use of a recovery factor less than 0.5 was discussed, but in conclusion the WG agreed that the estimated equilibrium catches were the most preferred option.

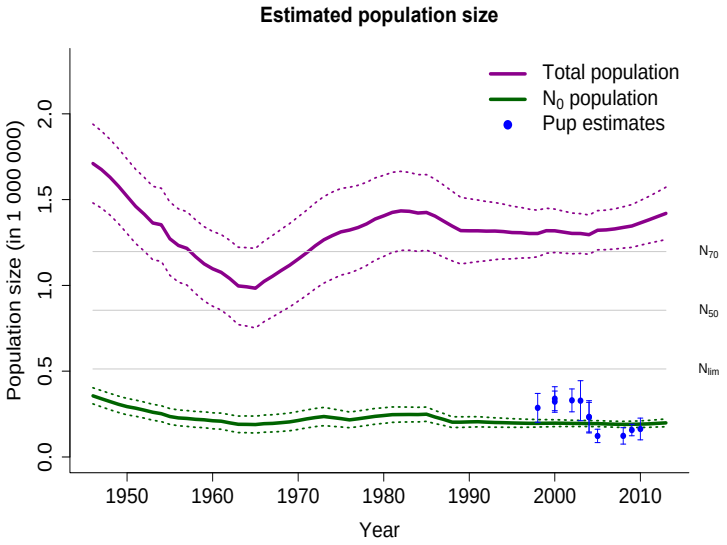

Figure 2: Modelled population trajectories for pups and total population (full lines) and 95% confidence intervals (dashed lines). N70, N50, and Nlim denote the 70%, 50% and 30% of the historical maximum population size, respectively.

Greenland Sea harp seals:

In the Greenland Sea, total catches were 5,593 harp seals (including 3,740 pups) in 2012, and 16,033 harp seals in the area in 2013 (including 13,911 pups). A new aerial survey to estimate harp seal pup production in the Greenland Sea was flown in 2012 and resulted in an estimate of 89 590 (SE = 12 310, CV = 13.7%) pups. This estimate is slightly, but not significantly lower, than estimates obtained in similar surveys of the area in 2002 and 2007.

The population model used to estimate abundance of harp seals in the Greenland Sea is similar to the model used to assess the abundance of the Barents Sea / White Sea harp seal population. The model trajectory suggests an increase in the population abundance from the 1970s to the 2013 abundance of 534 400 (379 200 – 689 600) 1+ animals and 93 010 (70 210 – 115 810) pups. The total population estimate was 627 410 (470 540 – 784 280) seals. This is slightly lower than the 2011 estimate of harp seals in the Greenland Sea of 649 566 (379 031 – 920 101) animals, but the estimates are not significantly different.

Unfortunately, the population model had difficulty in capturing the dynamics of the pup production estimates. The predicted population trajectories from the model are driven by the mark-recapture estimates of pup production from the 1980s and early 1990s. There is considerable uncertainty associated with these estimates.

The WG considered the Greenland Seal harp seal population as data rich, and above the N_{70} level (i.e., more than 70% of known maximum abundance measured). Therefore, catch advice can be provided with the use of an appropriate population model. At current catch levels, the 1+ population is predicted to increase ~21% over the next 10 years. The equilibrium catch level is 14 600 (100% 1+ animals). A catch level of 21 270 animals (100% 1+) would reduce the population to N70 within 10 years.

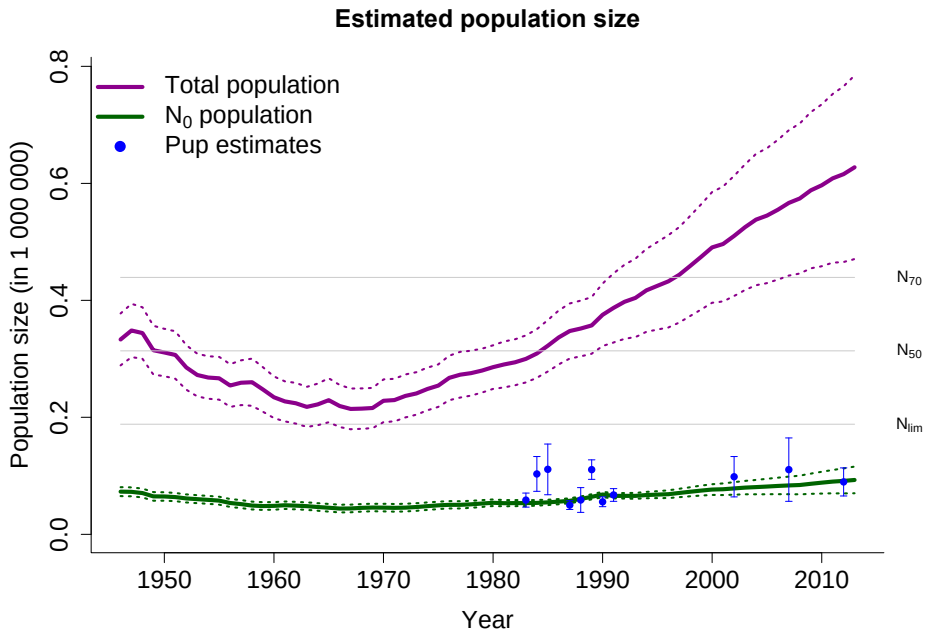

Figure 3. Modelled population trajectories for Greenland Sea harp seal pups and total population (full lines) and 95% confidence intervals (dashed lines). N70, N50, and Nlim denote the 70%, 50% and 30% of the estimated maximum population size, respectively.

Greenland Sea hooded seals:

Pregnancy rates of Greenland Sea hooded seals over the periods 1958-62, 1978-80, 1982-85, 1987 and 1999 ranged from 0.62 to 0.74 and showed no significant differences between sampling periods. The average pregnancy rate for the total sample was 0.68 (95% CI=0.06), which is about 20% lower than the pregnancy rate estimated earlier for Russian samples from 1986-1990. Ovary based pregnancy rates do not take into account any potential late term abortions and are therefore maximum estimates.

A Norwegian survey of the Greenland Sea carried out in 2012 (described in the section on Greenland Sea harp seals xxx) resulted in an estimated hooded seal pup production of 13 655 (SE = 1 900, CV = 13.9%). This estimate is lower than those obtained from comparable surveys in 2005 and 2007, but the differences were not significant. It is however, significantly lower than observed in 1997(23 762 pups, CV = 19.2%).

The total population estimated using an age- structured population dynamics model that incorporates historical catch data and estimates of pup production. The model is similar to the model assessing the abundance of the Greenland Sea and the Barents Sea / White Sea harp seal population. Assuming fecundity = 0.7, the model estimates a 2013 pup production of 14 010 (SE=1 622), a 1+ population of 68 820 (SE=7 862), for a total population of 82 830 (SE=8 028). It predicts a 7% decrease of the 1+ population over the next 10 years. The population estimates from the model were lower than obtained in 2011 due to the inclusion of the new pup production estimate.

All model runs indicate a population currently well below N30 (30% of largest observed population size). Following the Precautionary harvest strategy previously developed by WGHARP, it was recommended that no catches should be taken from this population.

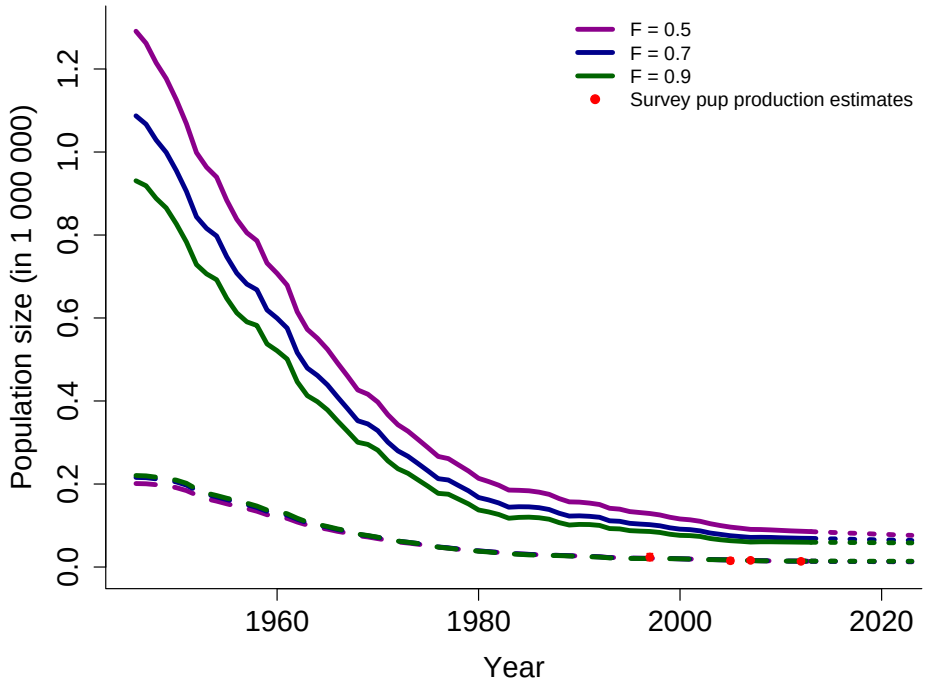

Figure 4: Modelled population trajectories for pups (dashed lines) and 1+ population (full lines) under different assumptions of fecundity (F) for Greenland Sea hooded seals.

Northwest Atlantic hooded seals

Catches

Under the Canadian Atlantic Seal Management Strategy, Northwest Atlantic hooded seals are considered to be data poor. Under this approach, TAC are set by considering a PBR approach. The quota has remained at 8 200 since 2007. The killing of bluebacks is prohibited in Canada.

Canadian catches of hooded seals (1+ only) have remained extremely low in recent years (Table 1). Reported catches in 2006, 2007, 2008 and 2009 were only 40, 17, 5 and 10, respectively. No hooded seals were reported taken in 2010 and 2013 while 2 were taken in 2011 and 1 in 2012.

The Greenland catches of hooded seals have declined significantly in the last five years. This decrease has mainly been caused a strong decrease in catches in southeast Greenland (their molting area), where catches in 2010 and 2011 were only around 10% of the catch level from the 1990s (Table 2).

Current research

Canada is continuing research on diets, reproductive rates and growth and condition. Canadian and Greenland scientists are continuing a study of the movements and diving behaviour of newly moulted hooded seals that provides data on habitat use. The animals are also acting as oceanographic samplers, collecting data on sea temperature and salinity.

Population assessment

There are no new data on the abundance of NWA hooded seals.

Northwest Atlantic harp seals

Catches

No new data are available on catches of harp seals in the Canadian Arctic. However, catches appear to be relatively low and a recent study indicates that current catches average less than 1,000 per year (Table 3).

Canadian catches have steadily declined since 2006 when 354,867 harp seals were reported taken (Table 3). Catches were significantly reduced in 2007 (224,745, 83% of TAC) due to the lack of ice in the southern Gulf and heavy ice off Newfoundland. Poor ice, offshore distribution and low prices also resulted in lower catches in 2008 with only 79% (217,850) of the TAC taken. Quotas have been increased, but catches in recent years have been extremely low. In 2011, only 40,389 (10.1% of the TAC) were taken due to a combination of poor ice conditions, reduced effort and alternate fisheries. Since then, catches increased slightly reaching 90,703 (22.7% of the quota) in 2013. The vast majority of harp seals taken in the Canadian commercial hunt were young of the year. Since 2008 they have accounted for over 99% of the reported catch.

Data on catches in Greenland are usually available 1 to 2 years after the harvests. Reported Greenland catches of harp seals from the Northwest Atlantic population seems to have stabilized at a relative high level around 70,000 - 90,000, which was reached in the last part of the 1990s (Table 3). Catches of harp seals in northeast Greenland is still small (most years below 100) and fluctuating, whereas catches in Southeast Greenland, which are a mixture of seals from the Northwest Atlantic and the Greenland Sea populations, has been declining in recent years.

Given the reduced level of recent catches in Canada, the high level of hunting in Greenland (including struck and loss) and the relative ages of seals taken in the two hunts, the current Greenland hunt is likely

to be having a greater impact on the population dynamics of Northwest Atlantic harp seals than the hunt in Canada.

Current research

Research on diet, reproductive rates, growth, condition and habitat use are continuing with a focus on the role of harp seals in the northwest Atlantic ecosystem, The impact of climate change on harp seals in the northwest Atlantic are being investigated, particularly with respect to how they cope with poor ice conditions. Changes in biological parameters are being monitored to determine how they may respond to density dependent factors or changes in prey availability.

Population assessment

Photographic and visual aerial surveys to determine pup production of Northwest Atlantic harp seals were carried out in February and March 2012. Preliminary estimates of pup production were presented at WGHARP. However, a full analysis of these surveys and the resulting estimates of total population were peer reviewed at the National Marine Mammal Peer Review Committee and are described below.

Status of Northwest Atlantic Harp Seals

The results of surveys carried out in 2012 to estimate pup production of Northwest Atlantic harp seals and a full assessment of the status of the population were peer reviewed at a meeting of the Annual Meeting of the Canadian National Marine Mammal Peer Review Committee (NMMPRC) in October 2013. Approximately 35 scientists from Canada and Norway participated.

Mortality

In addition to reported catches (Table 3), some seals are killed, but not recovered or reported (referred to as 'struck and lost'). Estimates of the additional mortality caused by struck and lost for young seals during the large vessel, whitecoat hunt (prior to 1983) are considered to be low (~ 1%). Since then, loss rates of YOY seals, which make up the majority of the current harvest in Canada, appear to be 5 % (or less) while losses of older seals are higher (assumed to be 50 % of those killed). This higher figure is also applied to all catches in the Canadian Arctic and Greenland when estimating total removals (Fig. 5).

Harp seals are also taken as bycatch in fishing gear. The Newfoundland lumpfish fishery is thought to be responsible for the largest bycatch mortality of seals. Estimates are not available for seals caught in other fisheries in Canada. The highest bycatch of harp seals was estimated to occur during 1992-96 with average catches of 29,431 animals per year. By 2003, bycatch was estimated to be less than 5,500. Estimates of bycatch levels in the last decade are not available and so the average annual level during the previous decade (12,000) has been assumed. A small number of harp seals (< 500/yr) are also taken in fishing gear in the northeastern United States.

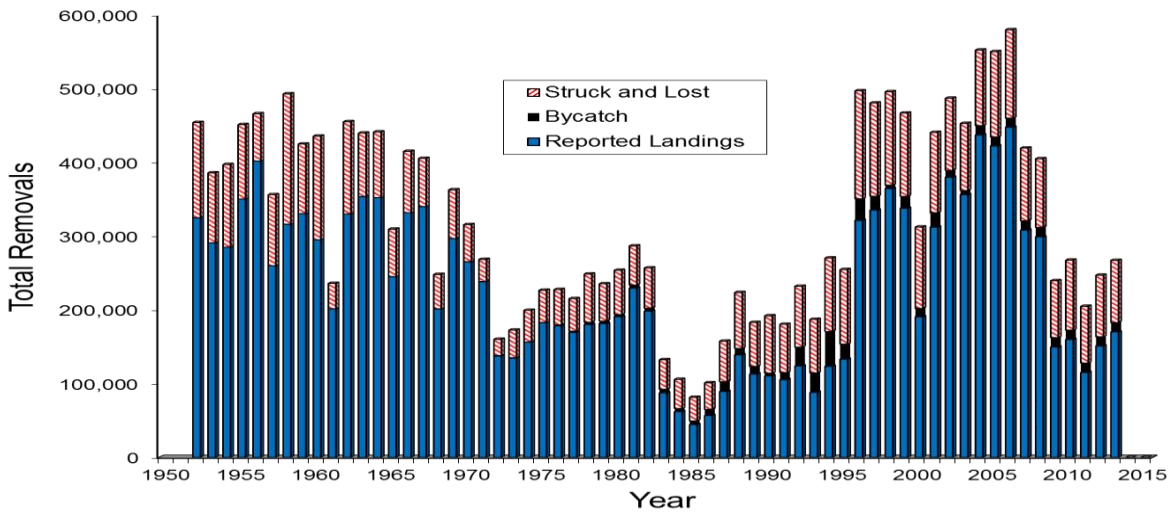

Figure 5. Total removals of Northwest Atlantic harp seals, 1952-2013.

Pup Production

Photographic and visual aerial surveys were flown in the Gulf of St. Lawrence, Strait of Belle Isle, and off Newfoundland (Front), to determine harp seal pup production between 27 February and 16 March, 2012. Estimated pup production in the southern Gulf was 115,500 (SE=15,300) animals. Surveys of the Strait of Belle Isle and at the Front resulted in estimates of 74,100 (SE=12,400) and 601,400 (SE=66,900) pups, respectively. Combining these areas resulted in an estimated total 2012 pup production of 790,000 (SE=69,700, CV=8.8 %). This estimate is approximately one half of the number of pups estimated in 2008, but similar to the numbers estimated to have been born in 1994, 1999 and 2004 (Fig. 6). Overall, the proportion of pups born in the southern Gulf of St Lawrence has declined from a high of 28 % in 1994 to 15 % in 2012.

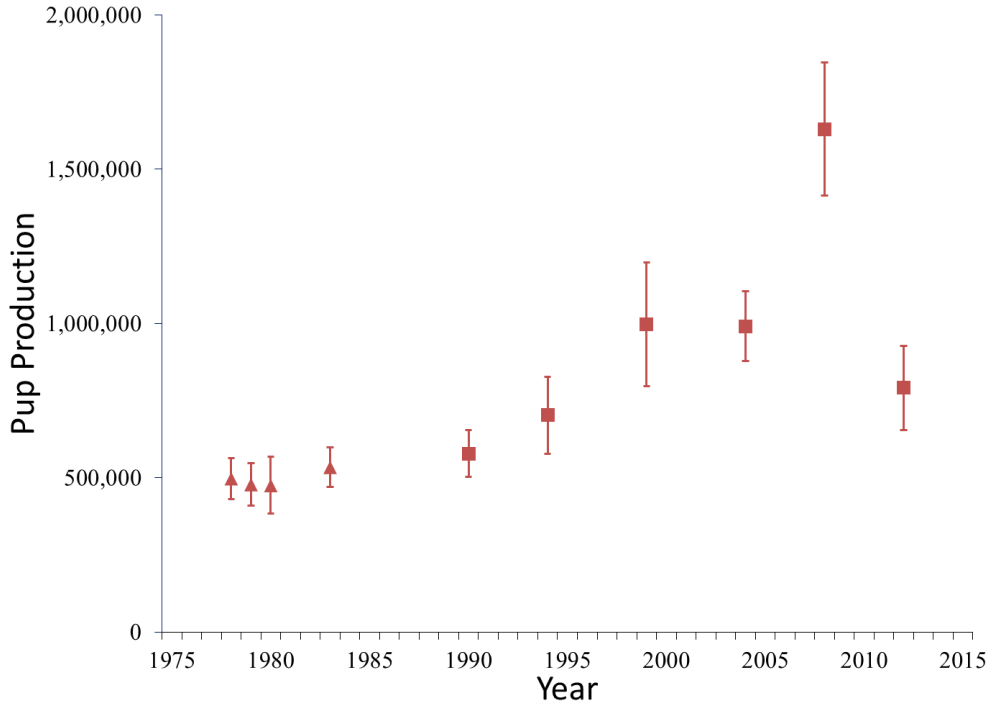

Figure 6. Estimated pup production of Northwest Atlantic harp seals. Estimates obtained from mark-recapture experiments are indicated by the triangles and aerial survey estimates by the squares.

Pregnancy rates

Estimates of late term pregnancy rates, fecundity and abortion rates of Northwest Atlantic harp seals were obtained from samples collected off the coast of Newfoundland and Labrador. No new data were available for young seals. The declining , but highly variable, reproductive rates observed since the 1980s have continued with the pregnancy rate of mature females falling to the lowest level since data was first collected in the 1950s, occurring in 2010 and 2011 (<0.3, Fig. 7). Modelling the impact of a wide range of possible factors indicated that the general decline in fecundity can be explained by the observed population increase while the interannual variability is in response to changes in late term abortions which, in turn, could be described either by a model that incorporated ice cover in late January or a model that incorporated ice cover and capelin biomass obtained from the previous fall as a proxy for prey availability. The abundance of capelin, a key prey of harp seals, has been shown to be correlated with the timing of ice retreat. Although the condition of adult female seals that are not pregnant has declined, the condition of pregnant females has not. This suggests that females that are in good condition maintain their pregnancy while those that do not have sufficient energy reserves may not become pregnant or may terminate their pregnancy by aborting the foetus.

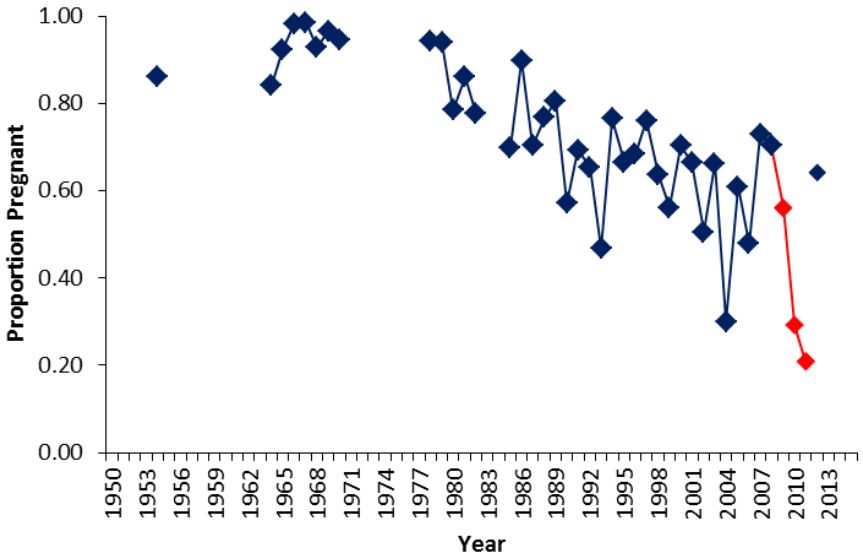

Figure 7. Estimated late-term pregnancy rates of Northwest Atlantic harp seals. Recent decline is highlighted in red.

Total Populations

The population model estimates the starting population size, the adult mortality rate (M) and, for the first time, the environmental carrying capacity. It incorporates a time series of pup production estimates up to 2012, as well as reproductive rates, ice-related mortality and harvest information to 2013 to predict 2014 pup production and total population size. The model provides a 2012 estimated pup production of 929,000 (SE=148,000), a total population of 7,445,000 (SE=698,000) and a K=10.8 million (SE=564,000). Projecting to 2014, results in an estimated pup production of 853,000 (SE=202,000) and a total population of 7,411,000 (SE=656,000) animals. The population appears to be relatively stable, showing little change in abundance since 2004 (Fig 8).

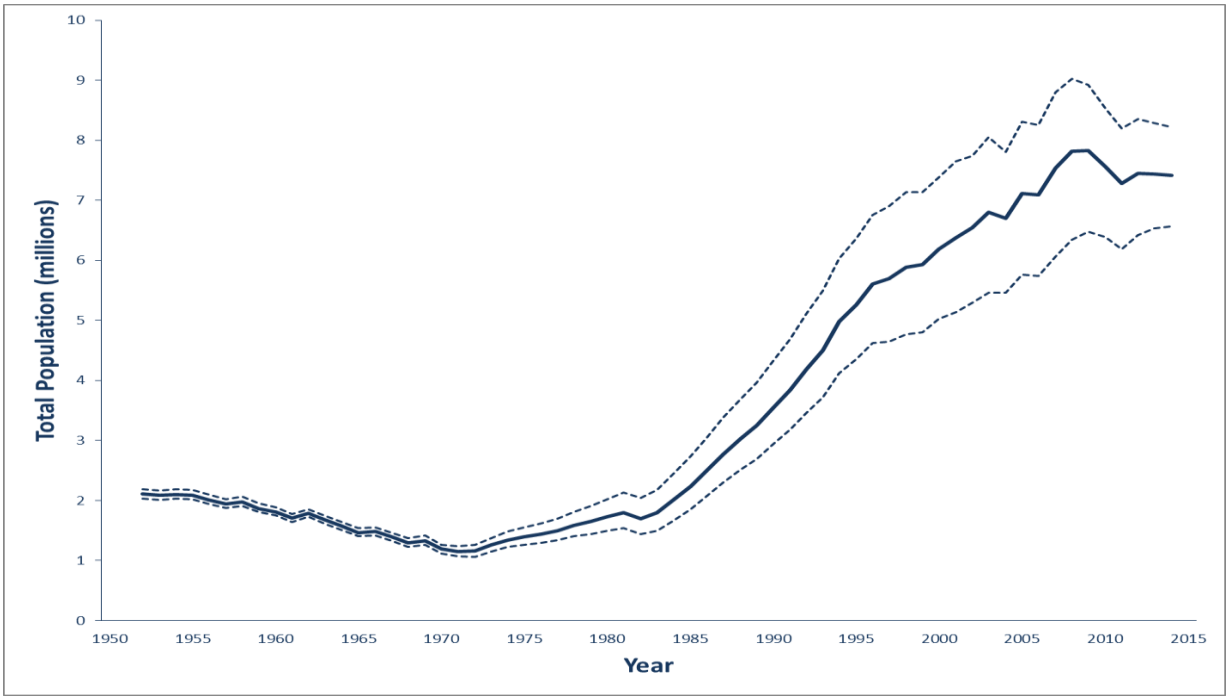

Figure 8. Estimated total population of Northwest Atlantic harp seals, 1952-2014.

Reference

ICES. 2013 Report of the Working Group on Harp and Hooded Seals (WGHARP). ICES CM 2013/ACOM:20.

DFO. 2014. Status of Northwest Atlantic harp seals, Pagophilus groenlandicus. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2014/011.

Table 1. Canadian catches of hooded seals off Newfoundland and in the Gulf of St. Lawrence, Canada ("Gulf" and "Front"), 1946-2013a,b. Catches from 1995 onward includes catches under personal use licences. YOY refers to Young of Year. Catches from 1990-1996 were not assigned to age classes. With the exception of 1996, all were assumed to be 1+.

	Large Vessel Catches				Landsmen Catches				Total Catches			
Year	YOY	1+	Unk	Total	YOY	1+	Unk	Total	YOY	1+	Unk	Total
1946-50	4029	2221	0	6249	429	184	0	613	4458	2405	0	6863
1951-55	3948	1373	0	5321	494	157	0	651	4442	1530	0	5972
1956-60	3641	2634	0	6275	106	70	0	176	3747	2704	0	6451
1961-65	2567	1756	0	4323	521	199	0	720	3088	1955	0	5043
1966-70	7483	5220	0	12703	613	211	24	848	8096	5431	24	13551
1971-75	6550	5247	0	11797	92	56	0	148	6642	5303	0	11945
1976	6065	5718	0	11783	475	127	0	602	6540	5845	0	12385
1977	7967	2922	0	10889	1003	201	0	1204	8970	3123	0	12093
1978	7730	2029	0	9759	236	509	0	745	7966	2538	0	10504
1979	11817	2876	0	14693	131	301	0	432	11948	3177	0	15125
1980	9712	1547	0	11259	1441	416	0	1857	11153	1963	0	13116
1981	7372	1897	0	9269	3289	1118	0	4407	10661	3015	0	13676
1982	4899	1987	0	6886	2858	649	0	3507	7757	2636	0	10393
1983	0	0	0	0	0	128	0	128	0	128	0	128
1984	206	187	0	393d	0	56	0	56	206	243	0	449
1985	215	220	0	435d	5	344	0	349	220	564	0	784
1986	0	0	0	0	21	12	0	33	21	12	0	33
1987	124	4	250	378	1197	280	0	1477	1321	284	250	1855
1988	0	0	0	0	828	80	0	908	828	80	0	908
1989	0	0	0	0	102	260	5	367	102	260	5	367
1990	41	53	0	94d	0	0	636[e]	636	41	53	636	730
1991	0	14	0	14d	0	0	6411[e]	6411	0	14	6411	6425
1992	35	60	0	95d	0	0	119[e]	119	35	60	119	214
1993	0	19	0	19d	0	0	19[e]	19	0	19	19	38
1994	19	53	0	72d	0	0	149[e]	149	19	53	149	221
1995	0	0	0	0	0	0	857[e]	857	0	0	857e	857
1996	0	0	0	0	0	0	25754[e]	25754	0	22847f	2907	25754
1997[e]	0	0	0	0	0	7058	0	7058	0	7058	0	7058
1998[e]	0	0	0	0	0	10148	0	10148	0	10148	0	10148
1999 [e]	0	0	0	0	0	201	0	201	0	201	0	201
2000 [e]	2	2	0	4[d]	0	10	0	10	2	12	0	14
2001[e]	0	0	0	0	0	140	0	140	0	140	0	140
2002 [e]	0	0	0	0	0	150	0	150	0	150	0	150
2003 [e]	0	0	0	0	0	151	0	151	0	151	0	151
2004 [e]	0	0	0	0	0	389	0	389	0	389	0	389
2005 [e]	0	0	0	0	0	20	0	20	0	20	0	20
2006 [e]	0	0	0	0	0	40	0	40	0	40	0	40
2007 [e]	0	0	0	0	0	17	0	17	0	17	0	17
2008 [e]	0	0	0	0	0	5	0	5	0	5	0	5
2009 [e]	0	0	0	0	0	10	0	10	0	10	0	10
2010[e]	0	0	0	0	0	0	0	0	0	0	0	0
2011[e]	0	0	0	0	0	2	0	2	0	2	0	2
2012[e]	0	0	0	0	0	1	0	1	0	1	0	1
2013[e]	0	0	0	0	0	0	0	0	0	0	0	0

[a] For the period 1946–1970 only 5-years averages are given.

[b] All values prior to 1990 are from NAFO except where noted; recent years are from Stenson (2009) and DFO Statistics Branch.

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

[d] Large vessel catches represent research catches in Newfoundland and may differ from NAFO values.

[e] Statistics no longer split by age; commercial catches of bluebacks are not allowed

[f] Number of YOY based upon seizures of illegal catches

Table 3. Catches of hooded seals in West and East Greenland 1954–2011.

Year	West Atlantic Population				NE	All Greenland
	West	KGH[b]	Southeast	Total		
1954	1097	-	201	1298	-	1298
1955	972	-	343	1315	1	1316
1956	593	-	261	854	3	857
1957	797	-	410	1207	2	1209
1958	846	-	361	1207	4	1211
1959	780	414	312	1506	8	1514
1960	965	-	327	1292	4	1296
1961	673	803	346	1822	2	1824
1962	545	988	324	1857	2	1859
1963	892	813	314	2019	2	2021
1964	2185	366	550	3101	2	3103
1965	1822	-	308	2130	2	2132
1966	1821	748	304	2873	-	2873
1967	1608	371	357	2336	1	2337
1968	1392	20	640	2052	1	2053
1969	1822	-	410	2232	1	2233
1970	1412	-	704	2116	9	2125
1971	1634	-	744	2378	-	2378
1972	2383	-	1825	4208	2	4210
1973	2654	-	673	3327	4	3331
1974	2801	-	1205	4006	13	4019
1975	3679	-	1027	4706	58a	4764
1976	4230	-	811	5041	22a	5063
1977	3751	-	2226	5977	32a	6009
1978	3635	-	2752	6387	17	6404
1979	3612	-	2289	5901	15	5916
1980	3779	-	2616	6395	21	6416
1981	3745	-	2424	6169	28a	6197
1982	4398	-	2035	6433	16a	6449
1983	4155	-	1321	5476	9a	5485
1984	3364	-	1328	4692	17	4709
1985	3188	-	3689	6877	6	6883
1986	2796a	-	3050a	5846a	-a	5846a
1987	2333a	-	2472a	4805a	3a	4808a
1988–92c						
1993	4983	-	1967	6950	32	6982
1994	5060	-	3048	8108	34	8142
1995	4429		2702	7131	48	7179
1996	6066	-	3801	9867	24	9891
1997	5250		2175	7425	67	7492
1998	5051		1270	6321	14	6335
1999	4852	-	2587	7439	16	7455
2000	3769	-	2046	5815	29	5844
2001	5010	-	1496	6506	8	6514
2002	3606	-	1189	4795	11	4806
2003	4351	-	1992	6343	10	6353
2004	4133	-	1690	5823	20	5843
2005	3092	-	1022	4114	14	4128
2006	4194	-	550	4744	3	4747
2007	2575	-	712	3287	7	3294
2008	2085	-	519	2604	2	2606
2009	**1627**	-	358	1982	1	**1986**
2010	**1871**		**266**	**2137**	**7**	**2144**

Year	West Atlantic Population				NE	All Greenland
	West	KGH[b]	Southeast	Total		
2011	**1827**		**225**	**2052**	**9**	**2061**

a Provisional figures: do not include estimates for non-reported catches as for the previous years.

b Royal Greenland Trade Department special vessel catch expeditions in the Denmark Strait 1959–68.

c For 1988 to 1992 catch statistics are not available.

Table 3. Reported catches of harp seals in the northwest Atlantic for 1952-2011. Estimated catches are indicated by shading. The Greenland catches are made up of the West Greenland catches and 1/2 of the SE Greenland. The other half of the SE Greenland and the NE Greenland are assigned to the West Ice population.

Year	Front & Gulf	Canadian Arctic	Greenland	NW Atlantic Total
1952	307,108	1,784	16,400	325,292
1953	272,886	1,784	16,400	291,070
1954	264,416	1,784	19,150	285,350
1955	333,369	1,784	15,534	350,687
1956	389,410	1,784	10,973	402,167
1957	245,480	1,784	12,884	260,148
1958	297,786	1,784	16,885	316,455
1959	320,134	1,784	8,928	330,846
1960	277,350	1,784	16,154	295,288
1961	187,866	1,784	11,996	201,646
1962	319,989	1,784	8,500	330,273
1963	342,042	1,784	10,111	353,937
1964	341,663	1,784	9,203	352,650
1965	234,253	1,784	9,289	245,326
1966	323,139	1,784	7,057	331,980
1967	334,356	1,784	4,242	340,382
1968	192,696	1,784	7,116	201,596
1969	288,812	1,784	6,438	297,034
1970	257,495	1,784	6,269	265,548
1971	230,966	1,784	5,572	238,322
1972	129,883	1,784	5,994	137,661
1973	123,832	1,784	9,212	134,828
1974	147,635	1,784	7,145	156,564
1975	174,363	1,784	6,752	182,899
1976	165,002	1,784	11,956	178,742
1977	155,143	1,784	12,866	169,793
1978	161,723	2,129	16,638	180,490
1979	160,541	3,620	17,545	181,706
1980	169,526	6,350	15,255	191,131
1981	202,169	4,672	22,974	229,815
1982	166,739	4,881	26,927	198,547
1983	57,889	4,881	24,785	87,555
1984	31,544	4,881	25,829	62,254
1985	19,035	4,881	20,785	44,701
1986	25,934	4,881	26,099	56,914
1987	46,796	4,881	37,859	89,536
1988	94,046	4,881	40,415	139,342
1989	65,304	4,881	42,971	113,156
1990	60,162	4,881	45,526	110,569
1991	52,588	4,881	48,082	105,551
1992	68,668	4,881	50,638	124,187
1993	27,003	4,881	56,319	88,203
1994	61,379	4,881	59,684	125,944
1995	65,767	4,881	66,298	136,946
1996	242,906	4,881	73,947	321,734

Year	Front & Gulf	Canadian Arctic	Greenland	NW Atlantic Total
1997	264,210	2,500[a]	68,816	335,526
1998	282,624	1,000[a]	81,272	364,896
1999	244,552	500[a]	93,117	338,169
2000	92,055	400[a]	99,801	192,256
2001	226,493	600[a]	86,763	313,856
2002	312,367	1,000	67,725	381,092
2003	289,512	1,000	67,607	358,119
2004	365,971	1,000	72,105	439,076
2005	323,826	1,000	93,121	417,947
2006	354,867	1,000	93,318	449,185
2007	224,745	1,000	84,272	310,017
2008	217,850	1,000	82,414	301,264
2009	76,668	1,000	71,716	149,384
2010	69,101	1,000	91,018	161,119
2011	40389	1,000	74,823	116,212
2012	71460	1,000	80,849[b]	153,309
2013	90703	1,000	80,849[b]	172,552

[a] Rounded

[b] Average of catches 2007-2011