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Mean age at sexual maturity and age-specific pregnancy rates of Northwest Atlantic harp seals in 1980 and 1981

by

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INTRODUCTION

Bowen, Capstick and Sergeant (1981) concluded that both mean age of sexual maturity and fertility rate of female harp seals had changed significantly over the period 1950-79. They also pointed out that the data were insufficient to determine the exact pattern of change over time or the underlying mechanisms responsible for these changes. However, the apparent relationship between body size and at age maturity in Phocids (Laws 1959) has led to the idea that density-dependent changes in per capita food availability and hence growth rate are responsible for the observed changes in reproductive potential.

To test the hypothesis we require, among other things, a series of estimates (at least 10) of age-specific pregnancy rates. Here we present data on the reproductive rates of female harp seals in 1980 and 1981.

METHODS

Female reproductive tracts and jaws were collected during the winters (December-February) of 1979-80 and 1980-81 from La Tabatiere and Les Escoumins, Quebec and St. Anthony, Newfoundland. Spring samples (April-May) were obtained from concentrations of moulting harp seals located off southern Labrador.

The methods used to determine the age and reproductive condition of females are described in Bowen et al. (1981). Mean age at sexual maturity was determined using the algorithm of DeMaster (1978).

RESULTS AND DISCUSSION

The reproductive condition of female harp seals sampled from December to February during the winters 1979-80 and 1980-82 is given in Table 1. In both winters, samples were collected from the northshore of Quebec and St. Anthony area, Newfoundland. Of 120 females examined in winter 1979-80, 64 were mature and 57 were pregnant, giving a fertility rate of 89.1%. In 1980-81, 237 females were examined of which 110 were mature and 106 were pregnant for a fertility rate of 96.4%. The difference in fertility rate between years was not significant (G test, $P > 0.05$, 1 df).

Age-specific pregnancy rates are also given in Table 1. In 1980, none of 17 4-year-old females were pregnant, 44.4% of 18 5-year-olds and 100.0% of females ages 6 through 9 were pregnant. Of 23 females age 10+ only 82.6% were pregnant. The 1981 data are more typical of recent estimates of age-specific pregnancy rates with 21.6% of 37 4-year-olds pregnant, 66.7% of 39 5-year-olds, 76.2% of 21 6-year-olds and 87.7% of seal 7-years and older.

During two sampling trips in spring 1981, seals were taken on the following dates: April 18-20 and May 15-17. The reproductive tracts of 141 females were examined and of 32 mature animals in the sample, 31 had ovulated in March 1981. Thus 96.9% of mature females had ovulated.

Mean age at sexual maturity of female harp seals in 1980 and 1981 is compared to the 1979 value in Table 3. Average age of maturity was 4.6 $\pm$ 0.3 ($\pm$ 95% C.L.) years in 1980 and 4.4 $\pm$ 0.3 years in 1981. There was no significant difference between these values and the value of 4.3 $\pm$ 0.2 years in 1979.

Roff and Bowen (1980) summarized the age-specific pregnancy rates of harp seals from 1965 to 1979. The 1980 and 1981 estimates are shown with previous data in Table 4. They concluded that there had been no change over time in the percentage of age 4 females pregnant ($X \tilde{\sim} 2.5\%$), despite the estimate of 23.8% in 1979. Recent data do not clarify the situation, as none of 17 4-year-olds was pregnant in 1980, but 21.6% of 37 were in 1981. The conclusion that the change in pregnancy rates over time has been limited to 5- and 6-year-olds (Roff and Bowen 1980) is supported by the 1980 and 1981 data.

REFERENCES

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Table 1. Reproductive condition of female harp seals sampled from December to February 1980 and 1981 at La Tabatiere and Les Escoumins, Quebec and St. Anthony, Newfoundland.

	1980					1981				
Age	n	Immature	Mature pregnant	Mature non-pregnant	% Mature	n	Immature	Mature pregnant	Mature non-pregnant	% Mature
1	5	5			0	7	7			0
2	5	5			0	28	28			0
3	19	19			0	35	35			0
4	17	17			0	37	29	8		21.6
5	18	10	5	3	44.4	39	13	25	1	66.7
6	14		14		100.0	21	5	16		76.2
7	9		9		100.0	19	1	18		94.7
8	8		8		100.0	7	1	6		85.7
9	2		2		100.0	5	3	2		40.0
10+	23		19	4	100.0	34		31	3	100.0
Total	120	56	57	7		232	122	106	4	
Fertility Rate				89.1%					96.4%	

Table 2. Reproductive condition of female harp seals taken at Front moulting concentrations in April and May, 1981.

Age	n	Immature	Mature ovulated	Mature non-ovulated
1	59	59		
2	34	34		
3	10	10		
4	11	5	6	
5	5	1	4	
6	6		6	
7	2		2	
8	1		1	
9	1		1	
10+	12		11	1
Total	141	109	31	1
Ovulation Rate				96.9%

Table 3. Mean at sexual maturity of female harp seals from 1979 to 1981, winter and spring samples combined.

Year	Mean age at maturity ($\bar{X}$)	Var ($\bar{X}$)	95% C.L. $\bar{X}$ Upper	Lower
1979	4.3	0.014	4.5	4.1
1980	4.6	0.015	4.8	4.3
1981	4.4	0.018	4.7	4.1

Table 4. Percentage of female harp seals pregnant by age and year.

Age	Year									
	1965	1966	1967	1968	1969	1970	1978	1979	1980	1981
2	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	6.1	0	0
4	2.7	0	0	0	4.0	0	2.5	23.8	0	21.6
5	11.4	11.1	21.1	31.6	16.0	23.1	60.5	53.3	27.8	64.1
6	54.1	35.3	60.6	70.0	43.8	50.0	90.0	100.0	100.0	76.2
7	71.1	72.7	96.6	91.7	82.1	90.0	66.7	88.9	100.0	94.7
8	84.9	87.5	87.0	81.8	93.1	94.7	70.0	100.0	100.0	85.7
9+	89.5	87.8	88.1	88.6	88.2	84.1	90.3	94.1	84.0	84.6
n[a]	149	58	161	79	180	110	83	48	57	106

[a] Number of pregnant females in sample.