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No. 846

### TITLE

The grey seal Halichoerus grypus (Fabricius)  
in eastern Canadian waters

### AUTHORSHIP

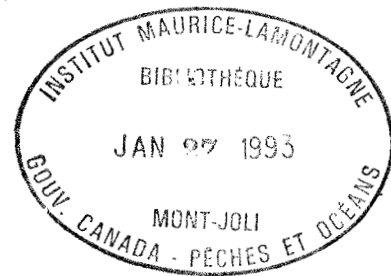
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With the exception of the sections  
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Recommendations, this report is the  
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## Introduction

The grey seal Halichoerus grypus is found in temperate and sub-arctic waters on both sides of the North Atlantic. The largest population, estimated at 36,000, occurs about the British Isles (Smith 1963a) with lesser populations of 3000 at the Faeroes and Iceland (Lockley 1954), 2-3000 along the west and north coasts of Norway (Øynes 1964), and a minimum of 5000 in the Baltic Sea (Hook 1964). The species appears to be absent from Greenland but is found again in eastern Canada, ranging from the northern tip of Labrador to as far south as Nantucket. The total population in this area is estimated at about 3000.

The grey seal shows marked sexual dimorphism, the dark-coated males being easily distinguished from the females by their larger size and pronounced roman nose (Figure 1). The latter character is exemplified in the specific name grypus or "crooked nose" and the Canadian vernacular name "horsehead" or "tête de cheval".

The females have less pronounced noses than the males and attain an average size of only 80 inches, about 15 inches shorter than the males. They have a white throat, mottled with dark patches, which further helps to distinguish them from the males (Figure 2).

The pups are born with long silky white fur faintly tinged with fawn here and there. This natal pelage (Figure 1)

is shed after 3 to 4 weeks and replaced by a coat of short stiff hair of a distinctive pattern in each sex. The male "moulter" is easily recognized by his larger nose and black coat with silver-grey reticulations. The female "moulter" is largely silver-grey in colour with scattered dark spots (Figure 3).

Though the grey seal has been taken in Canada since 1720 (Allen 1880) and probably a century before that, its specific identity was not recognized until over a century later when Gilpin (1874) recorded it as breeding on Sable Island. From that time until 1949 little further information was available on its distribution in eastern Canada. In that year the Fisheries Research Board began a survey of the harbour seal Phoca vitulina to determine the part played by this species in the spread of Porrocaecum decipiens, the parasitic roundworm of cod and other groundfish, for which seals are the primary host. During this investigation, conducted by Dr. H. Dean Fisher of the Fisheries Research Board, St. Andrews, New Brunswick, information was collected on the grey seal and a preliminary idea on its population was obtained. A systematic collection of specimens was also undertaken since the grey seal was found to be an important vector of the "codworm", stomachs containing on the average more than 5 times as many of these nematodes as harbour seal stomachs. The work lapsed in 1955 when Dr. Fisher became scientist in charge of our Arctic Unit in

Montreal, now the Arctic Biological Station, but was resumed again in 1961 when more opportunity was available.

Since that year we have carried out aerial surveys of all the areas known to have been frequented by large numbers of grey seals. Where breeding sites have been identified we have been able to visit most of them in order to make more accurate counts of pups and to carry out a tagging program.

#### Population status

Known breeding sites are at Sable Island; the Basque Islands off Michaud Point, southeastern Cape Breton Island; Deadman Island to the west of the Magdalen Islands; and at Amet Island and other localities in Northumberland Strait and along the west Cape Breton shore (Figure 4). Of these places only Deadman Island, and Amet Island in Northumberland Strait have been systematically exploited by local fishermen. The other breeding colonies have been unmolested: Sable Island because of its distance from land and the treacherous nature of its approaches; and the Basque Islands because of the local habit of hauling up all inshore fishing craft in the winter months when the hazards of icing are great.

After the breeding season there appears to be a general feeding dispersal of pups, immature and adult seals over a wide area.

Summer concentrations of grey seals are found at the French Islands of Miquelon off southern Newfoundland; at

Iles Razades near Trois Pistoles in the St. Lawrence River; at Anticosti Island; in the Miramichi estuary; along the eastern shore of Nova Scotia from Halifax to Louisbourg; in the Bras d'Or Lakes; and at Sable Island (Figure 4). Most of the observations concerning these summering groups have been made from shore or small craft and we have little idea of the numbers of seals involved. However we can estimate the total population at the beginning of each breeding season by counting the number of pups produced and multiplying by a factor of four. This higher figure is used in preference to the factor of three determined by Hewer (1964) since the adult males in the Canadian population appear to live at least ten years longer than European grey seal males; that is at least into their mid thirties. Thus with approximately 750 pups born annually we have a total population of 3000 grey seals at the beginning of each breeding season.

#### Breeding behaviour

The Canadian grey seal population can be divided into two groups: a group of open-sea-breeders found on the ice-free islands east of Nova Scotia, and a second group found breeding mostly on the ice in the Gulf of St. Lawrence. This latter group has its counterpart in the grey seals of the Baltic Sea.

The two colonies of open-sea-breeders are found at the Basque Islands and Sable Island and show interesting differences in breeding behaviour. At the Basque Islands

the seals are mostly confined to the largest island in the group which covers an area of about two acres. It can be seen from oblique aerial photographs (Figure 5) that the island is arranged into small territories about each dominant male, with the parturient females forming harems of up to 6 animals. An average of 200 pups has been born there in the past 3 years.

At Sable Island the seals are largely confined to the eastern spit, an open sand bar four to five miles long. Here space is virtually unlimited and the males lie scattered well apart. Males low in the hierarchy can haul out without fear of being challenged by more dominant males, and this results in a nearer approach to monogamy in the breeding groups, few males having two or more females. This colony is larger than the colony on the Basque Islands and produces an average of about 300 pups per year.

In the ice-filled waters of the Gulf of St. Lawrence the only securely established colony is that at Deadman Island, west of the Magdalens. There the narrow rocky beaches would support a breeding population several times larger than at present provided the seals were left unmolested. At last count in 1964 95 seals were seen, many of which must have been moulted pups.

In 1954 and 1955 H. D. Fisher investigated an apparently firmly established colony of grey seals, producing upwards of 300 pups annually, at Amet Island in Northumberland

Strait. However it was clear then that only a small proportion of females pupped on the island and on ice firmly attached to a projecting shoal. The majority of pups were born on ice which became detached by strong winds and currents and moved out into Northumberland Strait.

In January 1961 a camp was established on the island by helicopter but only 14 pups were found. This was surprising in view of the open nature of the ice about the island, but this reduction in numbers has been maintained every year since then. At first it was assumed that a serious decline had occurred in the population, but recent reports suggest that numbers are still maintained somewhere near the earlier level while only the pupping locality has changed. For example in 1962 grey seals were found near Cape George and along the west shore of Cape Breton Island. The ice in these localities is usually much-broken pack, blown in against the shore and then cemented into place by young ice. It seems reasonable to suppose that the seals pupped in the normal way somewhere near Amet Island and then drifted on the broken pack until this finally became fast to the western shore of Cape Breton Island. We can only guess at the population in the Gulf owing to the sketchiness of our own and other people's observations but a figure of 1000 seals appears reasonable.

As one might expect there are changes in breeding behaviour of the Gulf seals brought about perhaps by the

precarious nature of the ice on which the pups are born and the ensuing scattering which may occur. Harems are never formed, and when adult males are present they are usually accompanied by not more than one cow and pup. Thus once again it appears that where ample space is available monogamy is generally the rule.

It may be an oversimplification to view the grey seal's breeding behaviour as characteristically monogamous, but this is not without precedent amongst the pinnipeds. Thus the hooded seal Cystophora cristata, though not closely related to the grey seal, shows a similar behaviour pattern even though there is a marked disparity in size between the male and the female. In pinnipeds generally this size difference between the sexes may be correlated with a complex social organization during the breeding season, and appears to have resulted from the reduction in time between oestrus and parturition, necessitating mating on the land or ice (Laws 1960). Under such conditions larger males would have an advantage in retaining possession of one or more breeding females, and promiscuity would be replaced by polygamy, or its initial condition monogamy.

In spite of these differences of breeding behaviour in the various groups of Canadian grey seals, there is no apparent difference in the reproductive cycles. Pupping begins in late December and continues until mid February, the peak occurring in mid January. Lactation continues for between 2 and 3 weeks, the males mating with the females before

the pups are weaned. After the parturient females have left the breeding beaches, the pups remain behind for several more weeks, completing their moult before taking to the sea and dispersing (Figure 6).

#### Dispersal

During the past three years we have tagged about a thousand grey seal pups, and recoveries have been received from widely scattered localities in the Maritime Provinces, Quebec, and Newfoundland (Figure 7). Grey seal jaws have also been included in the returns for bounty claims from many localities in Labrador, and recently a grey seal jaw was included amongst the sample received from the Department of Northern Affairs' seal netting project at Cape Chidley, the northernmost tip of Labrador.

The southern limit of the grey seal extends into United States waters, a small breeding colony having been found at Nantucket (Hanley, Drury and Roth 1964). Though only 3 pups were produced in 1964 it is hoped that the islanders will carefully protect this rare member of North America's mammalian fauna.

#### Economic considerations

In European waters the grey seal has always been regarded as a menace by salmon fishermen who sometimes suffer badly from its depredations (Rae and Shearer 1965). In Canada the population of grey seals is not large enough to

present a serious problem to salmon fishermen, except perhaps to those engaged in the drift net fishery in the Miramichi estuary. Here a local bounty is in effect which allows some measure of local control to be exerted over the group of seals which invades the estuary every summer. However it is by no means certain that these seals are bent on the destruction of salmon to the exclusion of other fish since the majority of stomachs examined have contained remains of skates (Rajidae) and flatfish (Pleuronectidae), with herring, cod, hake, salmon and invertebrates, particularly unidentified squids and crabs, playing a lesser part in feeding (Table I). This pattern of feeding is somewhat different from that of grey seals killed in Scotland and Orkney where gadoids are the most important food, followed by salmonids and cephalopod molluscs, with skates and flatfish forming only a small portion of the diet (Rae 1963). Further studies in the Faeroes (E. A. Smith in litt.), where salmon are not found, show that cod predominates in the grey seal's diet, with catfish, halibut, haddock, flatfish, lumpsucker and squid also noted. In summary, one may say that grey seals eat a large variety of fishes, including species of no commercial importance, but that where large seasonal runs of commercially important fish enter coastal waters, these will become the predominant food source.

Of far more importance to the fishing industry is the role the grey seal plays in the distribution of infective

Table I. Contents of 106 grey seal stomachs taken in the Maritime Provinces.

	Fisher and Mackenzie 1955 <u>No./Vol.%</u>	<u>Additional stomachs examined</u>	<u>Total</u>
No. examined	44	62	106
No. empty	27	23	50
No. with recognizable food	17	39	56
<u>Food</u>			
Unidentified fish	8/36	9	17
Salmon	3/39	1	4
Unidentified gadoids	3/7		3
Cod		6	6
Hake	3/7	3	6
Unidentified flatfish	3/2		3
Winter flounder	3/trace	8	11
Skate		15	15
Dogfish	1/1		1
Herring	4/6	3	7
Smelt		2	2
Sand lance		1	1
Shad		1	1
Squid	1/1	4	5
Lobster		1	1
Crab		6	6
Shrimp	3/1		3
Skate eggs		3	3
Sand and clay		2	2

larvae of Porrocaecum (synonyms: Phocanema, Terranova) decipiens, the nematode worm which parasitizes cod and other groundfish. Since both the harp seal Pagophilus groenlandicus and the harbour seal Phoca vitulina are also important vectors of this parasite, it is necessary to consider all three species in any discussion of this problem. A recent reappraisal of old published data on rates of infestation of seals (Scott and Fisher 1958), combined with new data on seal stocks (Mansfield and Sergeant 1965) has led to the following assessment of the importance of each seal species in the Maritime Provinces:

	Relative importance of seal as vector		
	Harbour	Grey	Harp
Southern Gulf	3.8	15.8	80.4
Halifax to Cape North	46.0	54.0	0.0
Bras d'Or Lakes	17.0	83.0	0.0
Halifax to Yarmouth	100.0	*	0.0
Bay of Fundy	100.0	*	0.0
Sable Island	18.0	82.0	0.0

\* Small numbers of grey seals occur in these areas but their rate of infestation is unknown. The harbour seal is therefore assumed to be the principal vector.

Since seals are the primary host, and therefore the least numerous of the vectors associated with the parasite's life cycle, they represent the most feasible point at which

the cycle might be effectively interrupted. Clearly the grey seal is an important vector in some areas and must be considered in any control schemes, but there are practical limitations to any attempts to markedly reduce seal populations. The harp seal in the Gulf of St. Lawrence must first of all be excluded since its numbers need to be maintained at an optimal level consistent with the needs of the sealing industry. Thus the problem of parasite eradication in the Gulf appears insoluble if this can only be effected through reduction of seal numbers. The harbour seal is important elsewhere in the Maritime Provinces but is kept in check by bounty hunters. Over the past 15 years catches of young and adults have decreased by about 65 per cent. Since catching effort does not appear to have decreased, a corresponding reduction of the population is implied. Current estimates place this at between 5000 and 10,000 harbour seals in the Maritime Provinces.

A further increase in catches might be obtained most economically by encouraging fishermen to use simple set nets, a method which has proved effective in arctic localities (McLaren and Mansfield 1960), but reduction of the population by this method would probably not be very large. Only widespread and costly employment of hunters could cause a further significant decrease in the harbour seal population, a step considered unnecessary in view of the low numbers now present and the continuing pressure from bounty hunters.

Though present in smaller numbers than the harbour seal, the grey seal is an important vector of Porrocaecum because of its greater size and increased gregariousness, particularly during the breeding season from late December to early March. This habit makes it extremely vulnerable to human predation since the pups are born on ice or land, and do not enter the water until they are fully moulted, about four or five weeks after birth. Up till now protection of the grey seal has resulted from its relative inaccessibility during the breeding season, and from the fact that no bounty has been paid for killing it, except in the Miramichi estuary. Now that sealskins fetch such high prices in the world's fur markets there is every reason to suppose that the grey seal will be actively hunted, particularly for the skin of the moulted pup which is a highly valued product. There is no clause in the Seal Protection Regulations (Government of Canada 1964) which would prevent landmen and inshore fishermen from hunting grey seals, but operators of larger vessels and aircraft would be restricted to a definite season on the Front and within the Gulf of St. Lawrence (see Para. 13(1)). Since this season really applies to the harp seals, which begin their breeding season just as the grey seals are finishing theirs and dispersing, few grey seals are likely to be taken at this time. Grey seals within the Gulf and on the Basque Islands are thus vulnerable to exploitation by landmen, whilst only the colony at Sable

Island appears to be protected by its comparative inaccessibility.

#### Recommendations

In the British Isles grey seals are protected by law, though salmon fishermen may obtain licenses to shoot seals at their netting stations, while selected residents of Orkney are allowed to take the proceeds of several experimental kills (Smith 1963b). In order to compromise between the well founded pleas of salmon fishermen for reduction of grey seals (Rae and Shearer 1965) and the interests of a public keenly concerned with the welfare of its islands' fauna, the British Government is attempting to meet the increase of salmon predation (Rae 1963a, Rae and Shearer 1965) and codworm infestation along the east coasts of England and Scotland (Rae 1963b) by killing a fixed quota of seal pups at breeding colonies in Orkney and on the Farne Islands. At the latter colony about three quarters of the female pups produced annually will be killed over a period of five years. By this means it is expected that the breeding potential of the colony will be reduced by 25 per cent, but not until 10 years after killing began in 1963. In Orkney smaller proportional killings have been carried out since 1961 with the skins going to selected hunters.

Such a compromise might be the answer to Canada's grey seal problem. A properly controlled kill of moulted pups at either the Basque Islands or Sable Island could yield

a small but possibly economically worthwhile take of seal pelts, which are then at their greatest value, and the reduction in population could be compared over the years with the infestation of locally caught groundfish by Porrocaecum. A truer evaluation of the part played by the grey seal in the spread of this parasite might then be possible.

Literature Cited

- Allen, J. A. (1880) History of North American pinnipeds. Washington, Gov't. Printing Office; 784 pp.
- Fisher, H. D. and B. A. Mackenzie (1955) Food habits of seals in the Maritimes. Fish. Res. Bd. Canada, Progress Reports Atlantic Coast Stations; 61: 5-9.
- Gilpin, J. B. (1874) On the seals of Nova Scotia. Proc. and Trans. Nova Scotia Inst. Sci.; 3(4): 377-384.
- Government of Canada (1964) Fisheries Act. Seal Protection Regulations. P.C. 1964-1663. Canada Gazette, Part II; 98(21): 1257-1261.
- Hanley, W., W. H. Drury and C. E. Roth (1964) Nantucket's Horseheads. Massachusetts Audubon Soc., Lincoln, Mass.; Contribution 49: 2 pp.
- Hewer, H. R. (1964) The determination of age, sexual maturity, longevity and a life table in the grey seal (Halichoerus grypus). Proc. Zool. Soc. London; 142: 593-624.
- Hook, O. (1964) The distribution and breeding of the grey seal in the Baltic. In "A Seals Symposium". (Edited by E. A. Smith.) Nature Conservancy, Edinburgh; Mimeographed, 99 pp.

- Laws, R. M. (1960) The southern elephant seal (Mirounga leonina, Linn.) at South Georgia. Norsk Hvalfangst-Tidende; 10: 466-476 and 11: 520-542.
- Lockley, R. M. (1954) The Atlantic grey seal Oryx; 2: 384-387.
- Mansfield, A. W. and D. E. Sergeant (1965) Relative importance of seal species as vectors of codworm (Porrocaecum decipiens) in the Maritime Provinces. Fish. Res. Bd. Canada, Arctic Biol. Station, Ann. Rep.; 1965: 30-35.
- McLaren, I. A. and A. W. Mansfield (1960) The netting of sea mammals. A report on the Belcher Islands experiment, 1960. Fish. Res. Bd. Canada, Arctic Biol. Station, Circular; No. 6: 11 pp.
- Øynes, P. (1964) Sel på Norskekysten fra Finmark til Møre. Fiskets Gang; 48: 694-707.
- Rae, B. B. (1963a) The food of grey seals. In "Grey Seals and Fisheries". London. Her Majesty's Stationery Office; 52 pp.
- (1963b) The incidence of larvae of Porrocaecum decipiens in the flesh of cod. Dept. Agric. and Fish. Scotland, Mar. Res. 1963; 2: 28 pp.
- Rae, B. B. and W. M. Shearer (1965) Seal damage to salmon fisheries. Dept. Agric. and Fish. Scotland, Mar. Res. 1965; 2: 39 pp.

Scott, D. M. and H. D. Fisher (1958) Incidence of the ascarid Porrocaecum decipiens in the stomachs of three species of seals along the southern Canadian Atlantic mainland. J. Fish. Res. Bd. Canada; 15: 495-516.

Smith, E. A. (1963a) The population of grey seals. In "Grey Seals and Fisheries". London. Her Majesty's Stationery Office; 52 pp.

(1963b) Experimental culling of grey seals in Orkney. In "Grey Seals and Fisheries". London. Her Majesty's Stationery Office; 52 pp.

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Figure 1

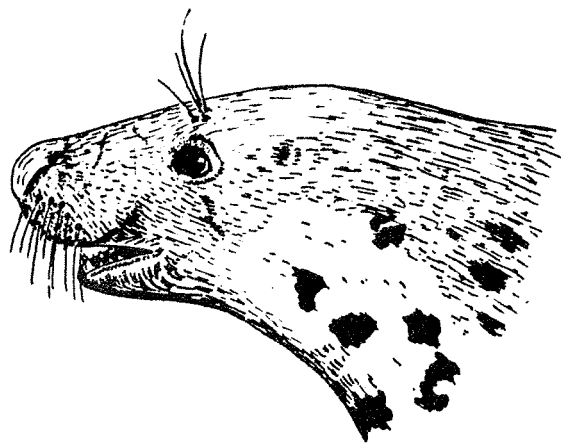


Figure 2

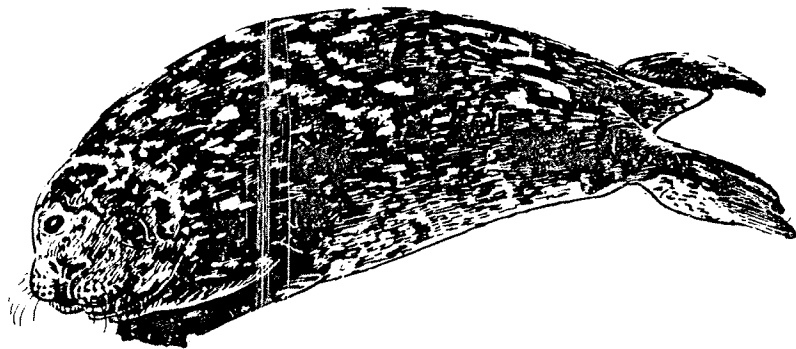
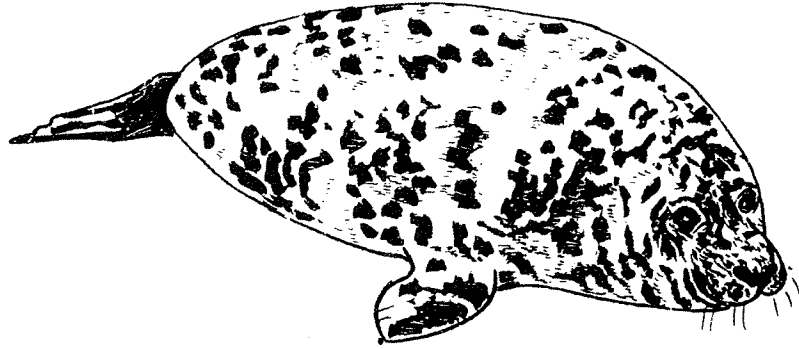


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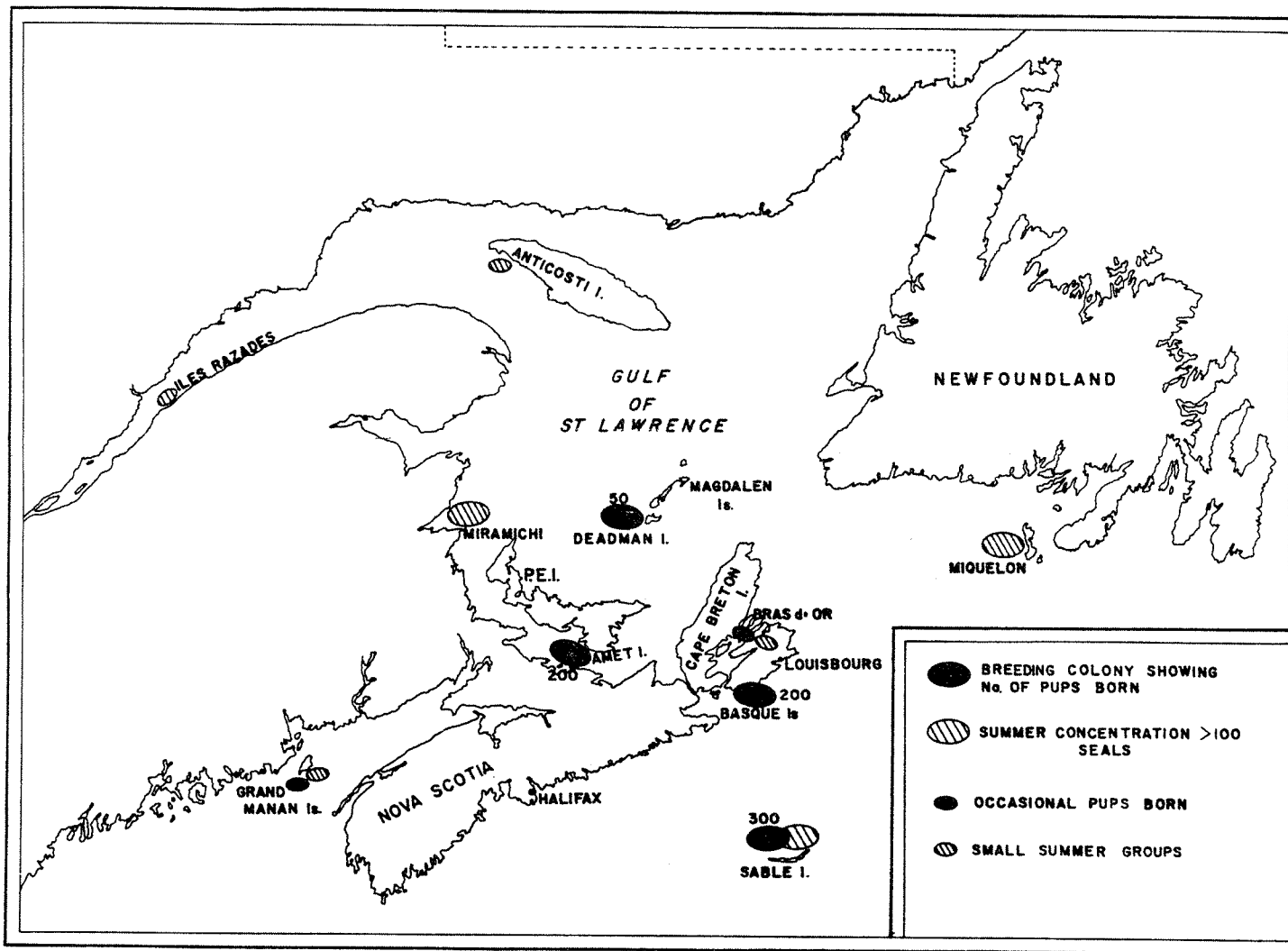


Figure 4



Figure 5

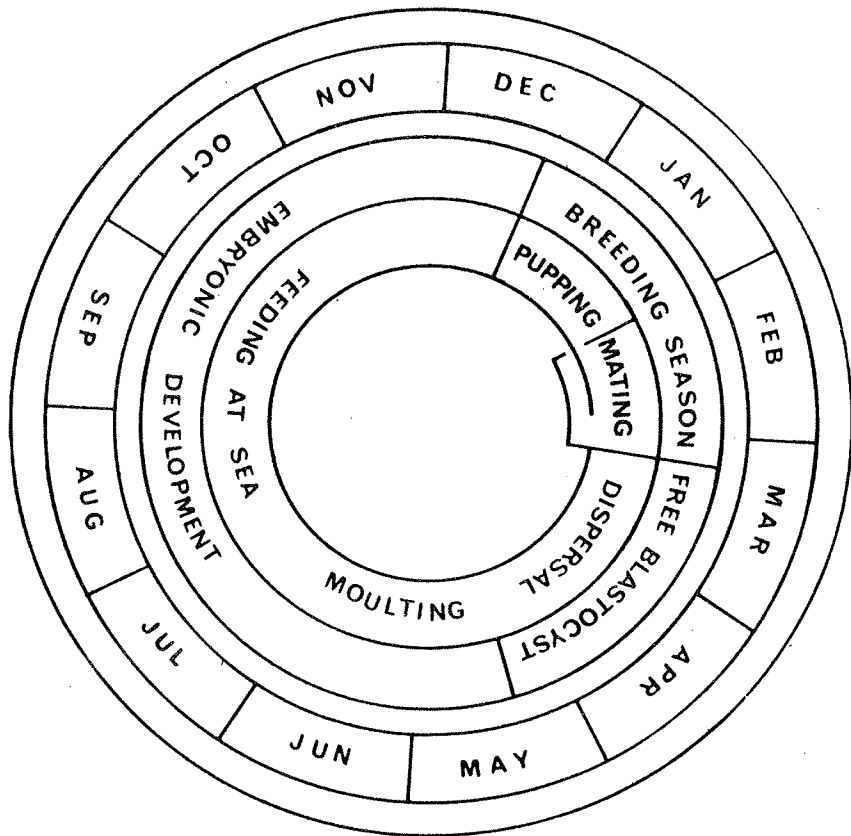


Figure 6

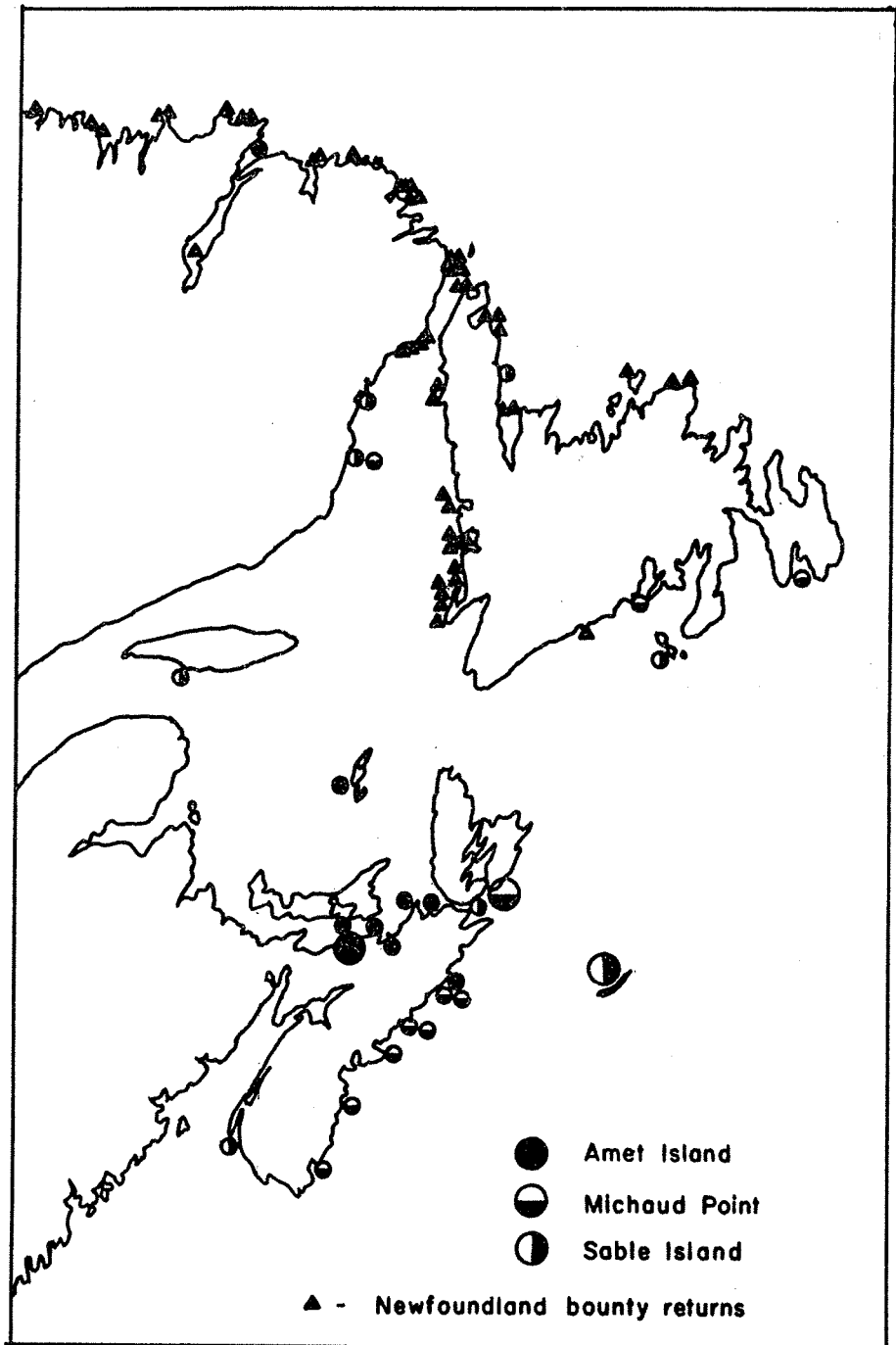


Figure 7