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A Summary of Data for The North Atlantic Population of Canada Geese

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prepared by the North Atlantic Population Canada Goose Working Group of the Atlantic Flyway Technical Section

Table of Contents

page number

1. Introduction

The original description of the Canada Goose *Anser canadensis* Linnaeus described geese from the area of Quebec City and it is unknown if the birds were breeding birds or transients (Todd 1938). Taverner (1931) described *Branda canadensis canadensis* as breeding across the continent rather than trying to sort out subspecies and populations with the information at hand. Todd (1938) described *Branta canadensis interior* based on his extensive travels in eastern North America and the differences between the geese on the east coast of Hudson Bay and those in Newfoundland-Labrador (*B.c.canadensis)*. The two subspecies were thought to intergrade in the region of Ungava Bay south. Low (1935) reported banding evidence supporting a distinct group of geese migrating along the North Atlantic coast. Hanson and Smith (1950) described a North Atlantic population which breeds in Newfoundland-Labrador and eastern Quebec and winters from Nova Scotia to Massachusetts and possibly as far south as New Jersey and North Carolina. Palmer (1976) describes *B.c.canadensis* as limited to a North Atlantic Population, but *B.c.interior* makes up four sub-populations (Eastern Prairie Population, Mississippi Valley Population, Southern James Bay Population, Mid-Atlantic Population) as described by Hanson and Smith (1950) (Figures 1,2).

Bellrose (1976) distinguished a North Atlantic and a Mid-Atlantic population of Canada Geese in the Atlantic Flyway . The subspecies associated with these populations were considered to be *B.c.canadensis* (North Atlantic) and *B.c.interior* (Mid-Atlantic). There has never been a definitive and convincing demarcation between the breeding grounds of the two subspecies. However, the subspecific determination of the geese is of less interest to waterfowl managers than the practical aspects of determining the population parameters for the respective populations. Although widely recognized to be a separate (sub-) population, it has not been necessary to manage the North Atlantic Population separately from the adjacent populations during years of high goose numbers in both populations. Segregation of the two populations can not be done satisfactorily on the wintering grounds. A definitive differentiation of the breeding areas is hampered by a lack of marking on the Labrador-Newfoundland breeding grounds. However, compilation of banding and neck-collar data support the existance of two populations which share wintering areas.

The current Atlantic Flyway Canada Goose Management Plan does not recognise the North Atlantic Population but the Canadian Wildlife Service manages this population separately from the Atlantic Population. The Canada Goose Committee of the Atlantic Flyway Technical Section has been charged with evaluating the data pertinent to this population and updating the Management Plan as appropriate. This report summarizes recent data respecting the status and distribution of the North Atlantic Population and makes recommendations for additional work.

2. Population Size and Breeding Distribution

The North Atlantic Population of Canada Geese breeds primarily in Newfoundland-Labrador. Several hundred pairs of geese may breed in the Maritime Provinces. Breeding population estimates for Insular Newfoundland are in the range of 4 000 pairs (Goudie 1987; Erskine 1987; Gillespie and Roberts unpubl.). Goudie (1987) concluded that this is a minimal figure because high densities (1.5 pairs per km^2) were recorded on patterned fen sites, notably the Swift Current Barrens. The number of breeding geese in Labrador is estimated to be in the order of 25 000 pairs (Goudie and Whitman 1987; Bateman 1993; 1994). Breeding densities in Labrador range from 0 in mountainous habitat to 20 pairs per 100 km^2 in some of the most productive ecoregions (Bateman 1993; 1994) (Figure 3). Recent work in Greenland has indicated an increase in the numbers of breeding Canada Geese and suggested affiliations with eastern North America (Fox *et.al* 1996).

The Ungava-breeding population of Canada Geese was estimated to be in the order of 118 000 pairs in 1988 and 29 000 in 1995 (Harvey and Bourget, 1995). The Newfoundland-Labrador breeding geese (the North Atlantic Population) may now make up 30 percent of the total Atlantic Flyway migrants (allowing for additional breeding geese in boreal Quebec).

3. Migration

Bellrose (1976) described the migration of this (sub-) population "--- down the Labrador coast to the Maritimes, where it picks up birds from Newfoundland. It continues along the coast of New England , across Long Island down the New Jersey shore, and along coastal Maryland to Pea Island National Wildlife Refuge, North Carolina." Analyses of recent neck-collar studies and an update of band recoveries (Bateman and Daury 1994) suggest that this description is still valid (Table 1, Figure 4), although more precise information is available on timing and changes in the wintering distribution are indicated. Neck-collar sightings indicate that migrants are present in some numbers in New England in early October (Hestbeck and Bateman, *in press*) (Table 2). Records from New England occur up to mid-April. There are two observations of Maritime - collared geese in Maryland prior to 15 October, but none in New Jersey. In recent years Prince Edward Island has been an important migration stop in both spring and fall. Counts of fall staging birds on Prince Edward Island approximate 13 000 in recent years (Figure 5).

4. Wintering Distribution

The migrant Canada Geese in the Atlantic Flyway winter from Nova Scotia south to South Carolina. Birds wintering south of Nova Scotia may be from several different populations including the problematic resident birds. The more coastal orientation of the North Atlantic Population compared to the northern Quebec geese is less evident from neck-collar observations than from the band recoveries. Neck-collars from Maritime-affiliated geese were seen inland in

southern New England and New Jersey (Erskine *in prep*). This is presumably the result of harvest patterns or, possibly, a result of change in distribution over time (band recoveries include many data from an early time period). However, geese neck-banded in the Maritimes during spring or fall were primarily associated with the Maritime Provinces during early fall and southern New England and Long Island during winter (Hestbeck and Bateman, *in press*) (Table 2). Fair numbers of these geese (16 percent of observations) were observed in winter in New Jersey, but only low numbers (6 percent of observations) south of New Jersey. Fewer birds were neck-banded in Labrador, but observations in winter were primarily (80 percent) in New England and secondarily in the Lower Hudson River Valley and New Jersey (20 percent). The only wintering areas where the NorthAtlantic birds can be reliably differentiated are in Nova Scotia. Approximately 10 000 birds winter in that province.

Pea Island National Wildlife Refuge, North Carolina has been considered a traditional wintering area for the North Atlantic Population. Records of the number of wintering geese in that refuge show a decrease from an average 4,370 geese in the 1966 to 1970 period to 503 geese in the 1990 to 1995 period (Figure 6).

5. Population Trends

A poll of the state biologists in the Atlantic Flyway indicated a decline in the "coastal " geese in recent years in Maryland and North Carolina. Recent neck-collar analyses suggest that "short stopping" of these geese may occur (Hestbeck and Bateman, *in press*). Other states with wintering or migrating geese were unable to speculate about the numbers of migrants vs the number of residents or the number of Ungava vs the number of North Atlantic birds (Rhode Island, New Jersey, Delaware). Pennsylvania has very few North Atlantic Population migrants, Maine and Massachussetts winters more geese now than in the past, New Hampshire indicated a decrease in migrant birds and Vermont has no evidence of a change in the number of migrant geese. The response from Connecticut suggested that the coastal geese (thought to be North Atlantic Population birds based on neck-collar observations) number about half the peak numbers recorded in the mid-1980's.

There is no evidence that the number of geese wintering in the Maritime provinces has declined over time (since the 1950's) and it may even have increased in recent years (R.Milton, pers, com.). There is some evidence that geese winter farther north in Nova Scotia, probably due to milder winters since 1970 (Erskine *in prep*). The number of wintering birds here approaches 10 000.

Fifteen fixed-wing transects were flown in Labrador in 1980 (total of 4252 km). Those transects were surveyed again as part of the breeding pair surveys in 1993 and 1994. There was no difference in the number of breeding pairs of geese recorded on the surveys, but the total number of geese was lower in 1993 than in 1980 or 1994 (Table 3) (Bateman 1994).

Survival estimates calculated from birds neck-collared on Prince Edward Island between 1990

and 1993 were between 0.644 and 0.674 (1990-1991 = 0.644 SE=0.072; 1992-1993 = 0.674 SE=0.033) (Hestbeck pers.com.). These survival estimates are lower than expected for a stable Canada Goose population.

Canada Goose harvests in the Atlantic Provinces are believed to be from the Newfoundland-Labrador breeding population (see the discussion of breeding distribution and migration). Harvest south of Maine is made up of unknown proportions of other populations. Attempts to differentiate populations of Canada Geese in the Atlantic Flyway by measurements have been inconclusive, but measurements from birds in the Atlantic Provinces have not been collected.

The harvest in the Atlantic Provinces generally increased from 1974 (the earliest reliable estimate) until 1989 (Figure 7). Harvest in 1992 was low at 27 800, but harvests in 1990, 1991, 1993 and 1994 were not dramatically different from the previous years. Harvest per successful goose hunter might reasonably be considered a better index to the state of the population given the stable season lengths and bag limits. That index does not suggest a reduction in availability of geese to hunters (Figure 8), again with the exception of 1992. The low harvest per successful hunter in 1992 (and the low harvest estimate) corresponds to a known poor production year as indicated by the age ratio in the Species Composition Survey.

An index to the age composition of the harvest is calculated from tail fans collected by the Species Composition Survey each year. Age ratios from Quebec, primarily a sample of Quebec-breeding birds, are somewhat different from those calculated from the Atlantic Province harvest (Figure 9), as one would expect if the populations are separate. Because the harvest in the Atlantic Provinces is essentially a sample of the Newfoundland-Labrador breeding birds (small numbers of birds breed in the Maritimes as a result of releases), the proportion of immatures in that harvest is expected to be a consistent index to the age composition of the population. The relation of the index to the actual age composition of the population is unknown. Because there has been no decline in the age ratio in the harvest in the Atlantic Provinces, it can be assumed that production has not changed in the population of birds being harvested.

6. Summary

Historically, a North Atlantic Population of Canada Geese was recognized and associated with a distinct sub-species, *Branta canadensis canadensis*. The current Atlantic Flyway Canada Goose Management Plan does not separate these birds from the Atlantic Population.

The number of breeding pairs of geese in Labrador is estimated to be in the order of 25,000 with and additional 4,000 pairs breeding on insular Newfoundland.

Migration is generally down the east coast with important migration stops on Prince Edward Island. Migrants are present in Prince Edward Island from September to November and have been observed in New England in early October. Spring records occur in New England up to mid-April.

Approximately 10,000 geese winter in Nova Scotia. The birds from the North Atlantic Population have been thought to winter coastally in the United States from New England to North Carolina.

Declines in "coastal" geese wintering in Maryland, North Carolina and Connecticut were reported by state biologists. There has been no decline in the number of birds wintering in Nova Scotia. Breeding pair surveys in Labrador indicated no change in the number of breeding geese between 1980 and 1993,1994. Harvest indices in the Atlantic Provinces suggest a stable population, although we recognise the problems associated with these indices. Age ratios of geese harvested in the Atlantic Provinces have not changed over the last twenty years. A survival estimate for geese neck-collared in Prince Edward Island is relatively low.

6.1 Data Deficiencies

Delineation of breeding populations when breeding ranges are continuous across large areas is difficult and must be imprecise unless large amounts of money are available. Waterfowl managers must use good judgement to determine when sound management can be based on current knowledge and when additional information is necessary. The North Atlantic Population of Canada Geese breeds at low densities across boreal forests. For management purposes, the precise location of the separation line between the North Atlantic Population and the Atlantic Population is unimportant - hundreds of kilometers corresponding to few geese. The data presented and the work referenced in this report show that geese neck-banded in western Labrador are most likely best described as part of the North Atlantic Population. A combination of leg band and neck band data from the Atlantic Provinces and Ungava, Quebec show that geese from these two areas can be described separately north of the migration-wintering areas where they mix.

Two important questions pertaining to the functional delineation of the North Atlantic Population remain:

1) The estimates of the size of the breeding population do not correspond to the harvest estimates for the population. Breeding population estimates based on fixed-wing surveys can be in error due to incorrect visability corrections, or birds breeding in Greenland may be a significant component of the harvest attributed to the North Atlantic Population.

2) Canada Geese breeding in the George River (eastern Ungava Bay) area of Quebec have not been marked. The migration, wintering affiliation of those birds is unknown.

7. Recommendations

a) It is recommended that a breeding ground survey be conducted in Newfoundland-Labrador for several years in a manner that will allow comparison with the results of previous work.

b) It is recommended that this population be monitored with a scheduled breeding ground survey at specified intervals. Annual surveys are recommended for 1997,1998, 1999.

c) It is recommended that the available neck-collar data be analysed to more precisely describe the wintering areas of these birds.

d) It is recommended that regular operational surveys- harvest estimates, hunter estimates, age ratios in the harvest, staging area counts on Prince Edward Island- be continued on an annual basis.

e) It is recommended that banding and/or neck-collaring be carried out on Prince Edward Island to monitor distribution and recovery rates. A neck-collar observation network in the Maritime Provinces and the Atlantic Flyway states will be a necessary part of this program when neck-bands are used.

f) Banding throuhout the northern Quebec breeding grounds (already proposed) will help delineate the geographic separation of the North Atlantic Population from the adjacent population. Particular effort should be made to mark birds in the George River area.

g) A breeding ground production and recruitment study is recommended for Newfoundland Labrador.

h) A survey of breeding Canada Geese in Greenland is recommended. A marking program should be conducted cooperatively with the Danish wildlife agency in Greenland at the same time as the marking program is going on in eastern North America to maximize use of the observer network.

i) Liver and/or blood samples should be collected throughout the breeding ranges of the NAP and AP for genetic diversity analyses. This study should be done with techniques comparable to those currently being developed for genetic comparisons of other *interior* and giant Canada Geese. The samples could be collected during banding so that only the analysis would be additional cost.

j) It is recommended that the Atlantic Flyway Council recognise the North Atlantic Population as a separate group of geese.

8. References Cited

Bateman, M.C. 1993unpubl. Canada Goose breeding ground survey in Labrador 1993. Can.Wildl.Serv. ms report. Sackville N.B. 18 pp .

Bateman, M.C. 1994unpubl. Canada Goose breeding ground survey in labrador 1994. Can.Wildl. Serv. ms report. Sackville N.B. 15 pp.

Bateman, M.C. and R.W.Daury. 1994unpubl. Update on Canada Goose band recoveries as they relate to the Atlantic Region. Can. Wild. Serv. ms report. Sackville N.B. 20 pp+Figures.

Bellrose, F.C. 1976. Ducks, geese and swans of North America. 2nd ed. Wildl.Manage.Inst.and Stackpole Books. Harrisburg, Pa. 544pp.

Erskine, A.J. 1987. A preliminary waterfowl population budget for the Atlantic Provinces , 1978-1985. Can.Wildl.Serv. Occas. Paper no.60: 65-72.

Fox, A.D., C.Glahder, C.R. Mitchell, D.A. Stroud, H. Boyd, and J.Frikke. 1996. North American Canada Geese (*Branta canadensis*) in West Greenland.Auk 113(1):231-233.

Goudie, R.I. 1987. Preliminary estimates of waterfowl breeding populations in Newfoundland, 1978-79. Can.Wildl.Serv. Occas. Paper no. 60: 36-44.

Goudie, R.I. and W.R.Whitman. 1987. Waterfowl populations in Labrador, 1980-82. Can.Wild.Serv. Occas. Paper no.60: 45-63.

Hanson,H. and R.Smith. 1950. Canada Geese of the Mississippi Flyway: with special reference to an Illinois Flock. Ill. Nat. Hist. Survey. 25:75-210.

Harvey,W. and A.Bourget. 1995 unpub. Abreeding pair survey of Canada Geese in Northern Quebec-1995. Atlantic Flyway Tech. Sect. Rep. 11pp.

Low, S.H. 1935. A coastal group of Canada Geese. Bird banding 6:67-68.

Palmer, R.S(editor). 1976.Handbook of North American Birds vol.2:185-234.

Taverner,P.A. 1931. A study of *Branta canadensis* (Linnaeus), the Canada Goose. Bull.Nat.Mus.Canada 67:30-40.

Todd, W.E.Clyde. 1938. A new eastern race of the Canada Goose. Auk 55:661-662.

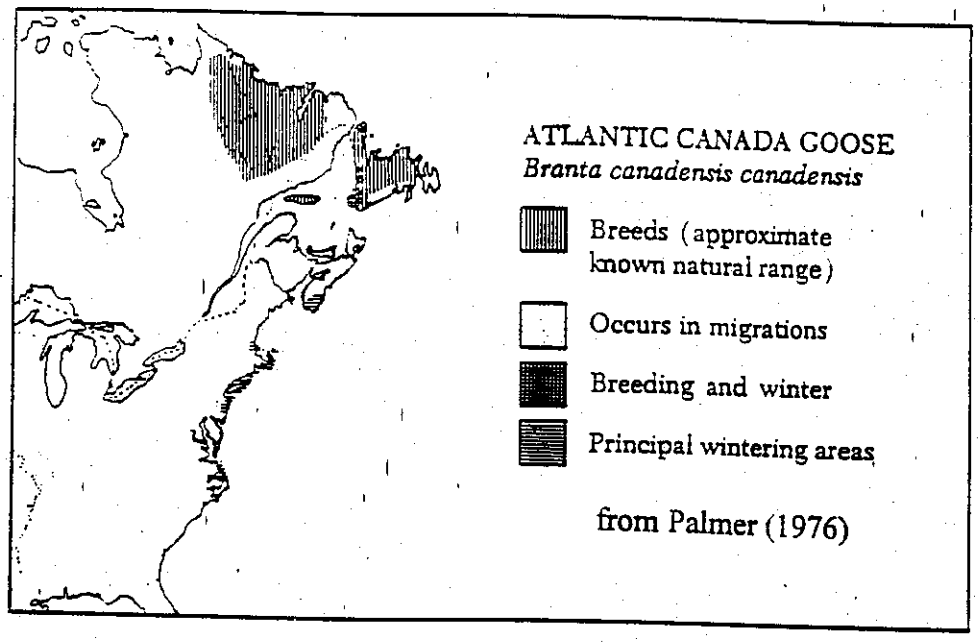


Figure 1. Breeding, migration and wintering areas of *Branta canadensis canadensis* (from Palmer 1976).

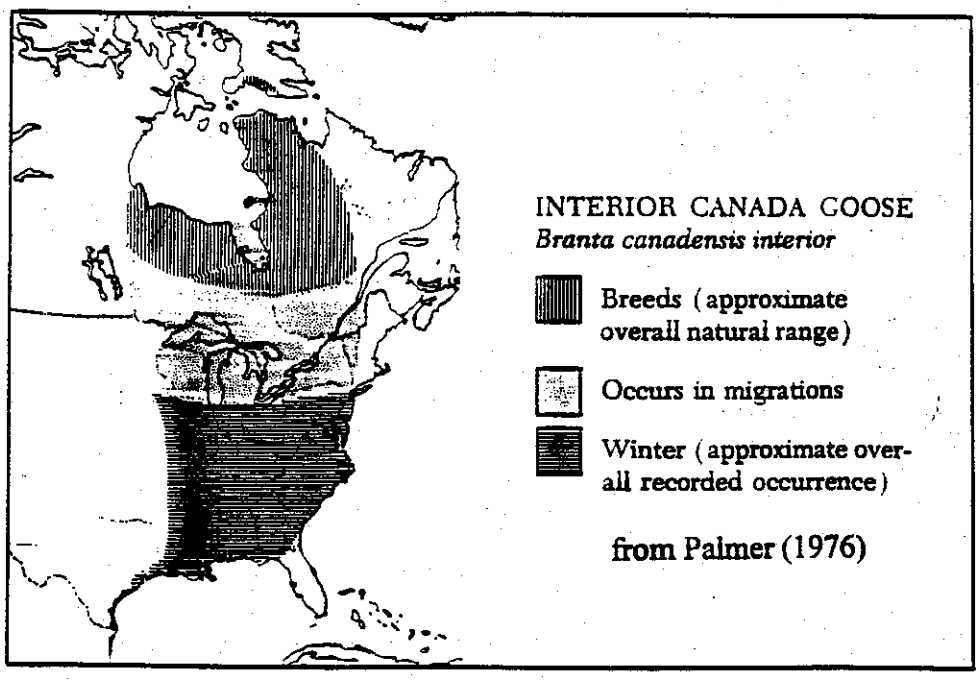


Figure 2. Breeding, migration and wintering areas of *Branta canadensis interior* (from Palmer 1976).

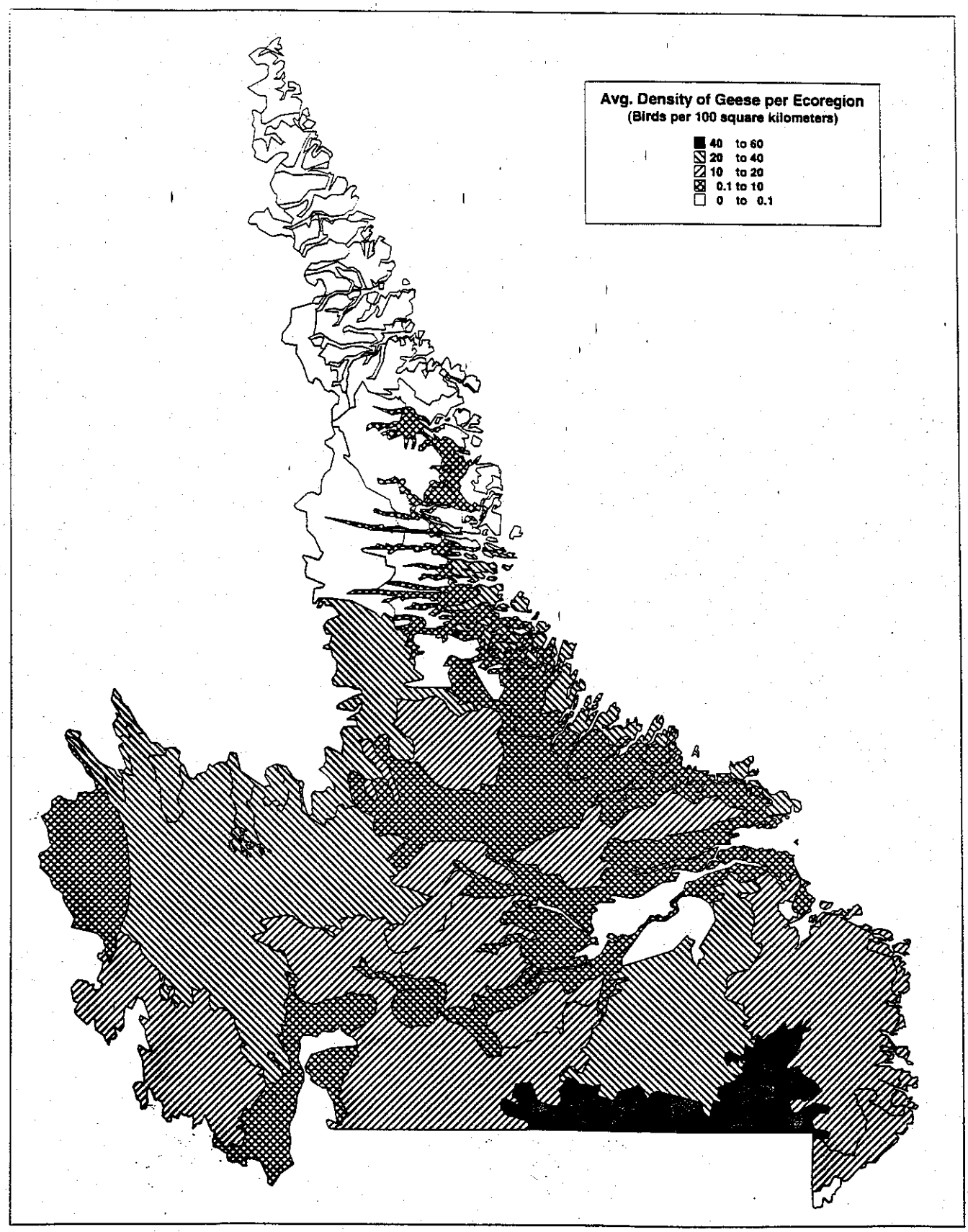
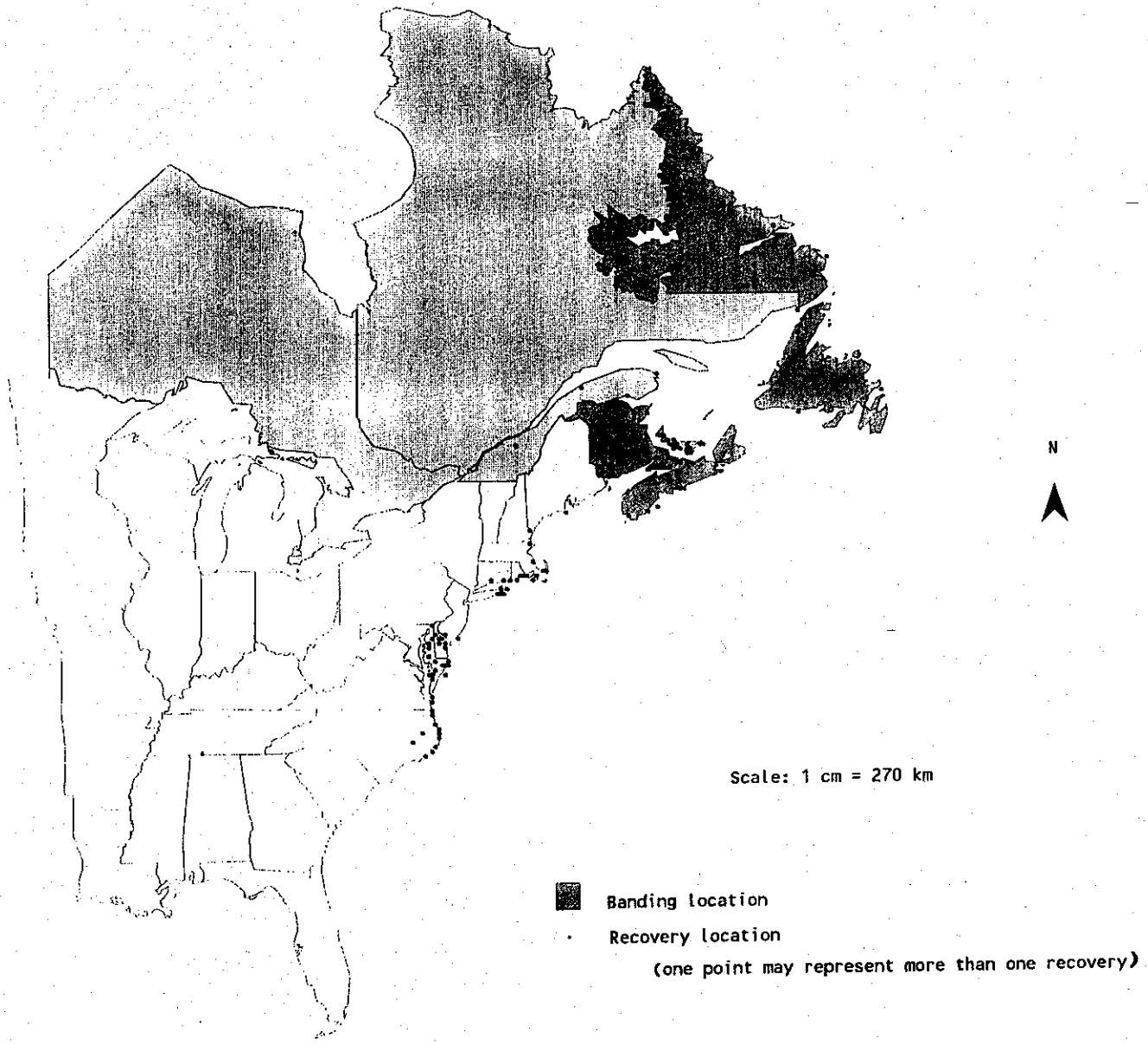


Figure 3. Distribution of Canada Geese including non-breeders (birds per 100 km^2) in ecoregions of Labrador surveyed by fixed-wing transects in 1993 and 1994 (uncorrected for visability).



ure ... oca... of C...da Goose band recoveries from geese banded in the Atlantic Region (1959 - 1989).

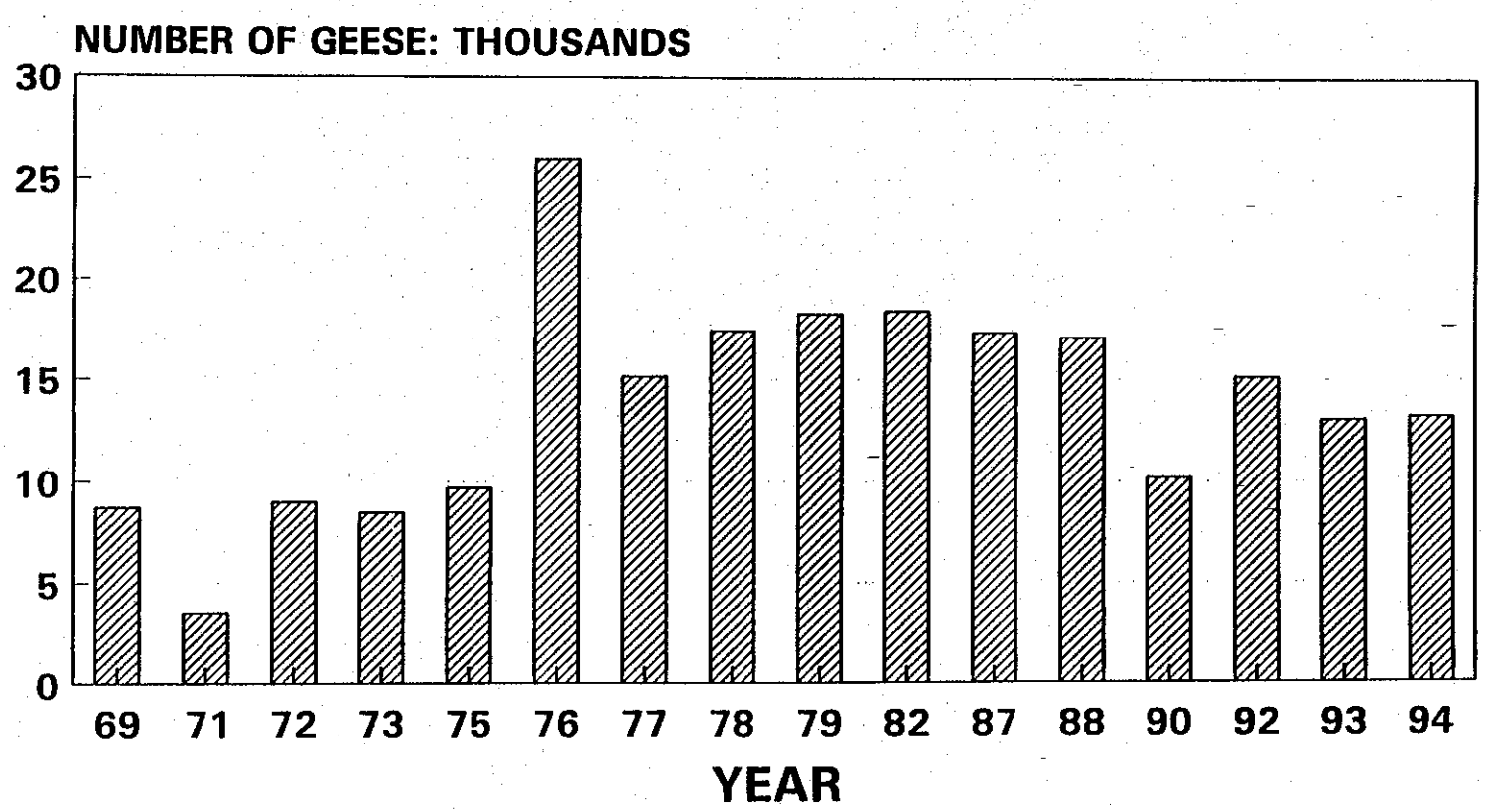


Figure 5. The number of Canada Geese recorded on fixed-wing surveys carried out in coastal areas of Prince Edward Island in mid-November, 1969 - 1994.

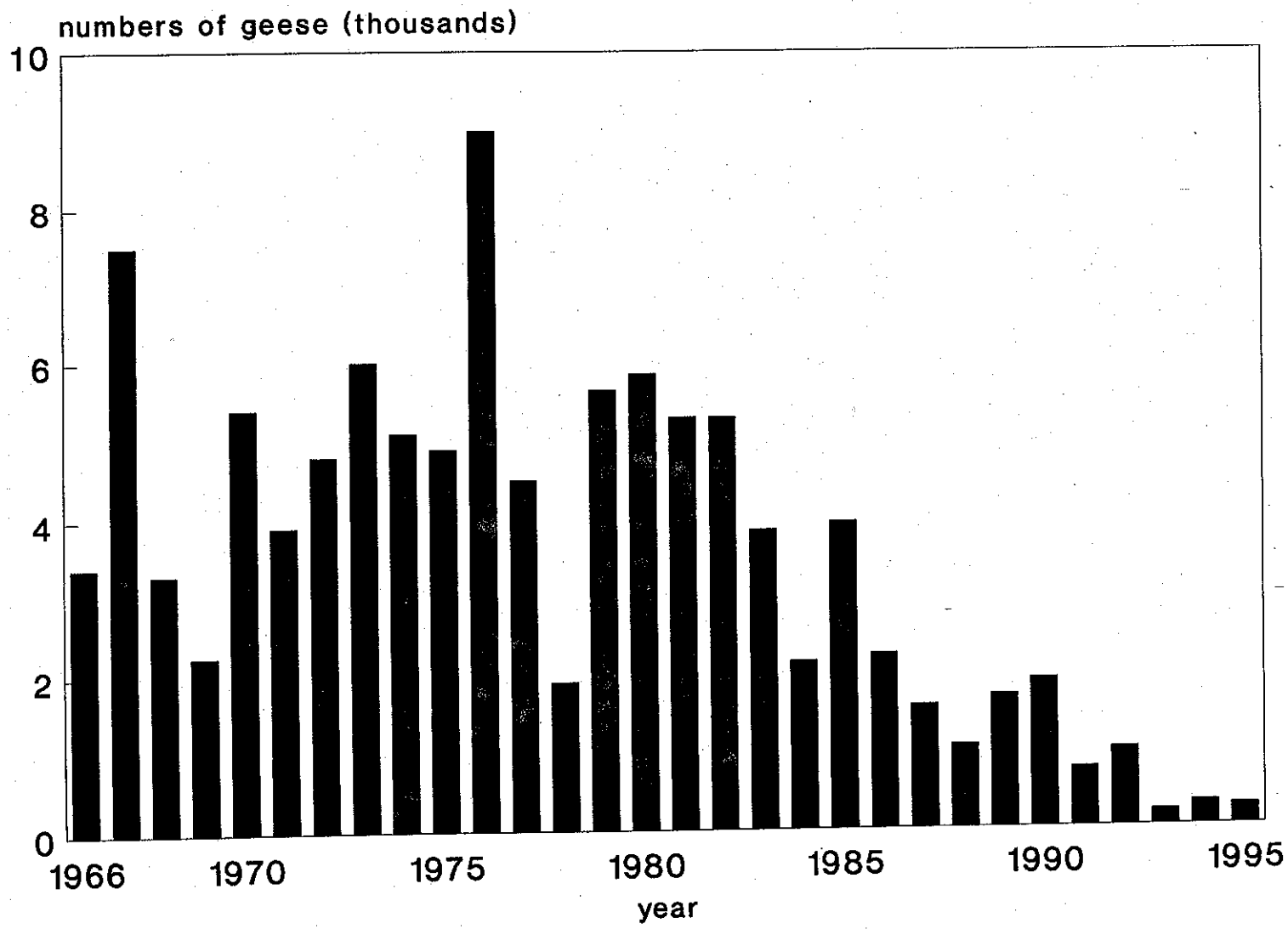


Figure 6. The peak numbers of Canada Geese recorded wintering at the Pea Island National Wildlife Refuge, North Carolina, 1966 to 1995. (Data from the USFWS Wildlife Management Office, Manns Harbour, North Carolina)

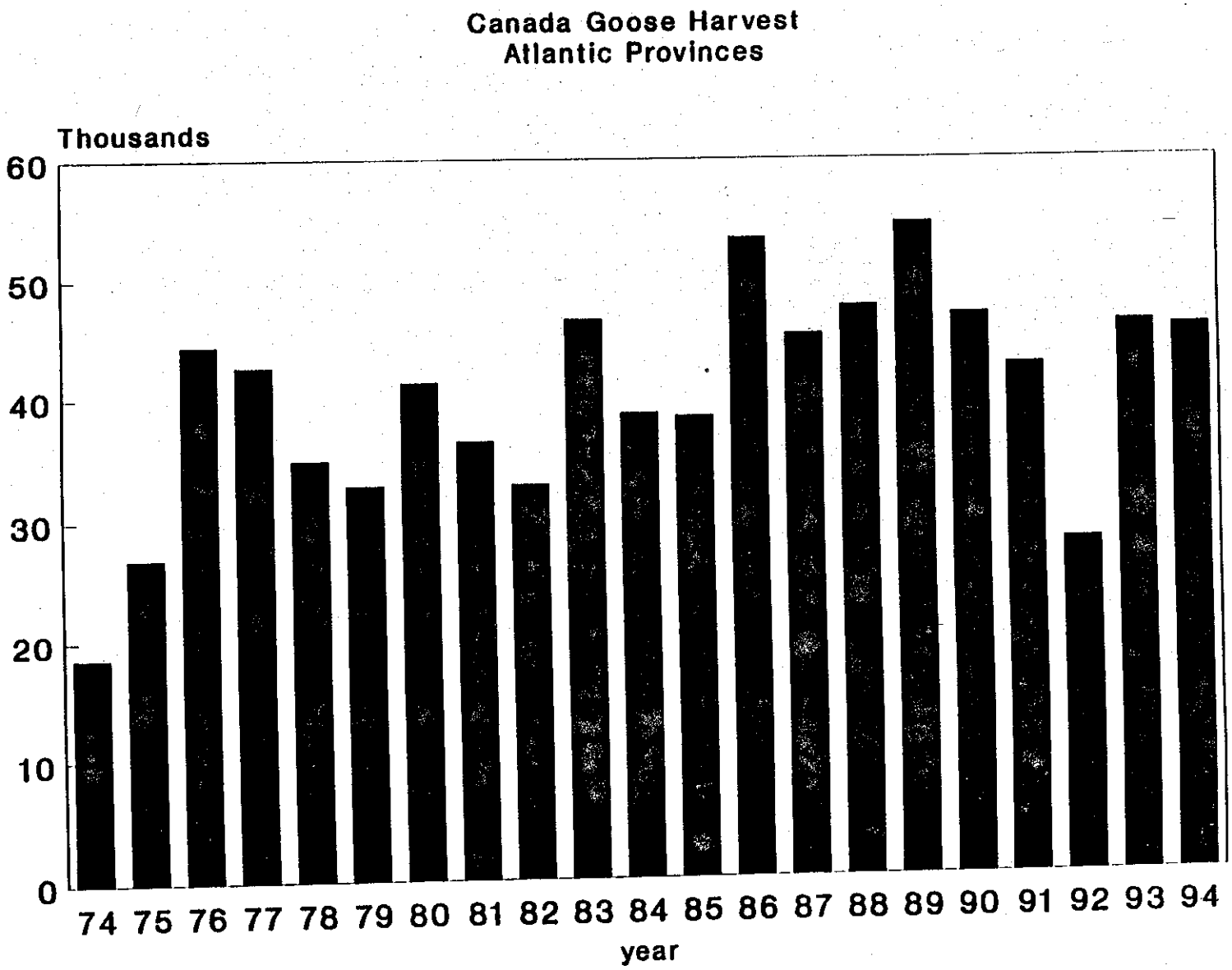


Figure 7. Canada Goose harvest estimates for the Atlantic Provinces 1974 to 1994 (from the National Harvest Survey data; CWS, Ottawa).

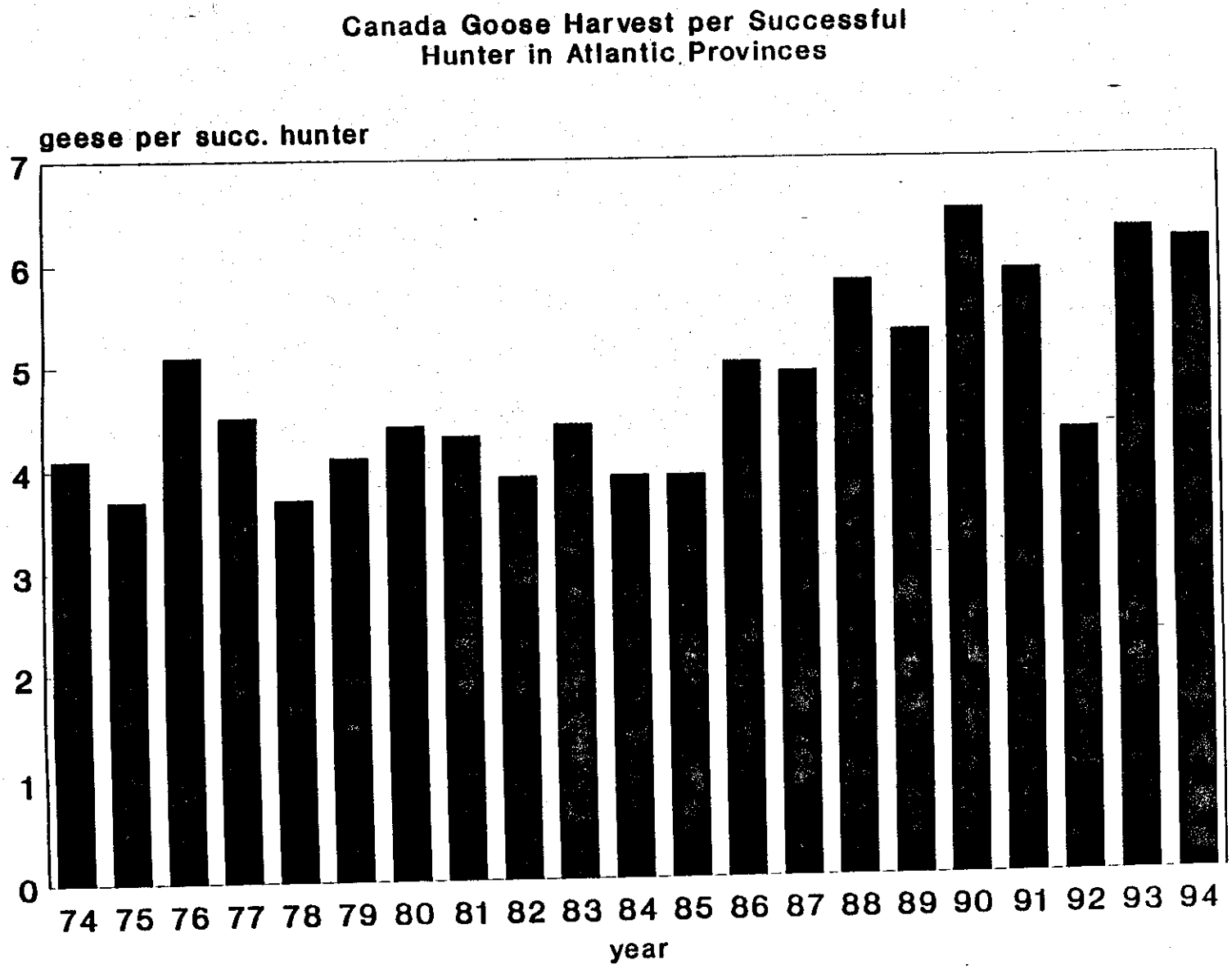


Figure 8. Estimates for the Canada Goose harvest per successful hunter in the Atlantic Provinces 1974 to 1994 (from the national Harvest Survey data; CWS, Ottawa).

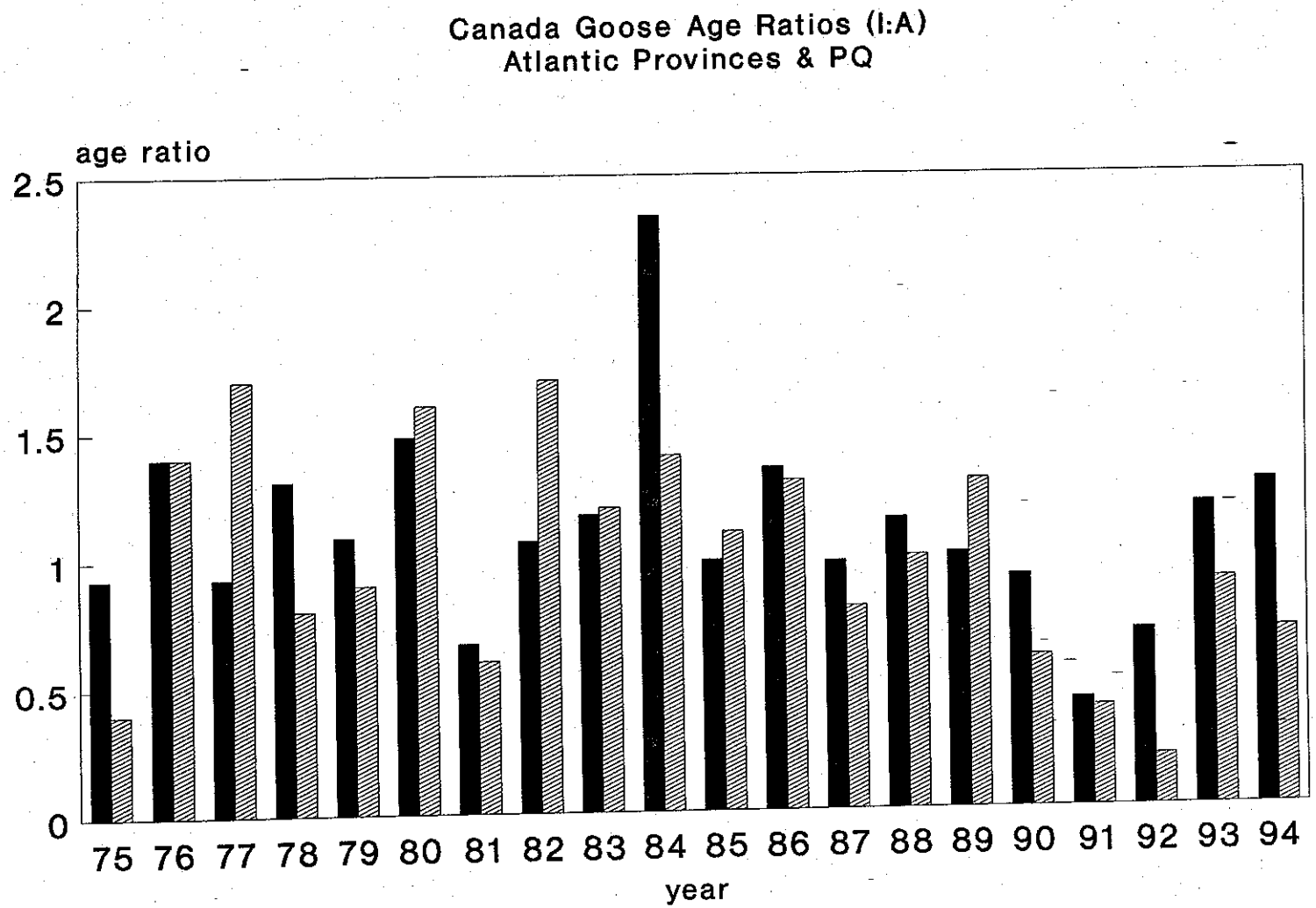


Figure 9. Canada Goose age ratios (I:A) calculated from tail fans in the Species Composition Survey in the Atlantic Provinces and in Quebec, 1975 - 1994.

Table 1. Number and location of bands recovered from Canada Geese banded in the Atlantic Provinces and recovered anywhere, 1923-1984 and 1985-1991.

Location of Banding	Time Period	No. (%) of Total Bands Recovered - Location of recovery						
		Atlantic Region*	Same Province	Quebec	Chesapeake	Mid Atlantic	New England	Total
NB	1923-84	-	1(33.3)	-	1(33.3)	-	1(33.3)	3
	1985-91	1(33.3)	1(33.3)	-	-	-	1(33.3)	3
	Total	1(16.7)	2(33.3)	-	1(16.7)	-	2(33.3)	6
NS	1923-84	14(25.9)	7(13.0)	-	29(53.7)	1(1.9)	3(5.6)	54
	1985-91	-	-	-	-	-	-	-
	Total	14(25.9)	7(13.0)	-	29(53.7)	1(1.9)	3(5.6)	54
PEI	1923-84	2(22.2)	2(22.2)	1(11.1)	3(33.3)	-	1(11.1)	9
	1985-91	20(16.9)	41(34.7)	3(2.5)	13(11.0)	22(18.6)	19(16.1)	118
	Total	22(17.3)	43(33.9)	4(3.1)	16(12.6)	22(17.3)	20(15.7	127
Nfld (insular)	1923-84	-	-	-	-	-	-	-
	1985-91	1(33.3)	-	-	-	1(33.3)	1(33.3)	3
	Total	1(33.3)	-	-	-	1(33.3)	1(33.3)	3
Labrador	1923-84	-	-	1(100.0)	-	-	-	1
	1985-91	1(5.6)	-	4(22.2)	6(33.3)	2(11.1)	5(27.8)	18
	Total	1(5.3)	-	5(26.3)	6(31.6)	2(10.5)	5(26.3)	19
Region Total	1923-84	16(23.9)	10(14.9)	2(3.0)	33(49.3)	1(1.5)	5(7.5)	67
	1985-91	23(16.2)	42(29.6)	7(4.9)	19(13.4)	25(17.6)	26(18.3)	142
	Total	39(18.7)	52(24.9)	9(4.3)	52(24.9)	26(12.4)	31(14.8)	209

* Exclude same province recoveries.

Table 2. Number and percent of observations of Canada Geese over time for geese neck-collared in the Maritime Provinces from 1987 to 1993 and observed from 1991 to 1995 (from Hestbeck and Bateman, *in press*).

	16-30 Sep.		1-15 Oct.		16-30 Oct.		1 Nov-15 Dec		16 Dec-28 Feb		1 Mar-15 Apr.	
St./Province	#	%	#	%	#	%	#	%	#	%	#	%
New Brunswick	6	20	1	2	1	1	0	0	0	0	0	0
Nova Scotia	0	0	0	0	0	0	0	0	1	0.3	0	0
Prince Edward I.	21	70	42	65	60	45	97	33	0	0	276	72
subtotal	**27**	**90**	**43**	**66**	**61**	**46**	**97**	**33**	**1**	**0.3**	**276**	**72**
New Hampshire	0	0	1	2	5	4	4	1	0	0	0	0
Massachusetts	0	0	1	2	10	8	31	11	54	18	5	1
Rhode Island	0	0	4	6	6	5	21	7	49	16	22	6
Connecticut	0	0	11	17	32	24	47	16	54	18	39	10
Long Island, N.Y.	1	3	2	3	1	1	45	16	70	23	14	4
subtotal	**1**	**3**	**19**	**29**	**54**	**41**	**148**	**51**	**227**	**74**	**80**	**21**
New York[a]	1	3	2	3	5	4	5	2	4	1	6	2
New Jersey	0	0	0	0	10	8	24	8	49	16	14	4
Pennsylvania	0	0	0	0	0	0	6	2	8	3	3	1
subtotal	**1**	**3**	**2**	**3**	**15**	**12**	**35**	**12**	**61**	**20**	**23**	**6**
Delaware	0	0	0	0	0	0	0	0	2	1	0	0
Maryland	1	3	1	2	3	2	7	2	10	3	4	1
Virginia	0	0	0	0	0	0	0	0	1	0.3	0	0
North Carolina	0	0	0	0	0	0	3	1	5	2	2	1
subtotal	**1**	**3**	**1**	**2**	**3**	**2**	**10**	**3**	**18**	**6**	**6**	**2**
Total	**30**		**65**		**133**		**290**		**307**		**385**	

[a]The state of New York without Long Island.

Table 3. Comparison of the 1980 fixed-wing transect results (Goudie and Whitman,1987) with results from transects 1 to 15 in 1993 and 1994 (uncorrected for visability).

	1980	1993	1994
total transect length (km)	4252	4379	4320
total area surveyed (km^2)	850	876	864
ave.density (ind.prs. per 100 km^2)	5.6	5.4	4.4
ave. density (total geese per 100 km^2)	26.8	10.9	19.7
estimated ind.prs. in area sampled (138,520 km^2)	7756 (SE=?)	7480 (SE=1077)	6094 (SE=914)
est.total geese in area sampled (138,520 km^2)	37100 (SE=?)	15100 (SE=2627)	27284 (SE=4092)