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Sea Duck Data for the Atlantic Region

Bill Barrow 1997

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REPORT

ENVIRONMENT CANADA

ENVIRONNEMENT CANADA

MEMORANDUM / NOTE DE SERVICE

To/ À:	Bill Prescott Biologist, CWS. Sackville NB.	Security-Class./Sécurité
		Our File/Notre référence
From/ De:	Bill Barrow Wildlife Technician CWS. Sackville NB.	Data File/Fichier de données
		Date 7 Sept. 1997

SUBJECT/OBJET: Sea Duck data for the Atlantic Region

For your interest I've enclosed seven internal reports on regional sea duck populations which at least will prove that we are trying to work on these critters. Most of this data should be published in the near future. The summary for Harlequin numbers around The Wolves is presently being submitted for publication. The data on harvest patterns and recent aerial surveys will be blended for a report in late 1997. The sea duck harvest for 1996-97 is very unusual and will be addressed separately. To date this harvest is two-thirds less than the norm. Within these reports are many reasons as to why the present surveys system isn't working for sea ducks. I believe we should modify the present system if we are to address sea duck issues.

Fluoroscope work for embedded shot in eider will continue in 1997. To date four populations of eider have been scanned and it's hoped that a sample from the St. Lawrence River and possibly a northern race will be processed this spring. A general publication is ready to be submitted and another which will key on the Common Eider is scheduled for late 1997. We will require the fluoroscope for a short period again this spring. *Can you co-ordinate the fluoroscope use with your surveys and toxics personnel?*


W.R. Barrow

Nova Scotia Scoter Harvest by Monthly Four Week Intervals, 1994-96

An average of 7000 scoter are harvested yearly in Nova Scotia with the estimated kill exceeding 10000 birds for peak years. Over 90 percent of the Nova Scotia scoter harvest is taken along the eastern coastal zone between Sydney and Yarmouth (C.W.S. internal reports).

Three species of scoter (black, white-wing, & surf) are subjected to identical harvest factors of which the most basic include hunting seasons, bag limits, weather, the hunter segment, and fishing seasons. The scoter harvest should reflect a relationship between migratory trends and harvest patterns. Nearly 80 percent of the scoter harvest for Nova Scotia occurs in October but slight differences are obvious for the individual scoter species.

		October				November				December				January				Total						
		1	2	3	4			1	2	3	4			1	2	3	4			1	2	3	4	
B.Scoter	1994		10	6	3	6		1	4	-	1		-	-	-	2		-	-	-	-		33	
	1995		3	7	2	5		2	-	2	-		1	3	-	-		-	-	-	-		25	
W.Scoter	1994		2	2	8	4		2	1	4	1		-	1	-	-		-	-	-	-		25	
	1995		2	7	3	-		1	1	-	1		4	5	-	4		-	4	-	-		32	
S.Scoter	1994		40	10	18	8		4	-	-	-		1	3	-	1		-	-	-	-		85	
	1995		20	26	10	10		3	2	-	1		2	1	-	-		-	-	-	-		75	

Harvest chronology for both the Black and Surf Scoter is nearly identical as both species are killed during the opening week of the hunt in early October and continually for the entire month. Over two hunting seasons (1994-96), wing returns for the Species Composition Survey indicate that 88% of the Surf Scoter and 72% of the Black Scoter were harvested in October. Only 16 percent (34/218) of the Surf and Black Scoter wing returns were later on in November and December. Both the Black and Surf Scoter appear to arrive in Nova Scotia before the hunting season and therefore the total relationship of harvest and migration is some what vague.

Unlike the Surf and Black Scoter, the White-w Scoter migration appears to be later as peak harvest is near mid October. The kill of white -wings remains steady throughout Nov. and Dec., extending into January, and actually exceeds the total kill of Surf and Black Scoter for this later segment of the hunting season. The Surf Scoter is by far the most numerous scoter species harvested in the Atlantic Region. For the two year period 1994-96 Surf Scoter wing returns comprised approximately 60 percent of the total scoter returns. The total harvest for the same period is nearly identical for both the White-wing and Black Scoter however the biology of these species contributes to a misleading numerical bias. Black Scoter migrate through the Maritimes in huge numbers to their primary wintering grounds in Chesapeake Bay. White -w Scoter are relatively rare in the Maritimes although they are acknowledged to be the most numerous of the three scoter species found in North America (Kortright 1967). On going C.W.S. coastal surveys (Sept.- Dec. 1996) for coastal Nova Scotia recorded < 300 white- wings but more than 10000 Black Scoter.

The statistical bias or equality in wing returns for the White- wing and Common Scoter is the result of a staggered white-wing migration and/or their vulnerability to hunting techniques.

Bill Barrow , Peter Hicklin
Internal Report, C.W.S. Sackville N.B.
5 Dec. 1996

Early Records For Scoter Migration Along Coastal Eastern New Brunswick

In 1967 Canadian Wildlife Service personnel designed a coastal survey program to monitor waterfowl in the Atlantic Region (see Hicklin P.W. and Barrow W.R. 1996 CWS Coastal Survey Blocks In Atlantic Canada). Since then and based on this survey technique hundreds of aerial surveys have been flown to estimate numbers of coastal ducks, brant and geese, shorebirds, seabirds, and even ponies on Sable Island. The survey technique has changed on an average of once every decade however little has been done to separate the scoter group of sea ducks by species to better understand a forty year population decline. For thirty years, within the Atlantic Region the three scoter species have been grouped as one with the exception of four aerial survey flights flown in 1974 & 1975.

The significance of these flights is now nothing more than a historic observation however there are some parallels with recent surveys and other observations. Literally at the flick of a switch, due to computer networking and active participation from naturalist groups vast amounts of data / observations are now available. Members of The Saint John Naturalist Club and other volunteers working at Pt. Lepreau recorded data on sea duck numbers and migration chronology. Huge flocks of scoter were observed flying up the Bay of Fundy towards the east coast of New Brunswick. For the spring of 1996 the Black Scoter migration appeared to peak during mid April while that for Surf Scoter was two weeks later extending more so into May. This trend of larger flocks of Black Scoter migrating ahead of Surf Scoter is supported by observations at Shippegan and Dalhousie N.B. White-wing Scoter observations are few and numbers appear to be very low. The peak observation for white-wings in 1996 was from Pt. Lepreau on 18 April 1996 when 338 birds were observed (1.6% of all scoter seen that day). White-winged Scoter numbers appear to be low during migration through the Maritimes however large numbers (CWS surveys) have been recorded along coastal Labrador during mid June. Probably the largest white-wing record for the Maritimes was that for a mid-winter aerial survey in 1987 when 1000 birds were observed near Canso Nova Scotia.

The four survey flights of 1974 & 1975 were flown near mid April and mid May for both years with the same pilot and observer (Lavender & Barrow) in excellent flying conditions. During April 1974, 16993 birds were counted of which 7894 were Black Scoter. The largest concentration for this flight was 3341 Black Scoter at Heron Island. A month later in May 12858 waterfowl were observed of which 6439 were Surf Scoter. Once again the largest concentration of Surf Scoter (3658) was at Heron Island.

Substantially greater numbers of waterfowl were observed during surveys in 1975. In April 54586 waterfowl were counted of which 38158 were Black Scoter. High concentrations were sighted at Kouchibouguac (16130), Miramichi (6495), Dalhousie (6178), and at Tabusintac (4472). In May 40,389 birds were surveyed of which 31695 were Surf Scoter. Peak numbers were located at Dalhousie (27484), Buctouche (1235), and at Heron Island (1144).

The data for aerial surveys in the mid 70's and that for ground surveys in the mid 90's suggests a differential migratory trend for the Black and Surf Scoter.

Bill Barrow, Peter Hicklin
Internal Report, C.W.S. Sackville N.B.
31 Oct. 1996

Overwintering Harlequin Ducks *Histrionicus histrionicus* on The Wolves
archipelago in the Bay of Fundy.

by
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INTRODUCTION

The eastern North American population of the Harlequin Duck *Histrionicus histrionicus* is presently estimated at <1000 birds and declining (Vickery 1988; Goudie 1989, 1991, Rose and Scott, 1994). The overwintering population extends from southern Labrador to Virginia (Vickery, 1988) and Vickery (1988) estimated the overwintering population of Harlequin Ducks in eastern North America around 650-700 birds. The most current counts of overwintering numbers available suggest an eastern population numbering about 715 birds (Montevecchi *et al.* 1995). This paper presents information on the numbers, age and sex of Harlequin Ducks which overwinter on The Wolves archipelago, New Brunswick, in the mouth of the Bay of Fundy.

MATERIALS AND METHODS

From 9 November, 1994, to 6 November, 1995, inclusively, we conducted sixteen boat surveys around The Wolves archipelago (Figure 1) to count, age and sex the Harlequin Ducks overwintering on the islands. The surveys were conducted using a 21-foot fishing boat from Beaver Harbour, New Brunswick, a small fishing community about six miles from The Wolves. Once we reached the archipelago, the surveys began when we reached Gull Rock and continued to the southern tip of Southern Wolf and extended northward along the eastern shores of Southern Wolf, Flat Wolf, Spruce Island, Green Rock and Eastern Wolf to the northernmost tip of Eastern Wolf at Molasses Rock (Figure 1). The counting ended at Molasses Rock and we returned to Beaver Harbour. Harlequins have never been seen on the western side of East Wolf (personal observation) and for that reason we did not survey that portion of the archipelago. On average, the surveys took about three hours to complete; they were conducted on clear days with little wind in order to provide clear unobstructed visibility of the birds when they flushed upon our approach.

RESULTS AND DISCUSSION

The numbers of Harlequin Ducks seen over the one-year period ranged from 14 birds on 9 November, 1994, to 38 on 15 March, 1995 (Table 1). Adult males and adult females made up 60.4% of the total 268 birds seen over the 12-month period while

19.7% of the birds were juveniles. Almost 5% of the birds could not be aged and sexed primarily because adult and juvenile females in single flocks were difficult to differentiate; most adult males and females flew in pairs which explains why the two sexes of that age group were nearly equal (Table 1). But where adult and juvenile females were mixed, we could not clearly differentiate them in flight although juvenile males were easily distinguishable by the facial markings. And so the lower proportion of juvenile females seen (1.9 per survey, on average, between 9 November and 10 May) (Table 1) was due to the difficulty in separating them from unpaired adult females.

On average, between early November and early May, we saw about 25 birds per trip (Table 1). But during the summer months, between 6 June and 23 October, there were no birds present on The Wolves. The first birds were not seen again in 1995 until 6 November. Over all twelve months that the islands were surveyed, an average of 16.8 birds were seen per trip (Table 1).

During the winter months (9 November - 15 February), all the Harlequin Ducks seen occurred on Eastern Wolf with Ship Beach being the preferred location. On most visits, birds concentrated in Ship Beach cove and upon our approach, they were flushed from the water and the rocks. Harlequins were only seen on the other islands (Flat Wolf and Southern Wolf) during the spring months (March, April and May). The birds seen on those months are quite likely migrants heading for breeding grounds in Newfoundland and Labrador with the largest number making passage in March. Based on the population numbers in Montevecchi *et al.* (1995), the numbers of Harlequin Ducks present on The Wolves each winter represents, at peak periods in March, 5.3% of the endangered eastern population.

ACKNOWLEDGEMENTS

We wish to sincerely thank Arnold and Vera Hawkins for their hospitality during our many trips to Beaver Harbour during these surveys. We are also most grateful to Osborne Hawkins who took us out to The Wolves with his fishing boat when ours would not start and for keeping an eye on "The Seaduck" in the harbour during those winter months. Other observers who assisted us were Danny Sears, Jason Hudson, Andrew Macfarlane, Don Colpitts and Kim Mawhinney.

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Table 1. The numbers, age and sex of Harlequin Ducks seen on The Wolves archipelago, Bay of Fundy, New Brunswick, 9 November, 1994 - 6 November, 1995.

DATE	LOCATION	NO.	AGE & SEX				
			AM	AF	JM	JF	UU
9 November, 1994	Eastern Wolf	14	6	8	-	-	-
30 November, 1994	Eastern Wolf	32	14	13 ¹	5	-	-
14 December, 1994	Eastern Wolf	25	11	5	1	8	-
9 January, 1995	Eastern Wolf	29	12 ¹	17 ¹	-	-	-
15 February, 1995	Eastern Wolf	22	3	4	5	-	10
15 March, 1995	Eastern Wolf and Southern Wolf	38	3	1	-	-	34
29 March, 1995	Eastern Wolf and Southern Wolf	28	3	15	2	-	8
18 April, 1995	Flat Wolf and Southern Wolf	21	6	4	-	11	-
26 April, 1995	Flat Wolf	21	9	1	11	-	-
10 May, 1995	Southern Wolf	16	2	3	8	2	1
6 November, 1995	Eastern Wolf	22	14	8	-	-	-
Total Numbers		268	83	79	32	21	53
Percent			30.9	29.5	11.9	7.8	19.8
Average No/trip:							
9 November-10 May		24.4	7.6	7.2	2.9	1.9	4.8
6 June - 23 October		0	0	0	0	0	0
9 Nov. '94 - 6 Nov.'95		16.8	5.2	4.9	2.0	1.3	3.3

¹ Uncertain of age

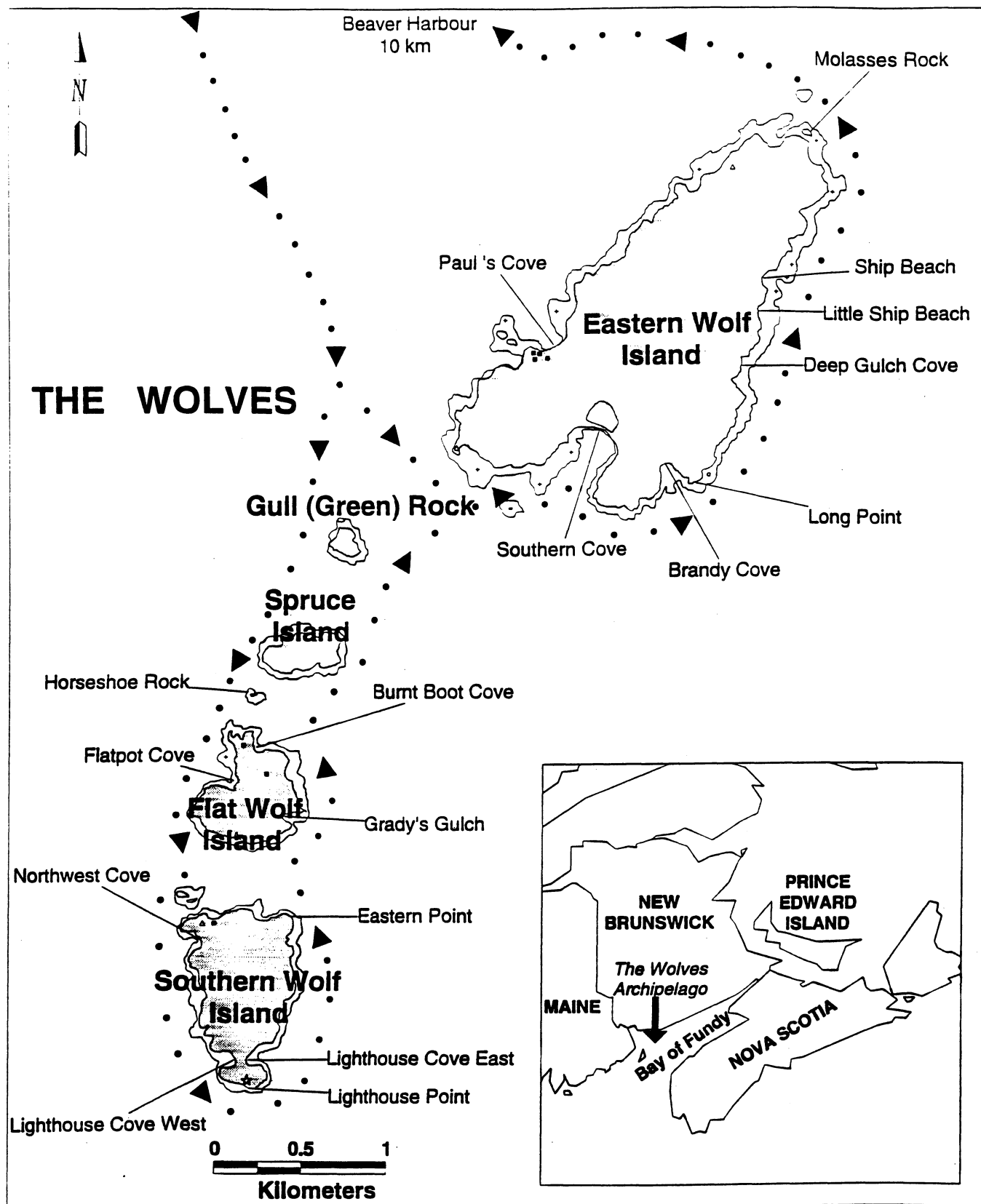


Figure 1. The Wolves archipelago in the Bay of Fundy showing boat census routes and staging / overwintering areas used by Harlequin Ducks.

A Summary of Atlantic Region Scoter Harvest 1981-1990

The following harvest interpretation is a summary of data found in CWS Progress Notes normally listed under "migratory game birds harvested in Canada" for a particular year. This publication is based on two surveys (1) a harvest questionnaire (H.Q.S.) where hunters provide detailed information on the hunt and harvest and (2) a species composition survey (S.C.S.) where hunters provide additional information in addition to a waterfowl wing or goose tail from each bird harvested.

The Progress Note report is a biometric blend for both surveys but addressed individually interpretation conflicts arise. The total scoter harvest based on the most recent Progress Note data suggests that the Newfoundland and Nova Scotia harvest is comparable. The S. C. S. alone indicates that the Nova Scotia harvest is significantly greater: ie. for 1994-96 Nova Scotia hunters submitted 83 percent of the scoter returns while the Newfoundland hunt accounted for 9 percent of the total scoter returns. Conversely the H.Q.S. indicates a sea duck hunt for New Brunswick, which in fact is true, but it is not evident in the most recent S.C.S. data. Both surveys suggest the Prince Edward Island scoter hunt is minor compared to that for Newfoundland and Nova Scotia. For the last two years of the S.C.S. there have been no scoter wing returns from Prince Edward Island and for the last ten years of the H.Q.S. only one data point is indicated for each of the three scoter species. Unfortunately the H.Q.S. combines both the Labrador and Newfoundland harvest data but S.C.S. wing return information focuses more so on exact location.

Harvest data (H.Q.S. & S.C.S.) for Scoter in the Atlantic Region 1981-1990

	Black Scoter		White- w Scoter		Surf Scoter	
	Range	Average	Range	Average	Range	Average
N F L D.	153-5774	1554	0-2167	923	807- 9039	3250
P.E.I.	0- 155	16	0- 32	3	0- 82	8
N.S.	624- 4635	2005	307- 2087	1394	957- 7497	3631
N.B.	0- 842	161	0- 215	105	0- 394	174

The three species of scoter are harvested throughout the four Atlantic Provinces of which Nova Scotia appears to be the most important numerically followed by Newfoundland, and to a much lesser degree by New Brunswick, and Prince Edward Island. Over a ten year period (1981-1990) harvest estimates suggest that approximately 7000 scoter are taken annually in Nova Scotia, 5000 in Newfoundland, 500 in New Brunswick, and less than 100 in Prince Edward Island.

Black Scoter Harvest in the Atlantic Region 1981-1990

Year	Nfld.	P.E.I.	N.S.	N.B.	Total
1981	3923	-	4635	169	8558
1982	5774	-	2672	-	8446
1983	588	-	2327	48	2963
1984	1762	-	1494	-	3256
1985	842	155	1098	-	2095
1986	771	-	3258	-	4029
1987	852	-	1439	842	3133
1988	153	-	624	322	1099
1989	495	-	660	-	1150
1990	382	-	952	225	1559

White -w Scoter Harvest in the Atlantic Region 1981- 1990

Year	Nfld.	P.E.I.	N.S.	N.B.	Total
1981	906	-	1416	118	2440
1982	424	-	1590	122	2136
1983	888	-	1363	215	2466
1984	1780	32	2087	-	3899
1985	1383	-	813	107	2303
1986	324	-	307	51	682
1987	-	-	1120	59	1179
1988	2167	-	1771	69	4007
1989	248	-	1571	139	1958
1990	1107	-	1899	168	3174

Surf Scoter Harvest in the Atlantic Region 1981-1990

Year	Nfld.	P.E.I.	N.S.	N.B.	Total
1981	1375	-	5921	215	7511
1982	9039	-	2819	218	12076
1983	5283	-	957	-	6240
1984	3821	-	2856	165	6842
1985	1197	-	3640	165	5002
1986	2798	82	2378	200	5458
1987	807	-	3261	196	4264
1988	1005	-	2359	184	3548
1989	3734	-	4918	-	8652
1990	3441	-	7497	394	11332

Long term declines in Atlantic Flyway sea duck populations have been identified as serious concerns by both the Canadian and U.S.A. Wildlife Service. Mid winter inventories for the three scoter species on the American coastal wintering grounds suggest a 40 percent decline since 1950. Within this brief, the decline is most obvious in the ten year summary of Atlantic Region Black Scoter harvest. Most regional Black Scoter harvest is either from Nova Scotia or Newfoundland. Peak harvest is from the early 1980's when 5774 scoter were taken on Newfoundland and 4635 scoter killed in Nova Scotia. Ten years later the Black Scoter harvest for Newfoundland had decreased to 382 birds and that for Nova Scotia 952 birds. A lineal ten year decrease for the Atlantic Region is apparent as total harvest for this species declined from approximately 8500 to 1500 birds.

Similar to the Black Scoter most of the Regional White-winged Scoter harvest is from Nova Scotia and Newfoundland. The Nova Scotia harvest averages 1400 birds and that for Newfoundland 900 birds. The peak white-wing harvest was 2167 birds from Newfoundland in 1988 and 2087 birds from Nova Scotia in 1984. The harvest totals suggests a stable but four year cyclic population.

The peak Surf Scoter harvest was from Newfoundland in 1982 when 9039 scoter were taken. The next highest kill was from Nova Scotia in 1990 with an estimated kill of 7497 scoter. Based on the existing harvest data the Surf Scoter population is difficult to interpret. The harvest in Newfoundland has decreased since 1982 while that for Nova Scotia peaked in 1981 and ten years later in 1990. The harvest total indicates a four year cyclic trend similar to that for the White-winged Scoter.

The question arises on whether one can interpret raw harvest data and relate it to population status? A pure population model should include this harvest data, but also age and sex breakdown, hunter response, biology of target species, weather relative to hunter days and survey technique. Our response time to published survey results is presently delayed by at least three years. We should have the capacity to respond immediately to; what has happened to the Black Scoter harvest over the last decade, zero white-wing harvest for Newfoundland in 1987, and in 1983 a 957 Surf Scoter kill for Nova Scotia a province which normally averages over 3500 birds. The potential to overlook production failures or other disasters is compounded due to the biology of the sea duck group and a formula to speed up data analysis is paramount. Nova Scotia hunters annually submit a disproportionate 80 percent of the Atlantic Region scoter harvest, so it appears that scoter harvest data for Newfoundland and Labrador is heavily dependent on a questionnaire from a zone known for poor hunter response. The survey design for Newfoundland / Labrador needs to be restructured to enhance hunter response and survey credibility.

It is astonishing/alarming to know that of the 12 most common species of sea ducks in North America none have stable or increasing populations. No other group of waterfowl are so affected. The need to focus on this group, and for speedier data retrieval are both vital to basic management. A new Progress Note design and/or publication which separates the sea duck data from that of the geese and dabbling ducks is required.

Bill Barrow, Peter Hicklin
Internal Report, C.W.S. Sackville N.B.
18 Nov.1996

Atlantic Region Sea Duck Harvest 1995-1996

The focal point for Atlantic Region sea duck harvest appears to be Nova Scotia (figure 1). Similar to the 1994-95 hunt more sea duck wings were submitted by Nova Scotia hunters than that total for New Brunswick, Newfoundland, and Labrador. No sea duck wings were submitted by Prince Edward Island hunters. The wing returns for New Brunswick and Labrador suggest a stable hunt over the two year period, and possibly a lower scoter harvest in 1995-96 for Newfoundland. The eider wing returns for Nova Scotia in 1995-96 indicate a 20% increase in harvest. Nova Scotia hunters submitted 72% of the wing returns for the larger sea duck group (eider, & 3 scoter species). For the second consecutive year the White-winged Scoter wing returns were all from Nova Scotia.

The total sea duck wing returns for the two hunting seasons (1994-96) is almost identical (325/327) due to a balance of scoter and eider totals; ie. in 1995-96 the increase in eider wing returns (148/164) was offset by a decrease in scoter wing returns (177/163). A general impression of whether this season was good or bad and how one would interpret it in terms of species production is difficult to access. The surveys section in Ottawa sent out a second request for wings from Nova Scotia hunters in 1995-96 so the interpretation of this response or increase in wing returns would disrupt data analysis and yearly comparisons.

Province	Common Eider	Surf Scoter	Black Scoter	White-w Scoter	Total	Percent
N.S.	99	75	28	32	234	72%
N.B.	1	4	2	-	7	2%
P.E.I.	-	-	-	-	-	-
Nfld.	63	11	2	-	76	23%
Lab.	1	5	4	-	10	3%
Total	164	95	36	32	327	

Nova Scotia led all Provinces in hunter response, wing returns, and the success index or total wings per hunter sample. The success index increased slightly (4.5- 4.9) with a corresponding increase in wing returns for Nova Scotia hunters. That for Newfoundland decreased from 4.4 to 4.2 along with a decrease in wing returns. The success index for both New Brunswick and Labrador increased for the 1995-96 hunt but both are based on a small sample size. The overall index for the Atlantic Region increased from 4.1 to 4.3 over the two seasons 1994-1996.

Province	Hunter Sample	Total Sea Ducks	Success Index
N.S.	48	234	4.9
N.B.	6	7	1.2
P.E.I.	-	-	-
Nfld.	18	76	4.2
Lab.	4	10	2.5
Total	76	327	4.3

Eighteen Newfoundland hunters contributed to the composition survey in 1995-96. Fourteen hunters submitted eider wings and of these only two had harvested scoter. Four additional Nfld. hunters harvested only scoter.

Labrador eider are harvested first on the northern tip of Nfld. near St. Anthony and then along the east coast to the Avalon Peninsula (figure 2). The importance of such traditional harvest locations as Twillingate, Fogo Island, Musgrave Hr. and Cape Freels near Notre Dame Bay is obvious as 52 percent of the total eider wing returns are from this zone. Similar to the 1994-95 hunt the Avalon and Burin zone in southeastern Nfld. is important for eider harvest.

Unlike the previous season both eider and scoter were harvested along the west coast of Nfld. at Port au Choix, Trout River and Lourdes. This harvest pattern suggests a west coast migration that extends to Nova Scotia and contributes to the scoter and eider harvest in Cape Breton and Chedabucto Bay.

For the two hunting seasons 1994-1996 only four sea duck wings returns were from coastal Labrador. Eighty-one percent of the returns were scoter from interior Labrador. During 1995-96 nine of ten sea duck returns were scoter (figure 3) all from interior Labrador. These scoter could be local birds or migrants from northwestern Canada. Most of the scoter returns are from near Labrador City or 50-60 miles south of Goose Bay. Four Labrador hunters participated in the 1995-96 waterfowl parts survey.

The eider harvest locations based on hunter wing returns for the Maritime Provinces is found in figure 4. The eider returns for Nova Scotia (99) was greater than the total sea duck hunt for the entire Atlantic Region. Similar to 1994-95 only one eider was reported harvested in New Brunswick and no sea duck harvest was indicated for Prince Edward Island.

The eider harvest pattern for the 1995-96 hunt in Nova Scotia spanned a coastal zone from Sydney to Yarmouth. The St Mary's Bay area appeared less significant in 1995-96. Only two wing returns were reported from this area in 1995-96 compared to 13 returns for the previous year. Similar to the previous years hunt the importance of southwestern Nova Scotia to eider harvest is obvious. Seventy-seven percent of the provincial eider harvest was from the coastal zone between Lunenburg and Yarmouth. Compared to the entire Atlantic Region 54 percent of the eider harvest is from this zone.

Forty-eight Nova Scotia hunters participated in the 1995-96 survey. Of this total 56% submitted eider wings and 44% returned only scoter wings. Eleven hunters reported harvesting both eider and scoter, and only four hunters reported shooting all three scoter species.

Similar to the eider harvest most of the scoter harvest in Nova Scotia is along the coast between Sydney and Yarmouth (figure 5). Nova Scotia scoter harvest in 1995-96 accounted for 83% of the total regional harvest. Surf Scoter (75) were the most numerous followed by White -w Scoter (32) and Black Scoter (28). The suggestion that White -w Scoter are more numerous (total wing returns) than Black Scoter is not supported by on going coastal aerial surveys or other Atlantic Region sea duck surveys. Three coastal zones continue to be important to scoter harvest in Nova Scotia. The Yarmouth Zone which includes the traditional hunting areas of Shelburne, Lockeport, and Cape Sable Island, the Halifax Zone from West Dover to Sheet Harbour, and the Chedabucto Bay Zone with the two traditional hunting areas of Isle Madame and Canso.

Three of the six scoter returns for New Brunswick are from the Saint John River Near Fredericton, and over the two year period 1994-96 four of nine scoter returns are from this area. Scoter utilize the Saint John River during spring migration and it appears that small numbers use this river system for fall migration. Most scoter migrate through the Northumberland Strait along coastal New Brunswick and Nova Scotia. At the Isthmus of Chignecto scoter migrants split and are funnelled south into the Bay of Fundy or migrate further east into Chignecto Bay and eventually along coastal Nova Scotia.

Bill B.

W.R. Barrow
C.W.S. Sackville N.B.
28 Oct. 1996

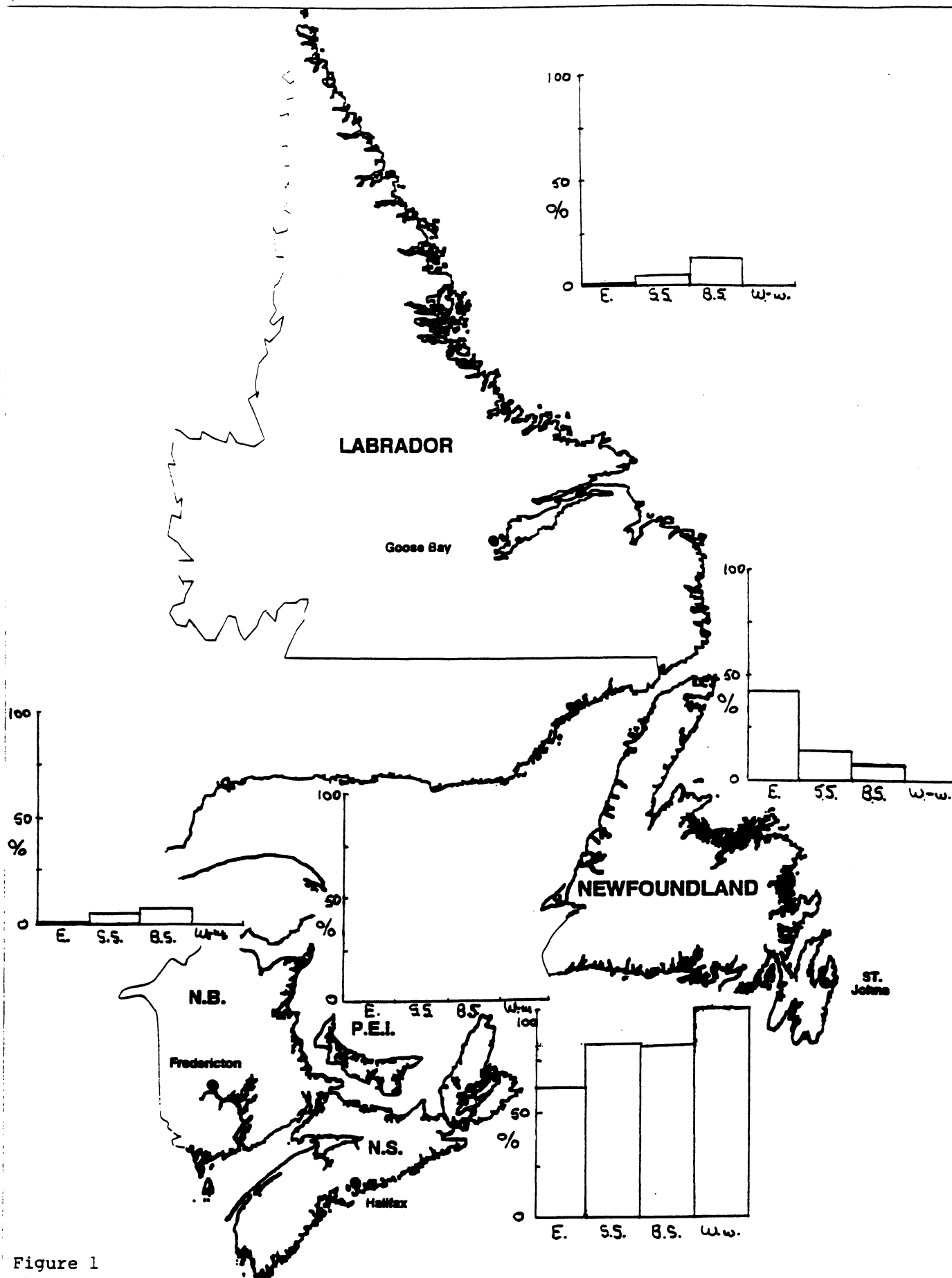


Figure 1
The sea duck harvest by province and percent, based on hunter wing returns for the Atlantic Region Species Composition Survey 1995-96.

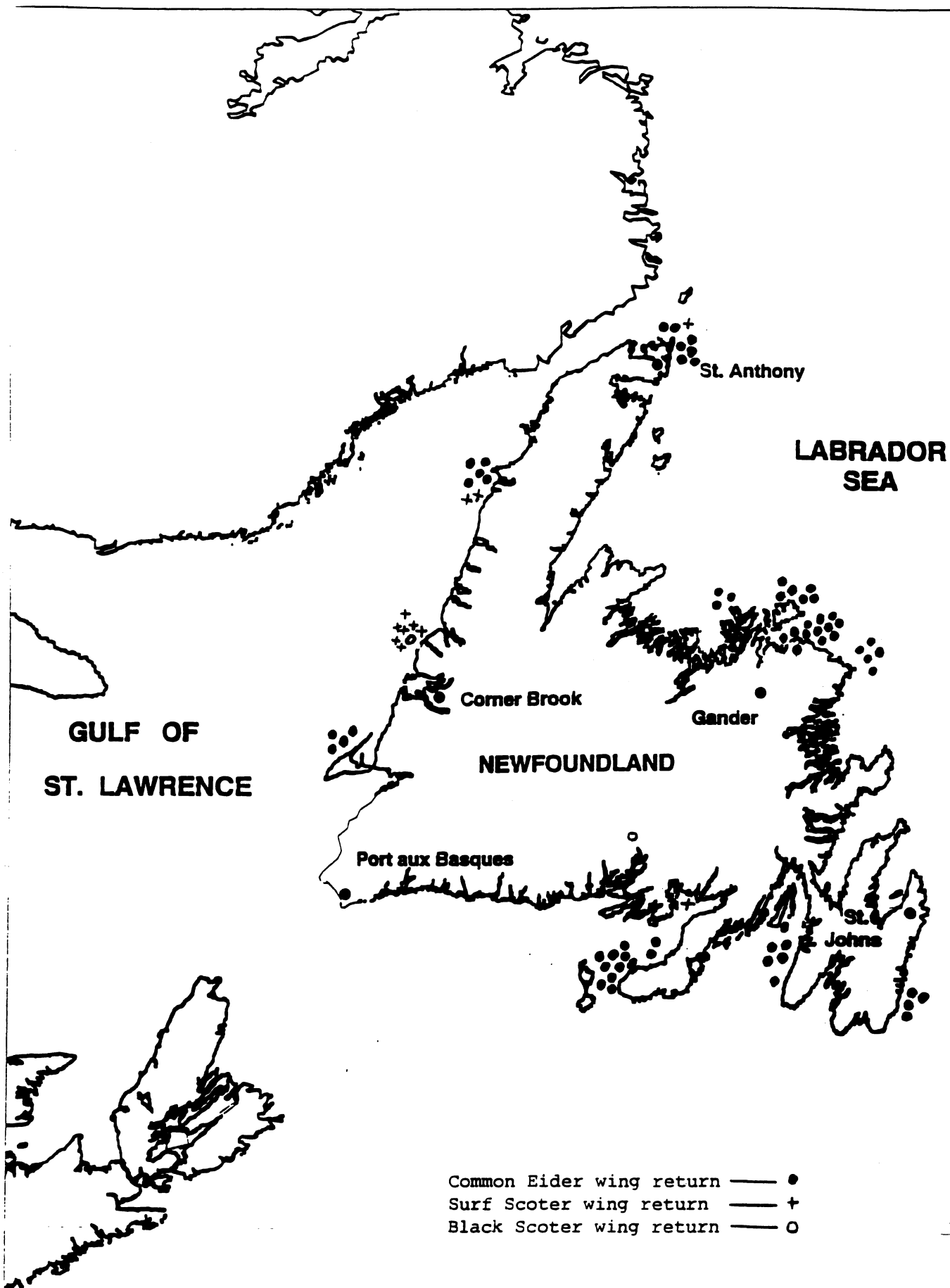


Figure 2

Species Composition wing returns for sea ducks in Newfoundland, 1995-96.

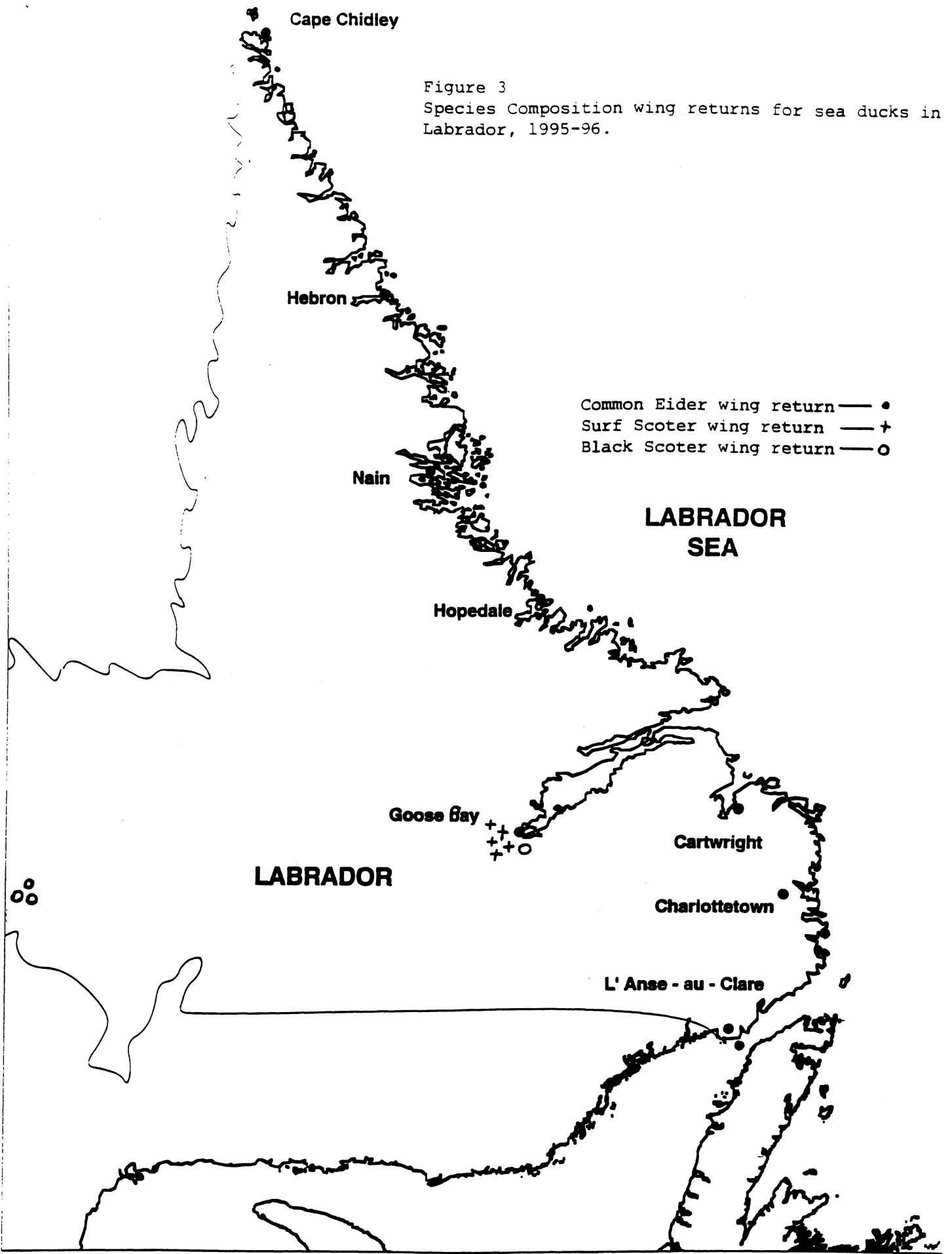


Figure 3
Species Composition wing returns for sea ducks in
Labrador, 1995-96.

Common Eider wing return — •
Surf Scoter wing return — +
Black Scoter wing return — ○

LABRADOR
SEA

LABRADOR

L'Anse - au - Clare

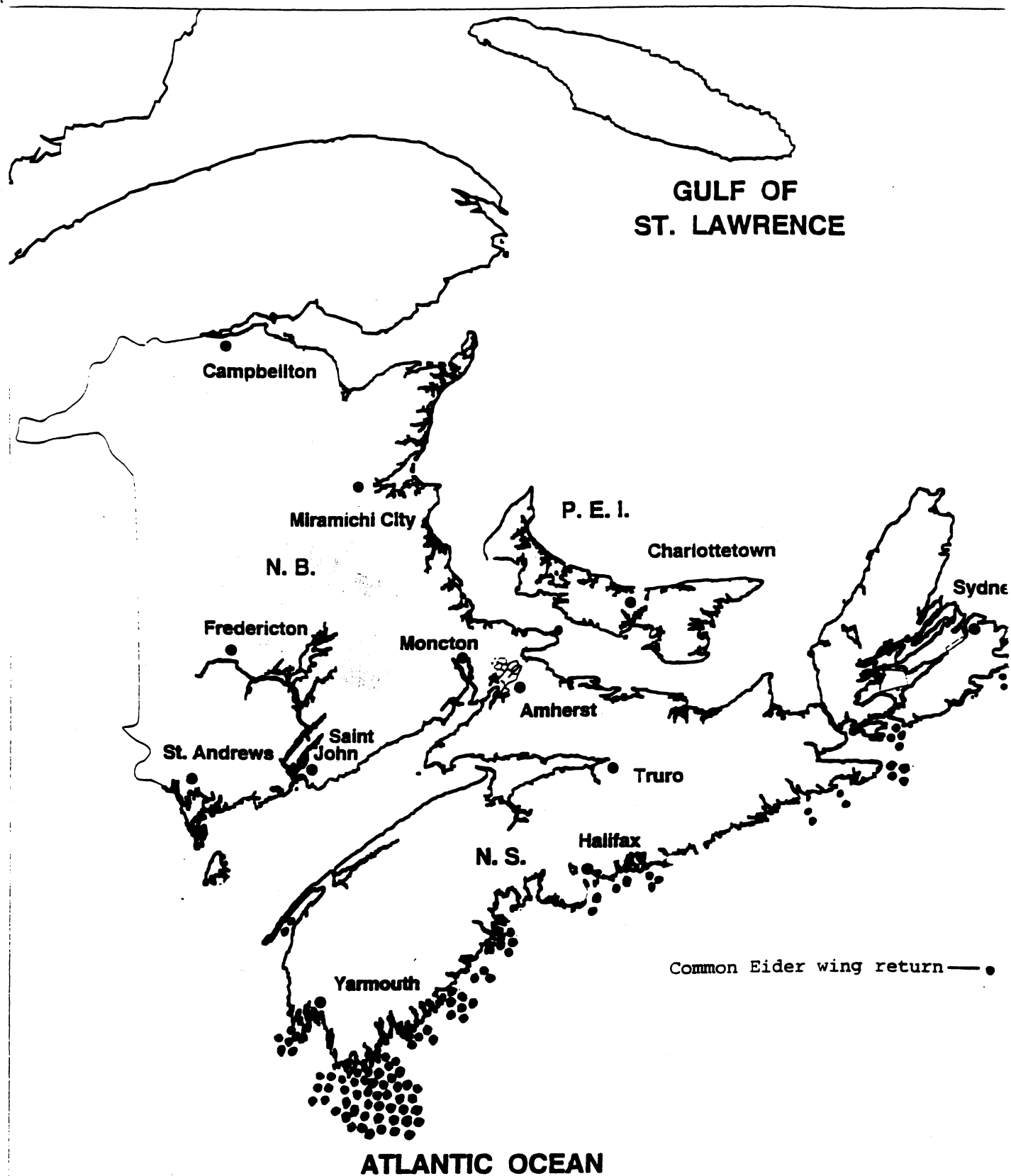


Figure 4
Species Composition wing returns for Common Eider in the Maritime Provinces, 1995-96.

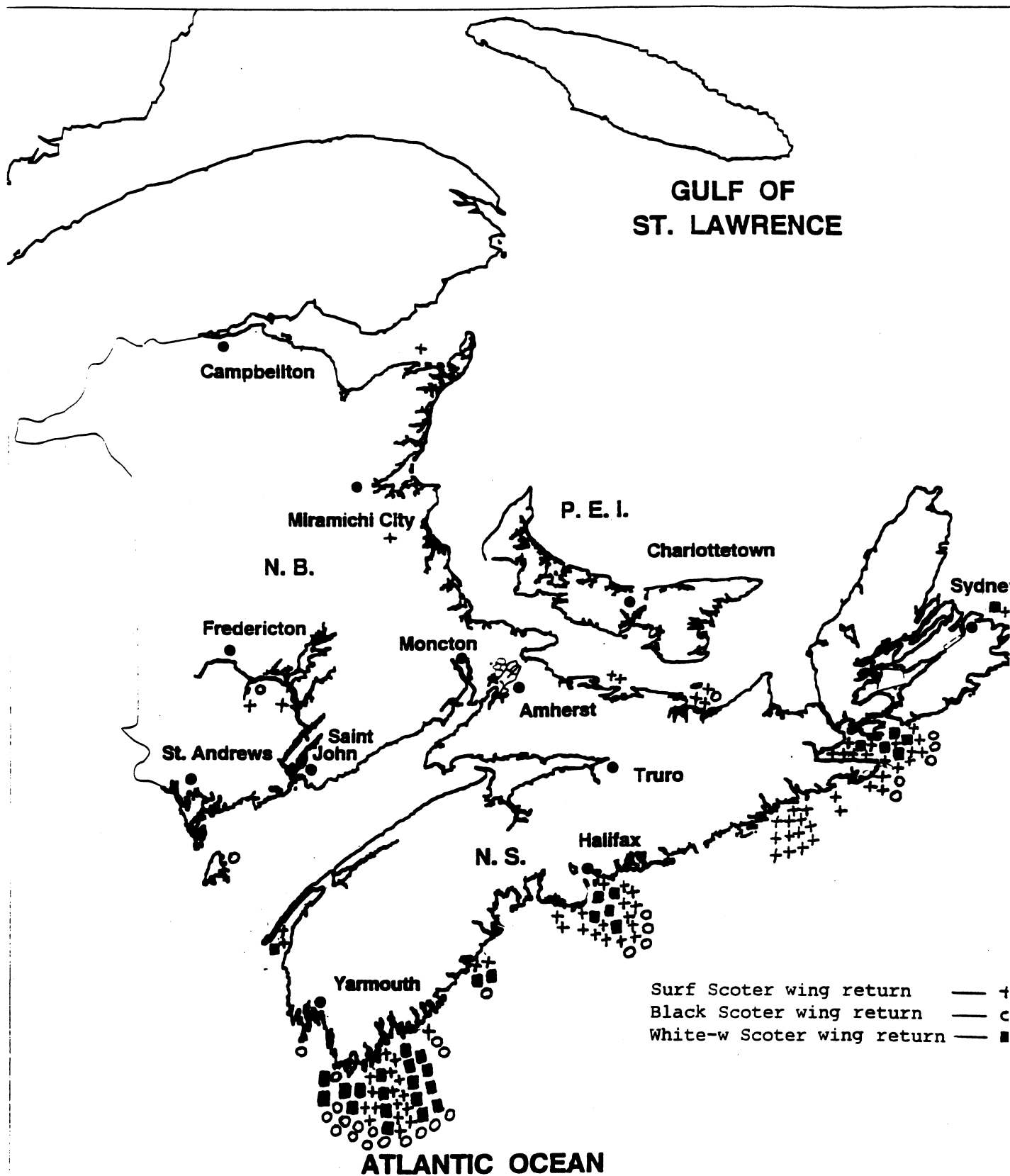


Figure 5
Species Composition wing returns for scoter in the Maritime Provinces, 1995-96.

The Atlantic Region Sea Duck Hunt 1994-95

The Atlantic Provinces Species Composition Survey is part of a national program in which a random sample of hunters are asked to return a wing or tail from harvested waterfowl for species age and sex identification. Quebec, Ontario, Western Canada, and the Pacific Regions all conduct similar surveys. Harvest patterns and production figures produced during work sessions known as "wing bees" are probably the most important data from this survey.

The sea duck component of this survey has traditionally been neglected due to poor compliance and sample size. Harsh coastal waters and complicated migration patterns contribute to this sampling trend, and a poor basic knowledge relative to other species. A traditional hunt exists in many Atlantic Region areas and it may be increasing with the decline of the fishery. A specific hands on approach to contact this group of hunters for more participation is required. Sea ducks remain a second class citizen at wing bees, a trend that needs to be reversed if we are to manage this group of birds.

The data for 1994-95 or lack of clearly shows the holes in our data collection. Its hard to envision only two eider wings from coastal Labrador a zone which has one of the highest embedded shot rates for waterfowl in North America. Only six Labrador hunters participated in this years survey.

	Common Eider	Surf Scoter	Black Scoter	White-w Scoter	Total	Per cent
N.S.	77	88	33	25	223	69
N.B.	1	2	1	-	4	1
P.E.I.	-	-	-	-	-	-
Nfld.	68	18	1	-	87	27
Lab.	2	7	2	-	11	3
Total	148	115	37	25	325	

Only the Nova Scotia returns represented all species of the larger sea duck group and comprised a disproportionate 70 percent of the total. The total sea duck returns should at least be doubled with the increase coming from the Fundy Region of N.B. and Newfoundland-Labrador. The sea duck hunt on P.E.I. is largely ignored due to the goose hunt but it should be addressed. The Black and White-winged scoter species are only represented in one of the five zones.

Improved hunter response is the key to reliable survey data. Nova Scotia hunters surpass all areas in response and appear to be more successful based on a simple index (total wings/hunter). On an individual basis Nova Scotia hunters are more successful and are more likely to apply for additional wing envelopes.

Province	Hunter Sample	Total Sea ducks	Success Index
Nova Scotia	50	223	4.5
New Brunswick	4	4	1.0
Prince Edward Island	-	-	-
Newfoundland	20	87	4.4
Labrador	6	11	1.8

Data on hunter response, harvest location and same basic interpretation is scattered throughout figures 1-6. A confidence level for reliable estimates based on this years sea duck data would be low or impossible.



CWS. Sackville WB.
Dec. 1995

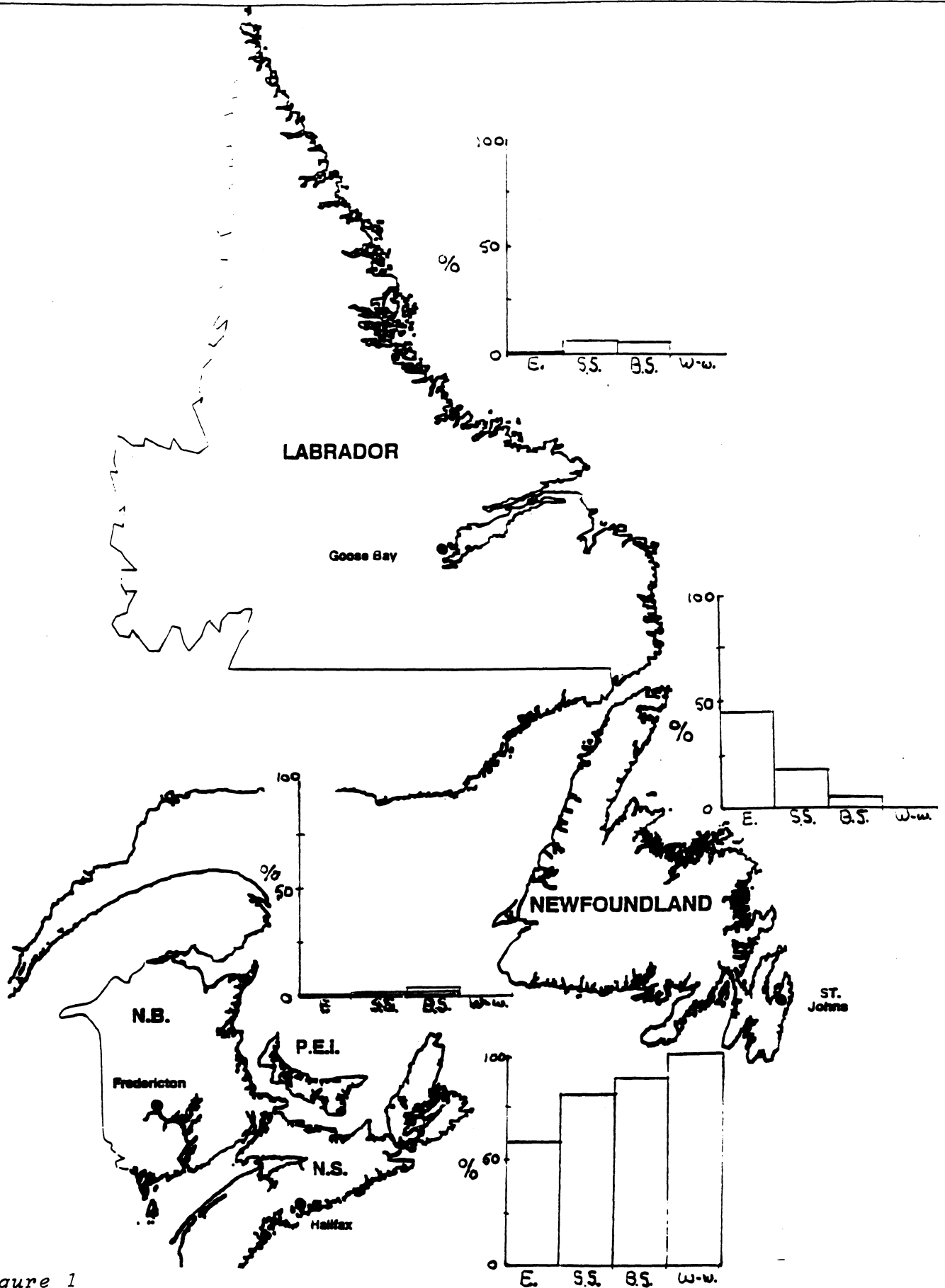


Figure 1
The Atlantic Region sea duck hunt by province and percent, based on the Atlantic Region Species Composition Survey hunter wing returns 1994-95.

A total of 68 Common Eider wings was returned from insular Newfoundland. The hunt appears to be financed by Labrador birds which are picked up first near St. Anthony. Thirty-four percent of the wing receipts were from this area. None were recorded as banded and/or from the nearby Hare Bay study area. These Labrador migrants are probably harvested along the entire east coast and in 1994-95 comprised 57 percent of the total wing receipts. Traditional sites such as St. Anthony, Fogo Island and Cape Freels contributed to most of the wing returns. Placentia, Grand Bank and Ramea were important zones for hunting along the south coast. The eastern and southern coastline is a complicated system of islands, bays, and important mussel food source, and contains at least 50 important areas used by seaducks. The west coast is more exposed, lacks the mussel food resource, and has only six sites identified as important to seaducks. Five wings all from Trout River, were from the west coast. Fifteen hunters returned eider wings of which eight contributed five or more wings or nearly eighty percent of the total returns.

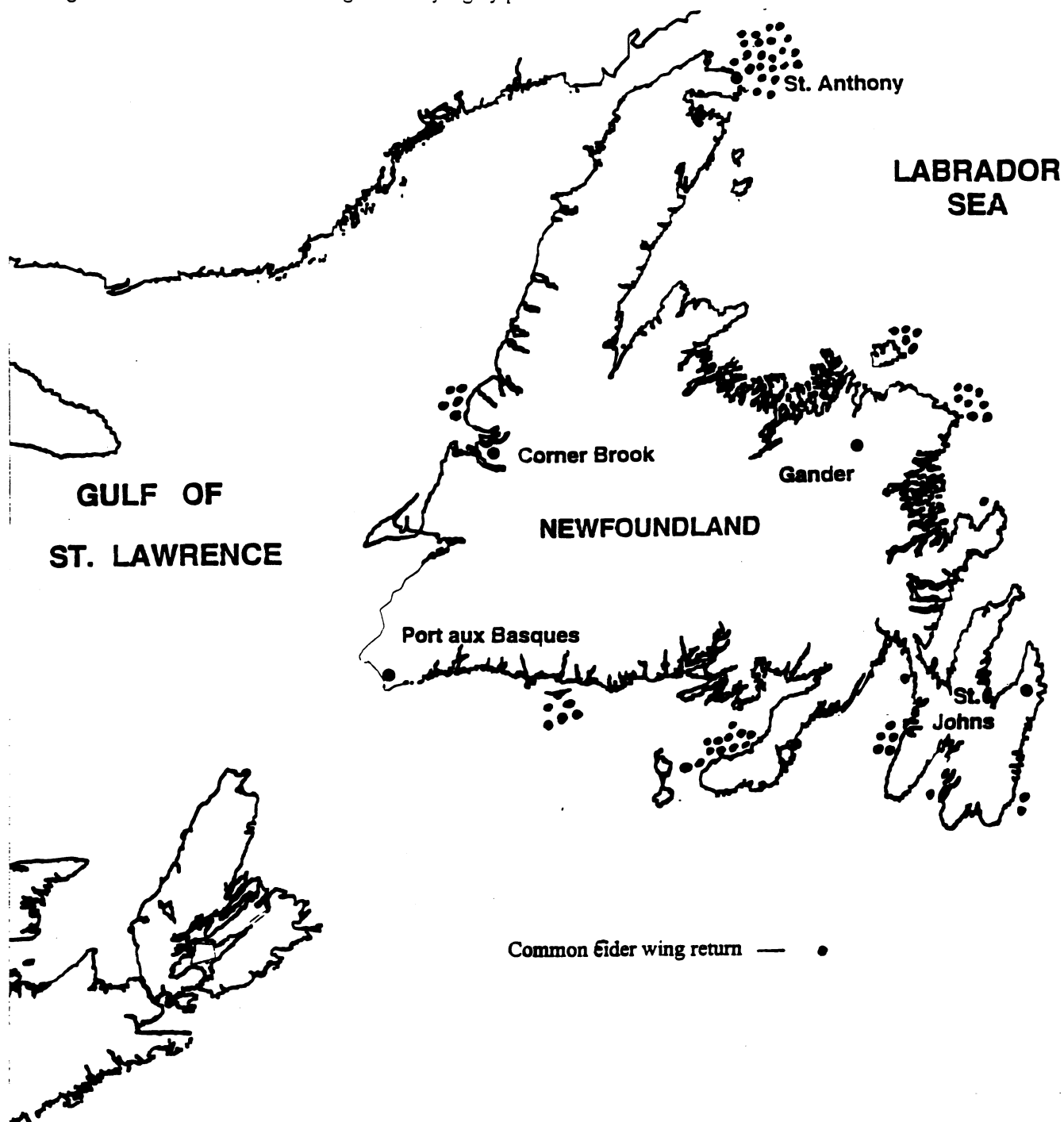


Figure 2
Species composition survey wing returns for eider in Newfoundland 1994-95.

Nine hunters contributed 19 scoter wings as part of the Atlantic Region Species Composition Survey. Five of the nine hunters responding had also submitted eider wings. Harvest patterns and population trends are impossible due to small sample size. For all of Newfoundland-Labrador, only 3 Black Scoter, 25 Surf Scoter and 0 White-wscoter wings were received.

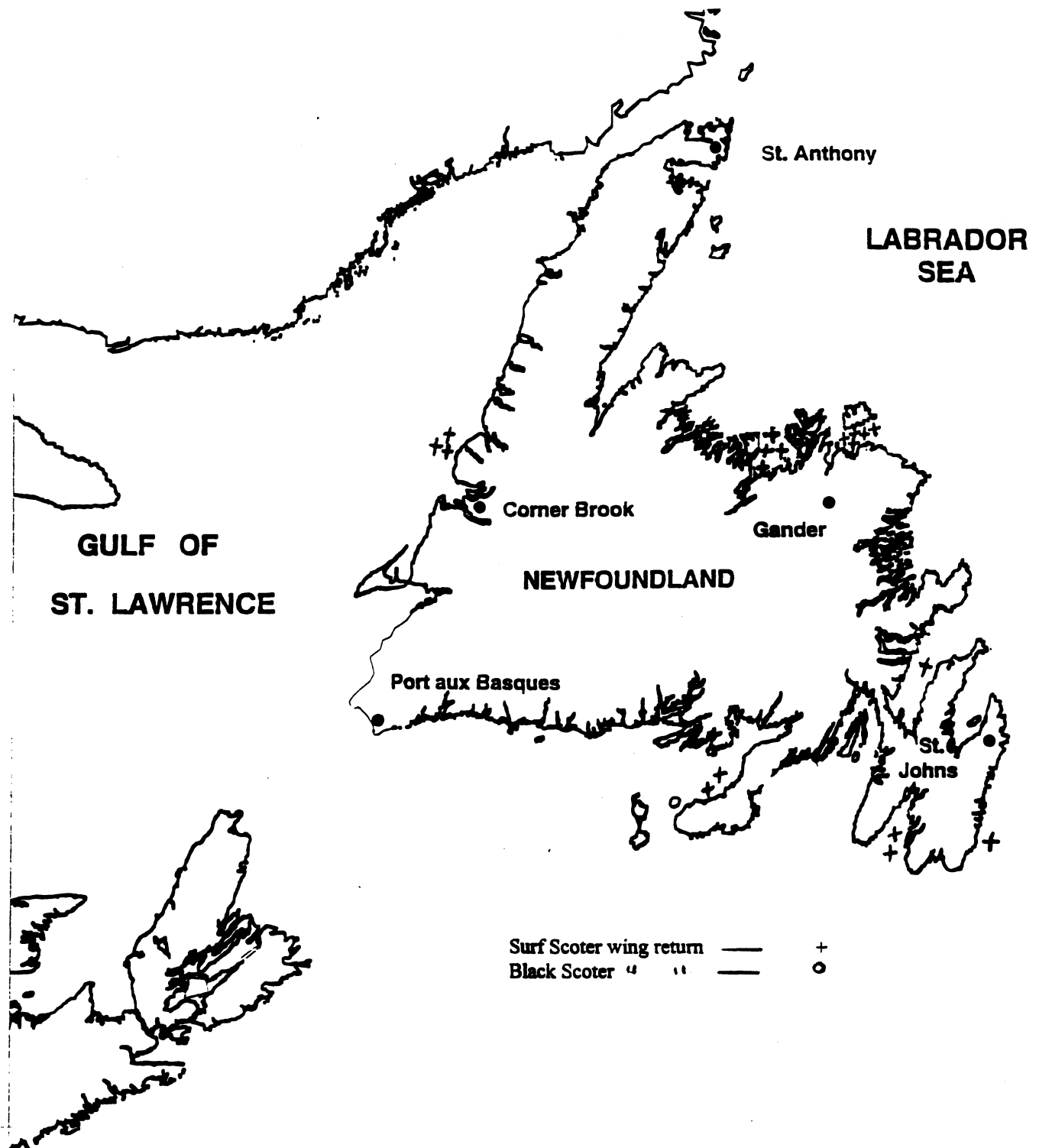


Figure 3
Species composition survey wing returns for scoter in Newfoundland 1994-95.

With the exception of one eider return from Northern New Brunswick all Maritime returns were from Southeastern Nova Scotia. Surprisingly no eider or scoter wings were received from the Fundy Zone of New Brunswick where sea duck hunting is common between Saint John and St. Andrews. No sea duck wings were returned by P.E.I. hunters although a hunt occurs here.

The total eider wing returns for Nova Scotia (77) surpassed the total for the other provincial hunts in the Atlantic Region (71). The harvest pattern is similar to the scoter species although not as defined due to less sample size. The importance of the Yarmouth Zone is again highlighted and to a lesser degree that for Halifax and Chedabucto Bay. Thirty-four percent of the Nova Scotia sea duck hunters harvested both eider and at least one of the scoter species. Fifty Nova Scotia hunters submitted sea duck wings compared to 30 from New Brunswick, Prince Edward Island and Newfoundland-Labrador.

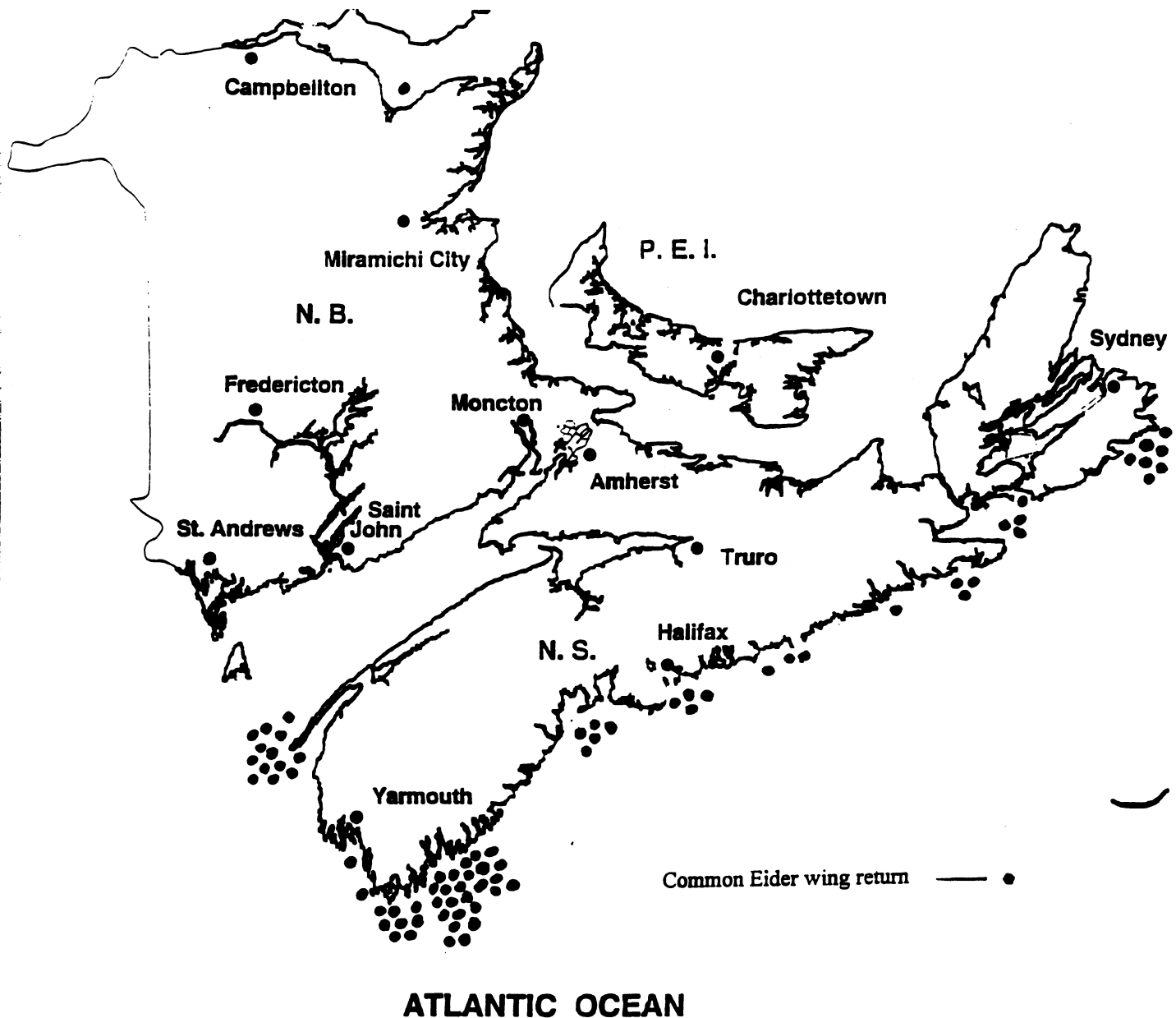


Figure 5
Species composition wing returns for eider in the Maritime Provinces
1994-95.

The focal point for Atlantic Region scoter migration and harvest appears to be the entire southeast coast of Nova Scotia between Sydney and St. Mary's Bay. Nearly five times as many scoter were returned from Nova Scotia then the entire Atlantic Region. Surf Scoter (88) were the most numerous, followed by Black Scoter (33) and White-wings (25). All three scoter species were harvested at three zones in Nova Scotia: The Outer Limits of Chedabucto Bay which includes Isle Madame and Canso, the Halifax Zone from Terence Bay to Sheet Harbour, and the Yarmouth Area between Liverpool and Yarmouth which encompasses the three traditional hunting locations of Lockeport, Shelburne and Cape Sable Island.

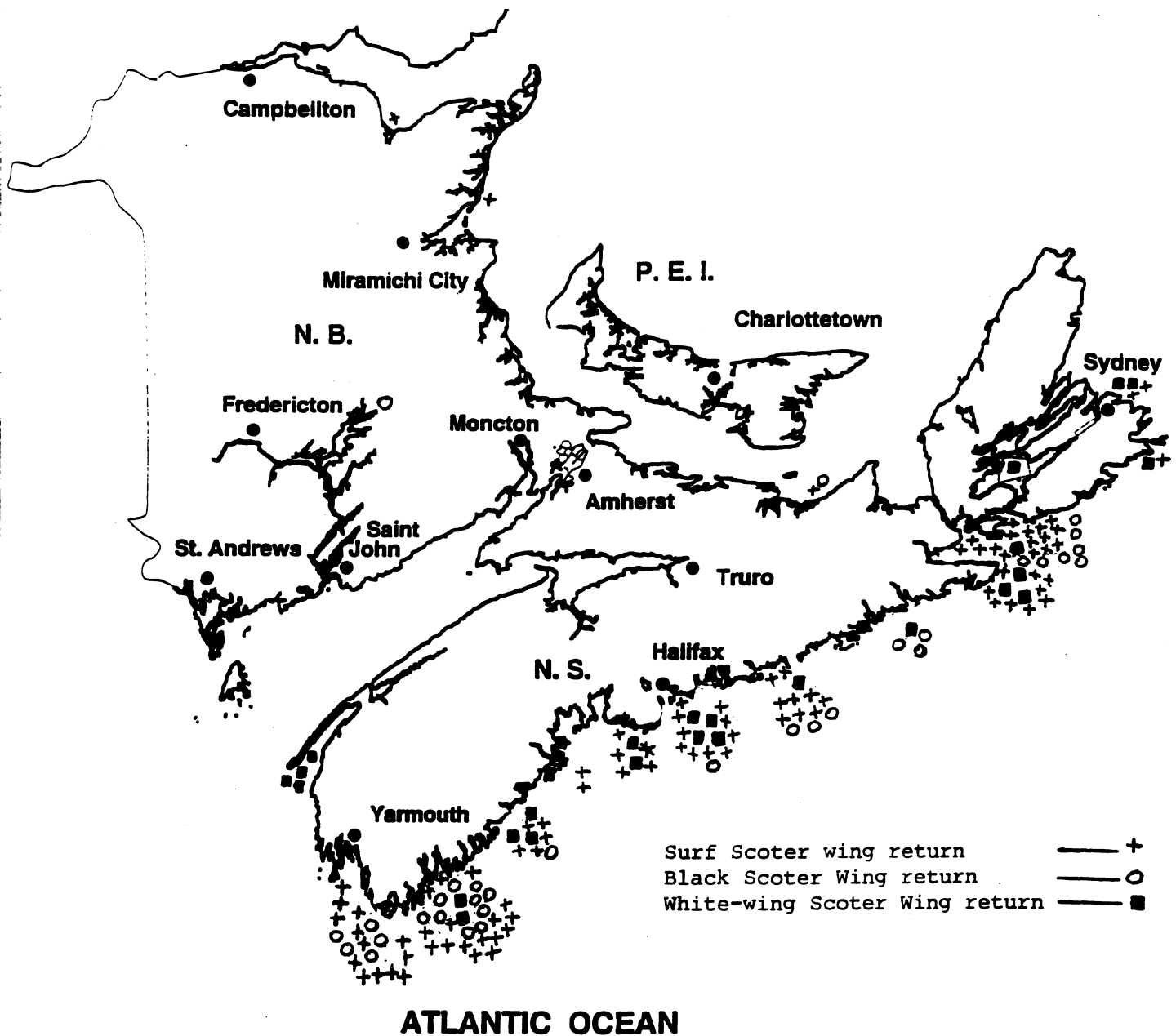


Figure 6
Species composition survey wing returns for scoter in the Maritime Provinces 1994-95.

+ 17 pages of tables
(not included)

Aerial Surveys For Sea Ducks Along The Eastern Shore of Coastal Nova Scotia 20 Sept.- 14 Dec. 1996

Introduction

Sea Ducks are difficult to work on, and for the most part have been ignored for issues such as Black Duck and Canada Goose declines, or habitat losses. Most have very complicated migratory patterns, spanning many jurisdictions and / or flyways, and frequent the most remote areas of North America. Basic knowledge on breeding, production, etc. is the least understood of all the waterfowl groups. Many factors have contributed to the sea duck biological void, but a recent awareness to population declines and increased harvest have prompted new scientific incentives. Little data on fall sea duck populations along coastal Nova Scotia are available, and a series of flights were scheduled to: (1) compliment the extensive mid-winter (Jan. & Feb. flights) inventory data base; (2) monitor migration chronology for eider and the three scoter species; (3) survey a sample of mussel aquaculture sites for sea duck depredation; and (4) to update data in the event of an environmental emergency.

Technique

Beginning on 20th Sept. and ending on 14th Dec. 1996 the entire eastern shore of Nova Scotia, between Canso and Cape Sable Island, was flown by fixed wing aircraft. Due to observation efficiency and time, it was necessary to fly the survey route in two segments; the northeast segment between Halifax and Canso, and the southwest segment from Halifax to Cape Sable Island. Each segment would take approximately five hours (1 day) to complete (figure 1). All of the surveys were flown in a Cessna 172 aircraft, by Nova Scotia Natural Resources pilot Craig Reynolds accompanied by C.W.S. technician/observer Bill Barrow. The surveys were flown at an average altitude of 120 feet and at an average speed of 100 mile / hour. The surveys could most accurately be described as an irregular line transect, which followed the outer limits of the coastal zone, and focused on the islands and shoals most frequented by sea ducks. The inland habitat such as river systems and bays were not flown, and therefore, species such as geese, goldeneye, and black ducks, would not be surveyed. All sea duck observations were recorded by numbered coastal survey blocks (see Hicklin, P.W. and Barrow, W.R. 1996 CWS Coastal Survey Blocks In Atlantic Canada). Three sorties outside the normal survey route were flown to facilitate data interpretation. Thirteen days and approximately 77 hours of flying were required to complete this field exercise.

Observations

The fall and early winter weather of 1996 was unique and is reflected in the sea duck observations for this effort. It is on record as being one of the warmest falls which included little snow or ice, few sub zero days, and warm southerly storms with high winds; all factors which would delay migration. Migrant sea ducks staged in large numbers to the northeast of Halifax where 66 percent of the total waterfowl and 98 percent of the total scoter were observed. In addition, 98 percent of the total scoter were Black Scoter; with White-w Scoter and Surf Scoter comprising only 530 of the 22,305 total scoter observed. The delayed migration, large numbers of waterfowl, and species composition, are highly unusual for this zone (pers. comm. George Boyd N.S. L. & F. technician, Peter Morash Lockeport, N.S. sea duck hunter).

Approximately 123,000 sea ducks were observed during the coastal surveys of which the Common Eider was the most numerous, and comprised 80 percent of the total (table 1). Scoter and Oldsquaw comprised respective 18 and 1 percent of the total sea duck sightings. Weather conditions, flock composition and size, and waterfowl behaviour were vital to survey results (figure 2).

The resident Nova Scotia breeding population of Common Eider was the first sea duck group to be surveyed. Survey flights were initiated during late Sept. when approximately 7,000 eider were counted. Most of the eider were brown females or immature birds, but it was interesting to note that only 1 percent of the eider in the survey section northeast of Halifax were male birds, but in the southwest segment the flocks were comprised of 40 percent eclipse male birds. Large numbers of male eider molt in this area near Lockeport, and it appears that subsequent flock dispersal remains local or possibly a more southerly migration. Overall, eider concentrations were small and exceeded 500 birds only at Port Latour, Port Joli, Clam Bay, and White Islands. No sea ducks other than Common Eider were observed on the September flights.

The second series of flights were flown near mid October, and the most obvious difference was the decline in eider numbers for southwestern Nova Scotia. Approximately 2/3 less eider (1,244- 3,900) were counted but the total for the northeastern zone remained nearly identical (3,304- 3,100). The first scoters were sighted during this second survey of 11th & 12th October.

Sea duck numbers more than doubled during the month of October. Nearly 18,000 waterfowl were recorded compared to the previous high of 7,000 birds. Eider numbers increased significantly and comprised 78 percent (14,000 birds) of the total sea duck sightings. For this late October survey eider numbers increased dramatically (1,244- 9,068) in southwestern Nova Scotia. The most notable observation was a raft of 3,700 eider near Lockeport at Ram Island, and two rafts of 1,000 eider at Rose Point, and Baccaro Point. Eider numbers increased by 2,000 birds in the northeastern section between Halifax and Canso, highlighted by a raft of 1,600 eider near Country Island, and a raft of 1,050 birds at the Bird Islands near Beaver Harbour.

Eider numbers appeared to increase less dramatically (4,000 birds) for the survey period mid Oct. to mid Nov. but total sea duck counts are now exceeding 20,000 birds. In the northeastern section between Halifax and Canso eider concentrations exceeding 1,000 birds were sighted at Country Island, Tobacco Island,

Sober Island, and Jeddore Rock. Other eider sightings included 555 at Barren Island, 455 at Halibut Island, and 465 at Egg Island. In the southwestern section of coastline, similar numbers were located at Pearl and Ram Islands, and a large concentration of 2,065 birds at Mouton Head. Other notable flocks were located at Sober Island (483 birds), Rose Point (669 birds), and at Western Head (505 birds).

The peak migration for sea ducks moving into Nova Scotia in 1996 occurred in the latter half of November (figure 3). Peak numbers of eider (35,000), and scoter (8,000) were recorded. Other indicators included large numbers of Oldsquaw, Purple Sandpipers, Harlequin Ducks, and White-w Scoters. By 30th Nov. eider numbers were still increasing in the northeast section peaking at around 25,000 birds. Those in southwestern Nova Scotia increased less dramatically to 10,000 birds. Eider concentrations in the northeast were most notable at Sambro (3,405 birds), Egg Island (3,777 birds), Taylor Head (1,337 birds), near Pumpkin Island (4,737), Bird Island (1,035 birds), White Island (1,935 birds), Tobacco Island (2,062 birds), Country Island (2,034 birds) and Canso (1,130 birds). Eider concentrations in the southwest section were less spectacular and were recorded at Prospect (740 birds), Gravel Island (560 birds), Cross Island (580 birds), West Ironbound (618 birds), Indian Island (1,960 birds), Mouton Head (1,690), and Blanche Island (639 birds). It is interesting to note, and simply points out some of the gaps in the aerial survey data base; that more data was collected on this single flight than that for the previous 30 years of aerial surveys.

By mid December eider numbers had decreased by 10,000 birds. This decrease was confined to the northeast section; but traditional sites of Canso, Country Island, Country Harbour, Tobacco Island, White Island, Bird Island, Pumpkin Island, Taylor Head, Charles Island, Egg Island and Sambro continued to hold an average of 1,286 birds. The total eider in the southwest section remained stable with smaller groups of birds dispersed throughout the zone. Larger concentrations of eider were recorded at Cross Island (1,315 birds), Indian Island (1,245 birds), Western Head (605 birds), and at Cadden and Little Joli Bays (604 birds).

Over the past thirty years of aerial surveys data for the three species of scoter was recorded as total or unknown scoter (see Hicklin, P.W. and Barrow, W.R. 1996, Early Records For Scoter Migration Along Coastal Eastern New Brunswick). This exercise would attempt to monitor scoter migration for each of the three scoter species. The scoter observations appeared to be highly unusual for the fall and early winter of 1996. Unlike the Common Eider the first scoter didn't appear in Nova Scotia until the second survey of mid Oct. In total 1,532 scoter were observed, all but eleven birds northeast of Halifax. Ninety-eight percent (1,512/1,532) were Black Scoter, a percentage which would remain constant for the entire survey exercise. The largest group (670 birds) was sighted at the Bird Islands near Beaver Harbour.

On 25 Oct. the Black Scoter numbers had doubled (1,532/3,392) that of the previous survey with only a total of 28 Surf Scoter and 15 White-w Scoter sighted. Peak numbers were located at White Island (800 birds), Bird Islands (1,050 birds), and at Egg Island (510 birds).

Scoter numbers increased by 1,200 birds (3,392/4,625) for the mid Nov. survey. Ninety-six percent of the scoter were Black Scoter, almost all from the northeast zone between Halifax and Canso. The exception was a small flock of 175 Black Scoter sighted near Mouton Head in the southwest sector. Black Scoter were recorded in large numbers at Tobacco Island (1,000 birds), Barren Island (700 birds), Bird Islands (500 birds), Taylor Head shoals (700 birds), and at Jeddore Rock (1000

birds).

All three scoter species are commonly shot by sea duck hunters in Nova Scotia (see Hicklin, P. W. and Barrow, W.R. 1996, Nova Scotia Scoter Harvest by Monthly Four Week Intervals, 1994-96 and A Summary of Atlantic Region Scoter Harvest 1981-1990). Hunter wing return data for the Atlantic Region Species Composition Survey for the previous two hunting seasons, 1994-1996 (see Barrow W.R. 1995&1996 CWS. Internal Reports) suggested that the Surf Scoter was the most important scoter numerically, and comprised nearly 60 percent of the total scoter harvest. The Surf Scoter puzzle was further complicated with the completion of the survey flights of Nov. 29 & 30. Scoter numbers peaked near the end of Nov. with large rafts sighted in the northeast zone near Sheet Harbour. Of the 8,440 scoter surveyed 96 percent were Black Scoter with only 101 birds from the southwestern zone. Large numbers of Black Scoter were encountered at Tobacco Island (3,400 birds), Halibut Island (750 birds), Bird Islands (1,200 bird), and near Pumpkin Island (2,200 birds).

By mid Dec. scoter numbers decreased by 56 percent to 4,778 birds. The species composition and area used were consistent with the previous surveys.

As noted previously and supported by regional and national surveys, the Surf Scoter is the most important scoter species taken by hunters. The harvest trend for Surf Scoter has been stable to increasing but that for Black Scoter has been a sharp decline. The absence of Surf Scoter and a seemingly over abundance of Black Scoter in this aerial survey exercise contradicts harvest survey data, however this conflicting data does support the theory of an usual year. The absence of Surf Scoter became an obsession with the flight crew and extraordinary methods were used to identify scoter concentrations. Surf Scoter appeared in such small numbers that no significant trend was apparent. Less than 50 birds were observed along the entire eastern shore of Nova Scotia. The Surf Scoter observations were even more astonishing when we consider that during the same period, and along the same coastline, Harlequin Duck numbers (75) exceeded that for Surf Scoter.

White-w Scoter numbers peaked near the end of Nov. occurring in small flocks rarely exceeding 50 birds. The one exception was a flock of 150 birds recorded in the mouth of Halifax Harbour on the two successive flights of 30th Nov. & 13th Dec. During this peak period 11 flocks of white-wings totalling 323 birds were surveyed.

Three additional surveys were flown in an attempt to locate Surf and White-w Scoter. On the 25th Oct. an off shore transect was completed between Halifax and Canso and on the 12th of Nov. the Isle Madame area of Chedabucto Bay was surveyed. No scoter were observed but one large concentration of eider was found on a previously unknown shoal near Country Island. The third flight on 28 Dec. from Yarmouth to Margaretsville on the Bay of Fundy was more successful. Hundreds of small flocks of Surf and White-w Scoter were surveyed in this zone (figure 4). Over 1,000 Surf Scoter and approximately 1500 White-w Scoter were located at the head of St Mary's Bay and along the Fundy shore Between Digby Gut and Margaretsville. No Black Scoter were sighted during this flight.

Two thousand scaup were identified at the head of St Mary's Bay and in the Annapolis Basin on 28 Dec. One other scaup sighting (125 birds) was at Barrington Bay on Nov. 30.

The Oldsquaw appeared to be the latest sea duck to migrate into the count zone. Only one small flock of 20 birds was sighted prior to the end of Nov. surveys. During these late Nov. surveys 910 oldsquaw were sighted along the eastern shore. Two weeks later in Dec. the Oldsquaw count had decreased to 209 birds. This species was dispersed throughout the entire coast and found almost always in small numbers. The largest counts for this survey was 170 birds at La Have Islands and 108 birds at New Harbour.

The endangered Harlequin Duck was first observed on the Nov. surveys. This duck is probably the most difficult sea duck to observe as most coastal surveys are from fixed wing aircraft and the basic technique is designed to observe large numbers of coastal migrants in open water. The harlequin is a small duck, almost always found in small numbers, and frequents the turbulent coastal zone along islands and shoreline where observations are very difficult. A total of 75 harlequin were observed during these surveys; all but 12 birds in the N.S. L&F Island Management Unit located approximately 25 miles east of Sheet Harbour. The observation zone is a system of islands and ledges which extends from Beaver Island northeast to Gull Ledge. Harlequin had been observed in this area previously during a helicopter survey (see Barrow, W.R. 1988, CWS. Internal Report) and during late spring eider banding efforts. Fifteen harlequin were recorded on 12th Nov; 5 at Big White Island, and 10 at Gull Ledge. Similar to the other sea duck migrants harlequin sightings increased significantly for the late Nov. flights. Forty- six birds were located on 29th Nov., 18 at Camp Island, 6 at Big White Island, and 22 at Little White Island. On 13th Dec., 2 harlequin were sighted near Beaver Island and 2 at Little White Island. Fourteen additional harlequin were observed in southwestern Nova Scotia. On 14th Dec., 6 birds were found at Harding Point and 4 at Grey Island. On 28 Dec., 4 harlequin were located on the north side of Long Island along the Bay of Fundy coastline.

Flock Behaviour

The flock behaviour or response to approaching survey aircraft was consistent throughout the exercise and actually assisted in species identification. Eider are probably the most visible because of the white males; they rarely flushed, but sometimes dive when approached. White-wing behaviour is identical to the eider as most watched very calmly as the aircraft approached. The Black Scoter almost always flushed (often within one mile) but would sometimes remain calm when in small numbers and mixed with large rafts of eider. The Surf Scoter had a somewhat nervous behaviour but they rarely flushed.. The Oldsquaw was similar to the Black Scoter and would most always dive or flush in response to an approaching aircraft. Harlequin are similar to Oldsquaw in response but are more difficult to identify due to size and habitat preference. Similar to Black Scoter Harlequin sometimes will sit calmly when mixed with eider. Small numbers of Goldeneye and Red- breasted Merganser were sighted due to surveys technique. These two species frequent the same habitat and always flush ahead of the aircraft making identification at a distance difficult. The Scaup, when approached, would most always remain calm, seldom dove, but if flushed travelled only a short distance.

Blue Mussel Depredation

Sea Ducks feed extensively on wild blue mussels and the potential for conflict with mussel aquaculture growers is increasing with this industry. In 1995, aerial surveys along coastal P.E.I. & N.B. (see Hicklin, P.W. and Barrow, W.R.1996, Numbers of Sea Ducks along the North Shore of Prince Edward Island and Northeastern New Brunswick) suggested that scoter oldsquaw and scaup depredated mussel aquaculture sites. Only the Common Eider was observed on similiar sites in Nova Scotia. Eight mussel aquaculture sites located within the survey zone were surveyed for sea duck depredation (figure 1). Three sites were located in the northeastern zone, at Whitehaven Harbour, Wine Harbour and Ship Harbour. The mussel leases within the southwestern zone were located at Tancook Island, Snake Island, Mahone Harbour, Lunenburg Harbour, and Barrington Bay. Observations at the Wine Harbour lease site were quite remarkable in that eider were observed on it for six consecutive flights. Fifteen eider were sighted there on the 20th Sept. flight and utilization increased to 150 birds for the late Nov. and mid Dec. flights. One lone eider was found at Whitehaven with no observations at the other sites. The potential for sea duck depredation in Nova Scotia is incredible however all of the leases are located in protected bays or harbours, isolated from the migratory corridors and seemingly unlimited natural food resource.

Acknowledgements

We thank the *Nova Scotia Department of Natural Resources* who released pilot Craig Reynolds for these survey flights. Also, the flexibility in scheduling aircraft by the *Shearwater Flying Club* was appreciated.

We are truly indebted to *Pilot Craig Reynolds* who did everything except write this report. His expertise in flying, understanding coastal work with its unique flight characteristics and weather systems, and his knack to find and identify sea ducks contributed significantly to this survey. Craig worked parts of six weekends for this survey, and in addition maintained his job, renovated his home, and thankfully kept the mid air collisions at a minimum. Best of luck to Craig and Sherry with their new arrival.

Bill Barrow, Peter Hicklin
Internal Report, CWS. Sackville N.B.
13 Dec. 1996

Footnote:

A preliminary sort of the hunter wing returns for the 1996-97 Atlantic Provinces Species Composition Survey indicates that the total sea duck kill may be down by 50 percent. To date only 131 eider and scoter wings have been processed compared to the previous two year average of 325 wings. All three scoter species were harvested in 1996 but to date only 30 wings have been sorted compared to the two year average of 140 wings. Sea duck hunting pressure appeared to be low for Nova Scotia in 1996. During 13 days of coastal flying, half of which were on Saturdays, only 6 hunting parties were observed.

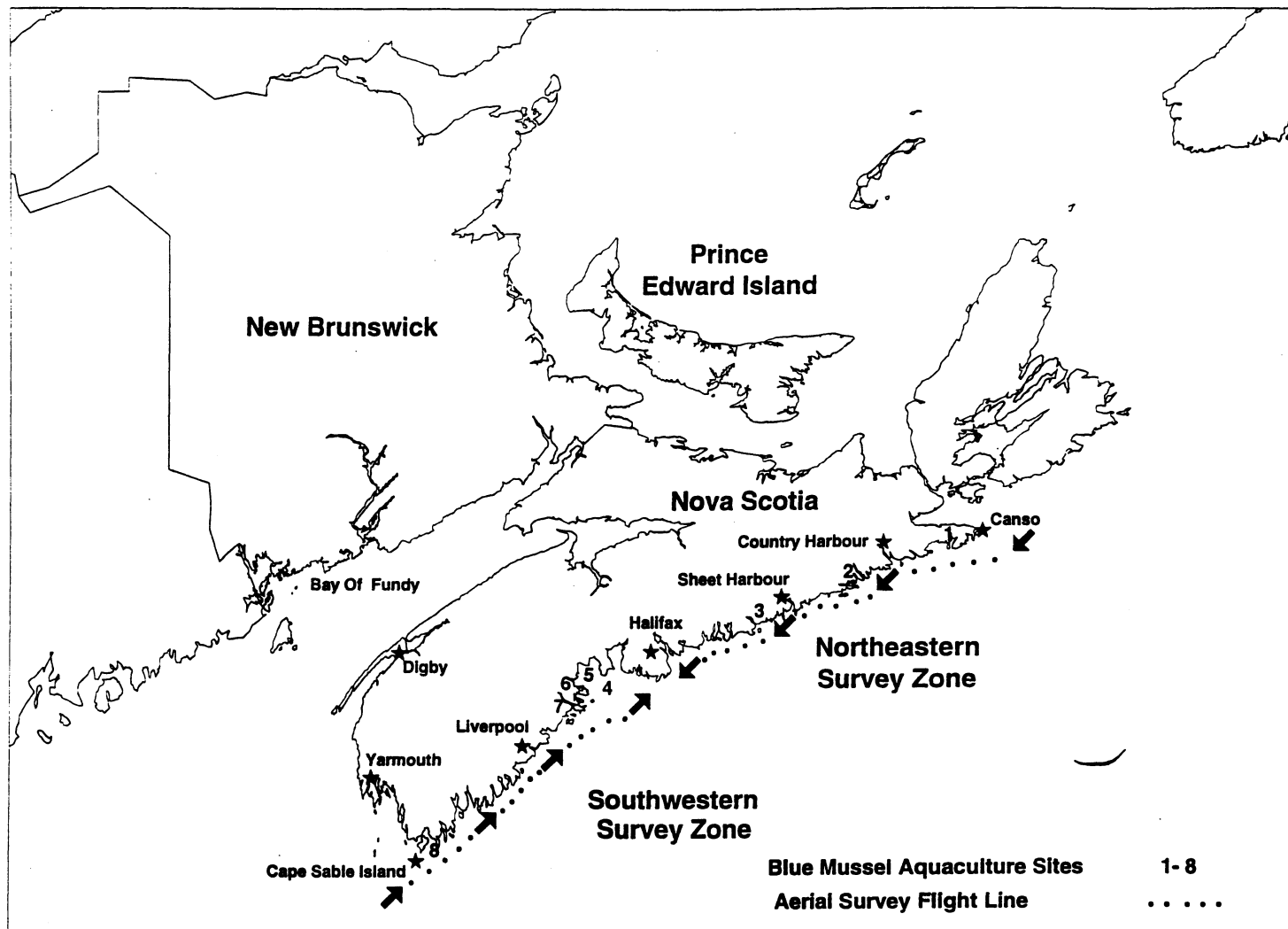


Figure 1 Coastal division for the twelve Nova Scotia aerial surveys flown from 20 September - 14 December, 1996.

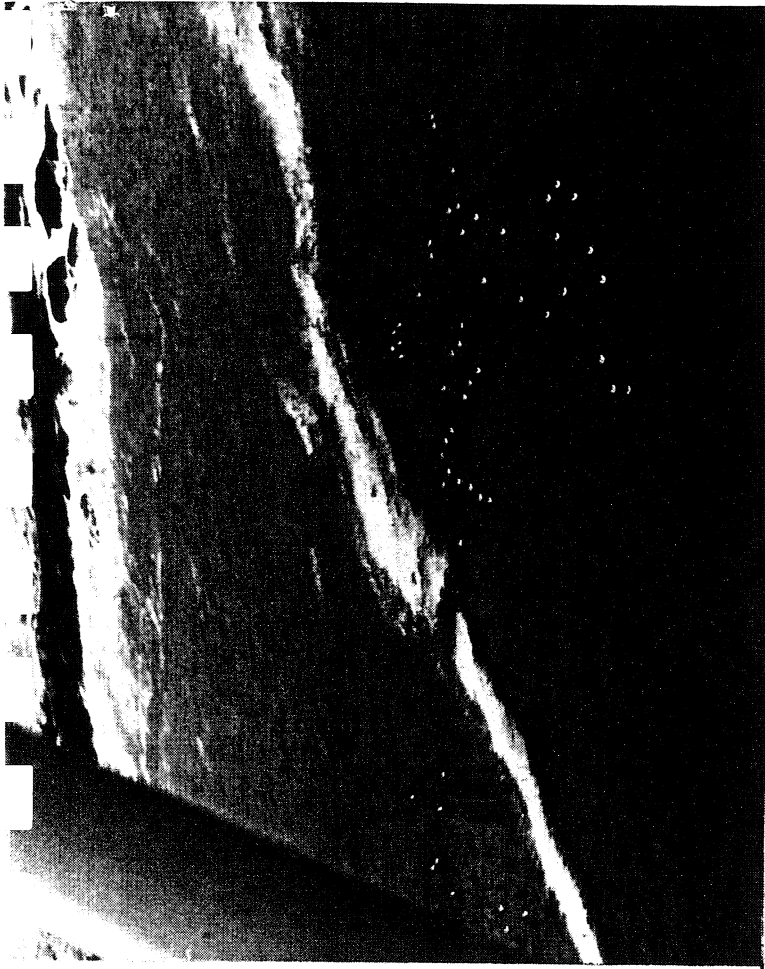
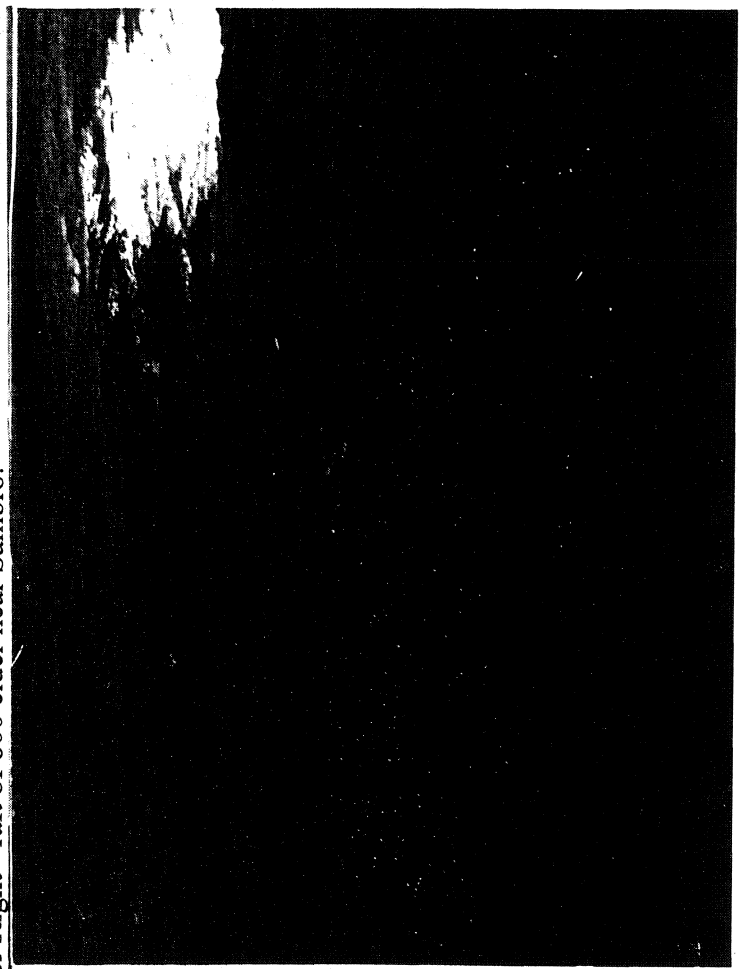
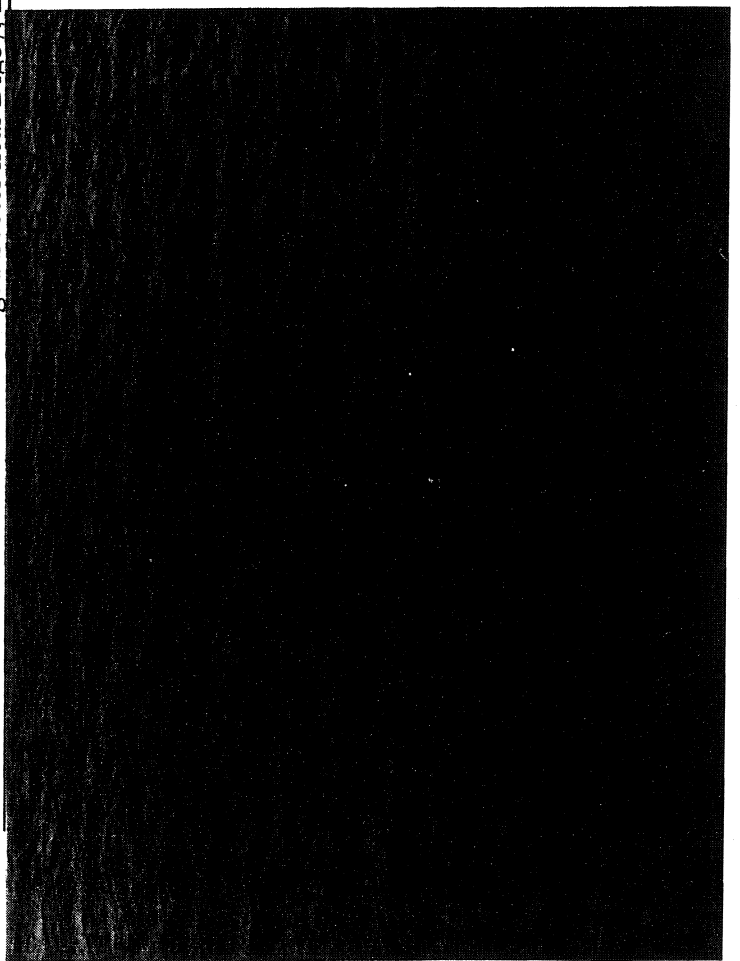
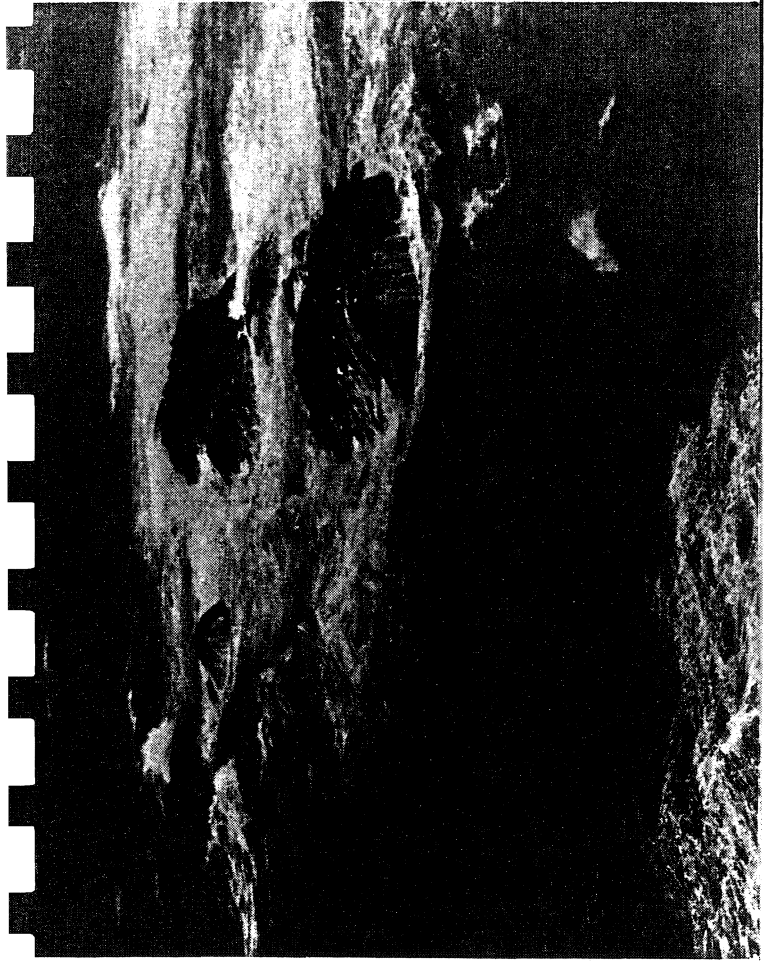


Fig. 2. Typical scenes for the eastern shore of Nova Scotia; Upper Left - rough coastal water, Upper Right - 200 eider
Lower Left - Surf and White-winged Scoter near Digby, Lower Right - raft of 800 eider near Sambro.



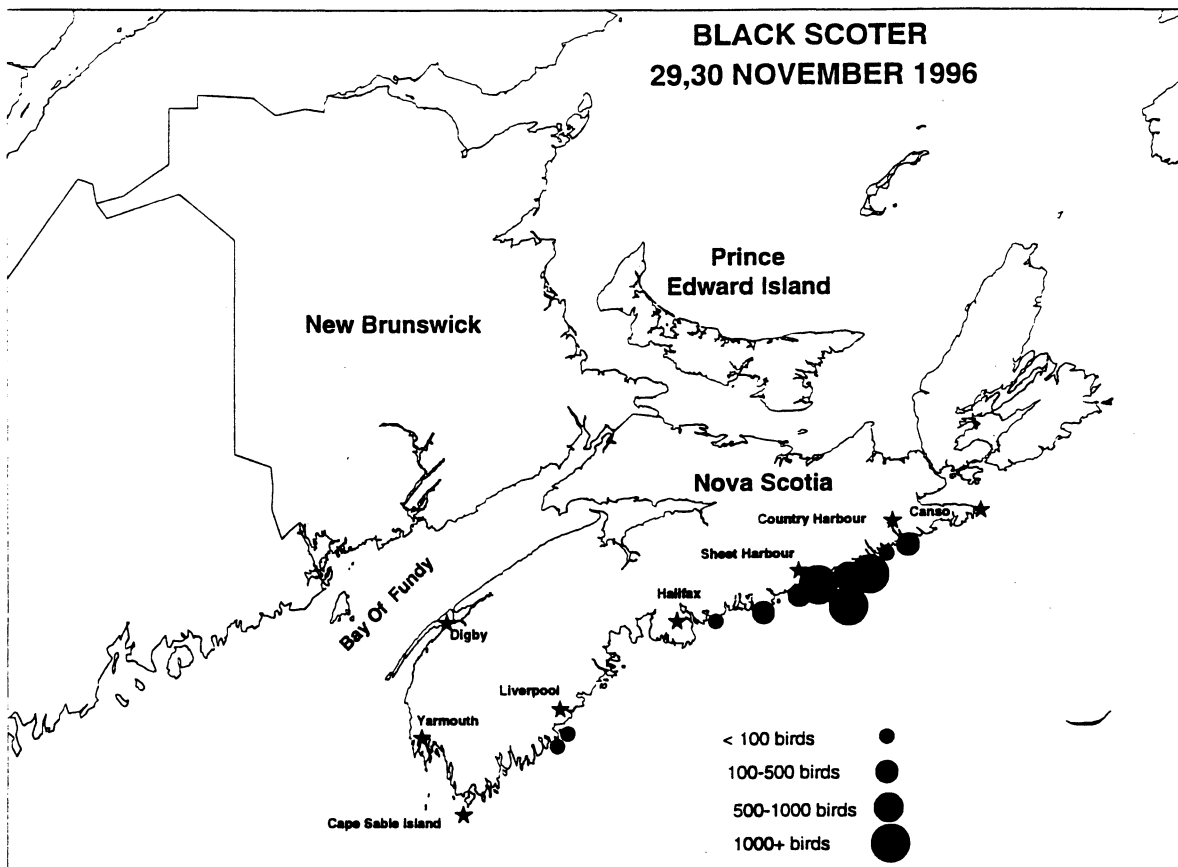
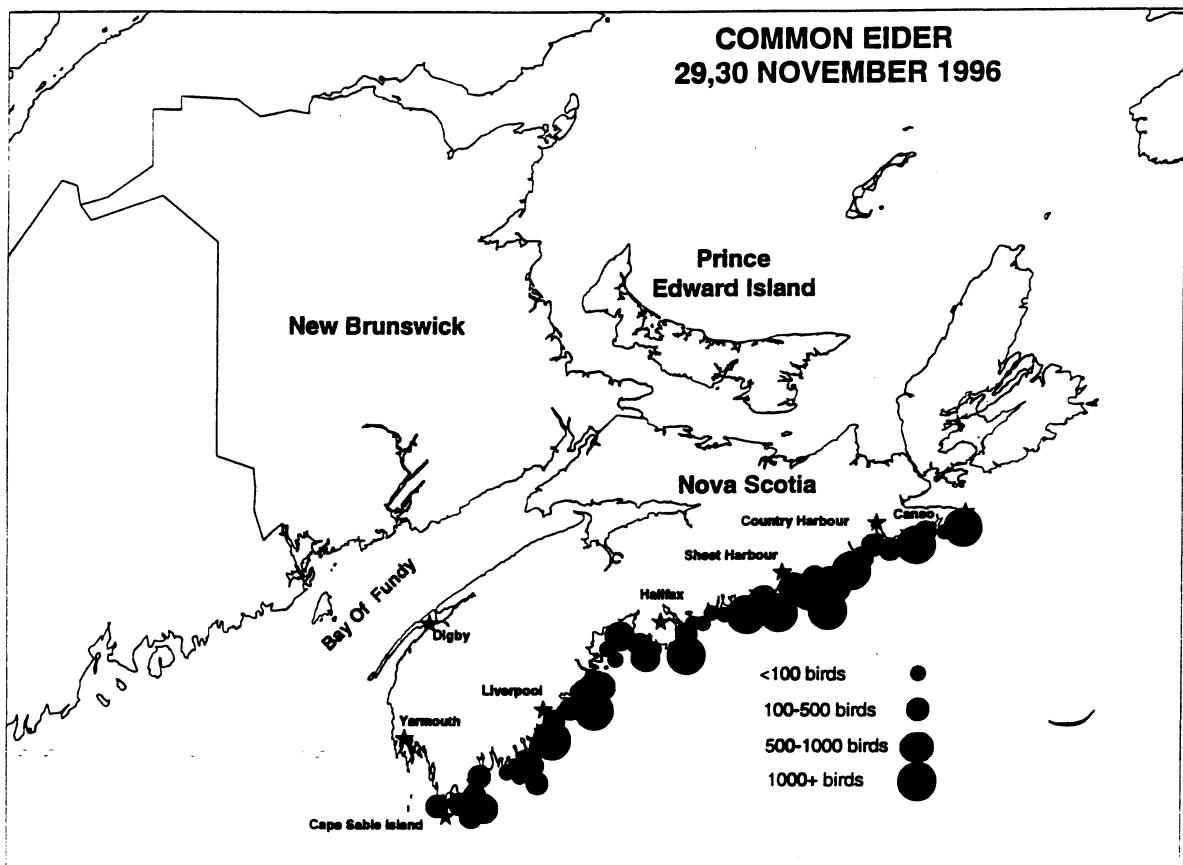


Figure 3 Peak Black Scoter and Common Eider concentrations observed along the east coast of Nova Scotia during the late November Flight.



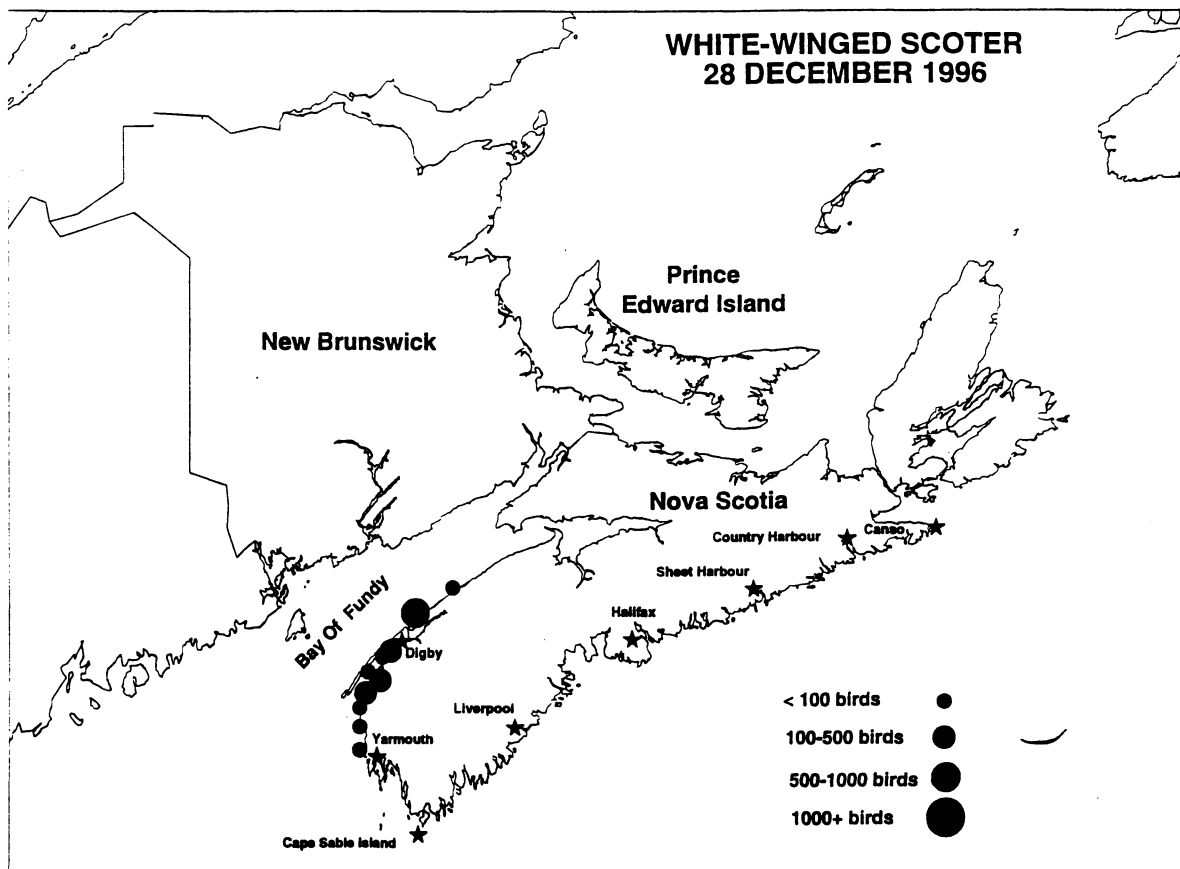


Figure 4 White-winged Scoter and Surf Scoter concentrations located during the special late December Flight.

