

A case for concern: The eastern population of Barrow's Goldeneye

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Abstract

Data on the eastern population of Barrow's Goldeneye *Bucephala islandica* are scant. Breeding has not been confirmed in eastern Canada, but recent pair surveys on the Laurentian plateau, along the north shore of the St. Lawrence estuary, suggest the possibility of breeding there. Groups of males have been reported at the mouth of some of the inlets of the northeastern Labrador coast, indicating possible moulting locations for drakes. Information on winter distribution indicates the concentration of several hundred birds in the St. Lawrence estuary, a few hundred around Anticosti Island, and small numbers in the Maritimes and eastern coastal United States. No reliable data exist on population trend or size, except to indicate that goldeneyes, as a group, are declining in the east. Harvest rate data are unreliable owing to small sample sizes. Best estimates suggest that the population may be around 3000–4000 birds. Our poor state of knowledge, combined with hunting pressure and logging operations on potential breeding areas, is cause for concern for the continued existence of this population. Research and conservation efforts are urgently needed.

Résumé

Les données sur la population de Garrots d'Islande (*Bucephala islandica*) de l'Est sont rares. Leur reproduction n'a pas été confirmée dans l'est du pays, mais de récents relevés de couples dans le plateau laurentien, sur la côte nord de l'estuaire du Saint-Laurent indiquent la présence possible d'aires de reproduction en ces lieux. On a observé des groupes de mâles à l'embouchure de certains bras de mer du nord-est de la côte du Labrador indiquant des lieux de mue possibles pour ceux-ci. Les renseignements disponibles sur leur distribution hivernale indiquent la concentration de plusieurs centaines d'oiseaux à l'estuaire du Saint-Laurent, de quelques centaines aux environs de l'île Anticosti, et d'un petit nombre dans les Maritimes et sur la côte est des États-Unis. Il n'existe aucune donnée fiable sur les tendances ou la taille de la population, sauf pour indiquer une diminution globale des garrots dans l'Est. Les données relatives au taux de prises ne sont pas concluantes en raison de la petite taille des échantillons. Les évaluations les plus crédibles fixent entre 3000 et 4000 le nombre de ces oiseaux. L'état lacunaire de nos connaissances, combiné à la pression exercée par la chasse et l'exploitation forestière sur les aires

de reproduction possibles est un sujet préoccupant pour l'existence de cette population. Des efforts de recherche et de conservation sont nécessaires et urgents.

1.0 Introduction

Barrow's Goldeneye *Bucephala islandica* has an unusual distribution that mirrors, to some extent, that of the Harlequin Duck *Histrionicus histrionicus* (Palmer 1976). The core (>70%) of the population breeds and winters west of the Rocky Mountains, with two small populations in the east: one in Iceland, estimated at 800 pairs by Bardarson (1987) but at only 600–1200 birds by Rose and Scott (1997), and the other in eastern North America (Savard 1987). The status and size of the eastern population are poorly known. This may be cause for concern in view of the traditional hunting activities in the wintering range of the species in Canada and the United States. This is emphasized by the recent increase in hunting of sea ducks in the eastern United States (U.S. Fish and Wildlife Service 1993) and the apparent decrease in goldeneye numbers in the Atlantic flyway (Serie 1993; Dubovsky et al. 1995). Whereas recent attention has been devoted to Harlequin Ducks, following their listing as an endangered species (Goudie 1989; World Wildlife Fund 1995), little concern has been voiced for Barrow's Goldeneye in eastern North America. The species was not even classified as "vulnerable" in a recent publication on the threatened birds of Quebec, likely because of lack of information (Robert 1989). There are serious questions that need to be addressed. For example, will Barrow's Goldeneye fall into the gaps of our waterfowl management system or those of the existing endangered species program? Do existing data suggest that we should be concerned about this species? In this paper, we briefly review what is known about the eastern population of Barrow's Goldeneye and identify urgent research and management needs.

2.0 Distribution

2.1 Breeding

There is no confirmed breeding record of Barrow's Goldeneye in eastern North America (Erskine 1992; Savard 1995). However, recent inventories conducted in Quebec by the Canadian Wildlife Service along the north shore of the St. Lawrence River revealed the presence of several pairs on

interior lakes at the time of initiation of the breeding season (Fig. 1, Table 1). Therefore, this vast area should be considered as a probable nesting area for part of the eastern population. Also, several pairs were seen north of Charlevoix county in small lakes located at high altitude (Savard 1995). Most pairs were seen on small lakes (10 ha) and rarely with Common Goldeneye *Bucephala clangula* pairs (D. Bordage, unpubl. data). The use of small lakes is consistent with what is known of the western population (Savard 1984, 1987).

2.2 Moulting locations

Moulting Barrow's and Common goldeneye drakes have been reported in inlets of the Labrador coast, especially between Makkovik and Rama Bay (Gilchrist and Chamberlain 1955; Lock 1986; Goudie et al. 1994; P. Linegar, unpubl. data). In 1994, S. Gilliland (unpubl. data) reported 45 Barrow's Goldeneyes in Hebron Fjord and Primo Inlet, 132 in Rama Bay, and 37 in Rowsell Bay; he surveyed only eight of the major inlets. In 1954, 1500 moulting goldeneyes were seen near Nain, of which 50% may have been Barrow's Goldeneyes (P. Linegar, unpubl. data). The exact proportion of Barrow's Goldeneyes moulting along the Labrador coast is still unclear. However, one adult drake banded while moulting there in 1955 was shot 14 years later, in 1968, in Quebec close to the St. Lawrence estuary (Fig. 2). This suggests that birds moulting in Labrador are likely birds from eastern Canada and not from Iceland or Greenland. On 8-9 June 1976, aerial surveys revealed the presence of several small groups of male goldeneyes, totalling 932 birds, along the shores of Anticosti Island. One group of 352 birds was mostly Barrow's Goldeneye (P. Dupuis, unpubl. data). Whether those birds were nonbreeders or postbreeding males on, or moving to, their moulting sites is not known. Clearly, more surveys are needed to elucidate the use of the waters around Anticosti Island by Barrow's Goldeneye.

2.3 Winter distribution

The winter distribution of Barrow's Goldeneye is quite patchy and still clouded in uncertainties (Reed and Bourget 1977; Savard 1987, 1990). Within the St. Lawrence estuary, only two localities harbour significant numbers of wintering Barrow's Goldeneye: Baie-des-Rochers and Baie-Comeau (Savard 1990) (Fig. 3). In 1987 and 1988, numbers near Baie-Comeau ranged between 100 and 500 birds. The group of 500 birds observed on 3 January 1988 was composed of 300 males, 160 females, and 40 subadults. During the same period, numbers in Baie-des-Rochers ranged between 100 and 465 birds. The group of 465 birds was composed of 236 males and 229 females (including subadults). Two other areas are known to support Barrow's Goldeneyes in winter — the coastline near the Forillon National Park, where 185 birds were counted during the 1994-1995 Christmas Bird Count (LeBarron 1995), and Percé, where 148 birds were seen during the 1995-1996 count (LeBarron 1996). Both of these locations are on the Gaspé Peninsula (Table 2).

An aerial survey of the St. Lawrence estuary, the Gulf of St. Lawrence, Anticosti Island, and Gaspé Peninsula in 1976 and 1980 (P. Dupuis and A. Bourget, unpubl. data) indicated that most wintering goldeneyes are concentrated within the estuary, with a few flocks around Anticosti Island

(Dupuis 1976) (Table 3). It is nearly impossible to properly separate the two species of goldeneye from an aircraft at a distance. Because of their aircraft shyness, goldeneyes often flush early, well in front of the aircraft. This shyness, compounded by the large size of flocks, makes identification difficult. In 1976, special efforts were made to identify goldeneyes to species within the St. Lawrence system (Table 3). Within the estuary, where flocks are larger, only 27% of goldeneyes seen were identified to species. Among the birds identified ($n = 2458$), 57% were Barrow's Goldeneyes. This figure may be misleading, as most large flocks of goldeneyes, which are the hardest to properly identify to species, are all Common Goldeneyes (Savard 1990). Also, there is some indication that Common Goldeneyes take off more readily than Barrow's Goldeneyes at the approach of an airplane. The data suggest a greater proportion of Barrow's Goldeneye relative to Common Goldeneye in the Gulf of St. Lawrence (Table 3). However, this area supports many fewer goldeneyes than the estuary (Table 3).

Since the reviews of Hasbrouck (1944) and Griscom (1945), little has been added on the distribution and abundance of Barrow's Goldeneye in the eastern United States. Christmas Bird Count results do not indicate any major wintering concentrations (50 birds and more) in the United States or the Maritime provinces (LeBarron 1992, 1993, 1994, 1995, 1996, 1997). However, given the highly clumped distribution of the species and its apparent specialized habitat, it is possible that a few important wintering concentrations may have been overlooked.

3.0 Population size and trends

In the St. Lawrence estuary, comparisons of winter surveys of goldeneyes suggest a decline in the number of wintering birds (Table 4). Because of the inherent variability of these types of surveys, caution is required in interpreting these data. It is quite likely, however, that there has not been an increase. This is supported by an apparent decline in the number of migrating goldeneyes in the fall along the south shore of the St. Lawrence estuary (P. Dupuis, A. Bourget, and L. Breton, unpubl. data).

Estimates of the wintering population of Barrow's Goldeneye vary according to the ratio of Common to Barrow's used. An optimistic (assuming the 1976 ratios are accurate) estimate yields 5214 in the estuary, 1384 in the gulf, and 275 in Gaspésie, for a total of 6873 birds in 1976 (Table 3). However, as discussed above, besides being highly unreliable, given the large number of unidentified goldeneyes (73% in the estuary and 46% in the gulf), the 1976 species ratio in the St. Lawrence estuary is likely biased towards Barrow's Goldeneye. Winter ground surveys in the estuary yielded a ratio of 14-27 Barrow's for every 100 Common (Table 5), which is probably a more accurate ratio. With a ratio of 14%, the 1976 wintering population becomes 3443 birds, and with a ratio of 30%, 4634 birds for the estuary and gulf of St. Lawrence combined.

Over time, for the estuary between Baie-Saint-Paul and Les Escoumins, using a 30% species ratio, one can calculate 2089 Barrow's in 1976, 1348 in 1988, and 760 in 1994. This, of course, assumes an equal decline of both species and an equal performance of the aerial observers over these years, which are both unlikely. What seems clear is that

Figure 1
Location of probable breeding pairs of Barrow's Goldeneye seen between 1990 and 1995 in May and June

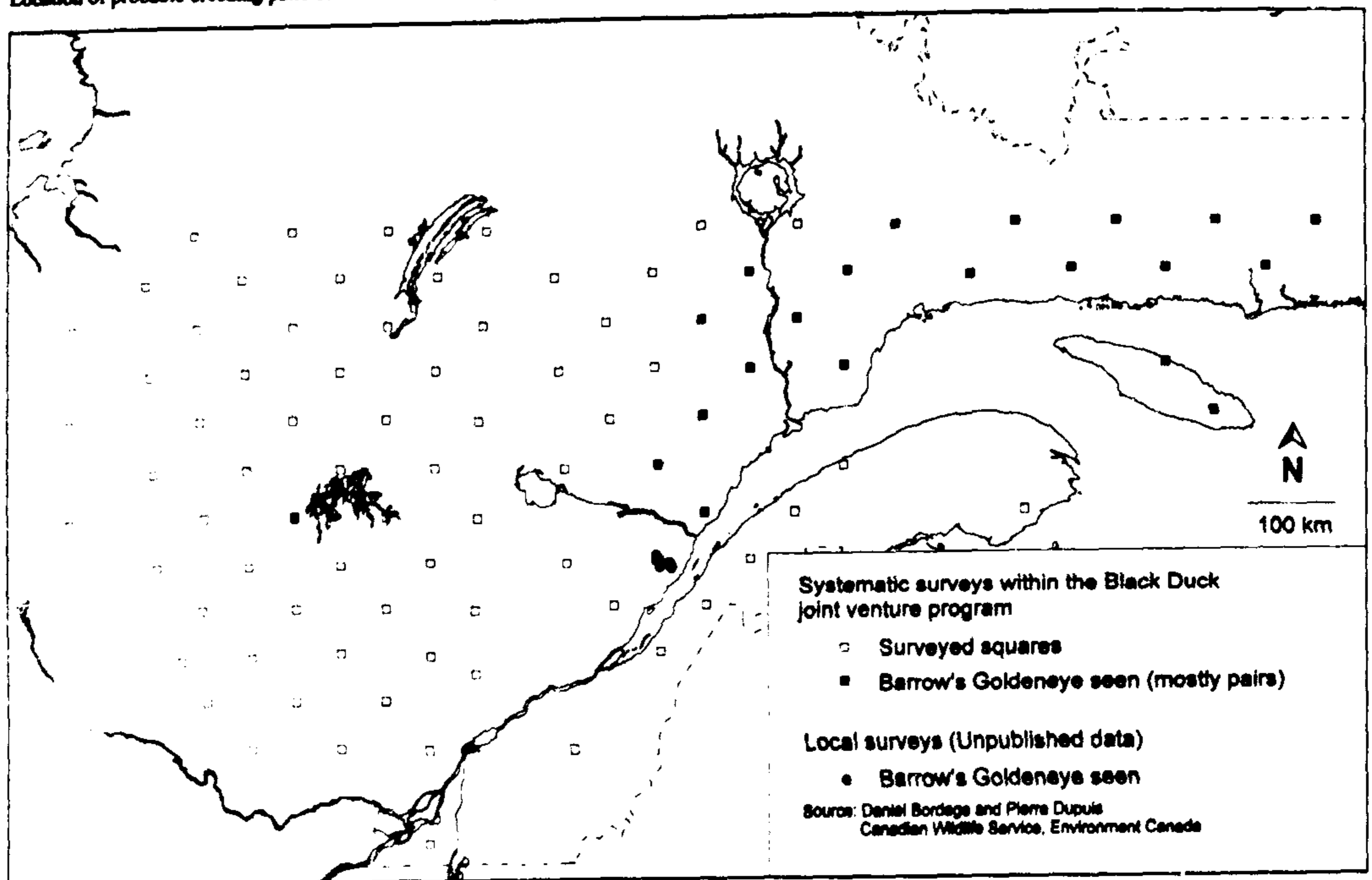


Table 1
Observation of breeding pairs of Barrow's Goldeneye in Quebec^a

Quadrat ^b no.	UTM East	UTM North	1990	1991	1992	1993	1994 ^c	1995 ^c
22								2M 1F ^d
26	457800	5352500	2M 1F			X ^e	X	X
29	452800	5356100			2F	X	X	X
36	407900	5401300		2M 2F	9M 11F			1M 1F
43	451900	4543100			1M 1F	X	X	X
44	553200	5454000			1M 1F	X	X	X
51	504800	5501100	3M 2F	4M 2F			1M 1F	
52	604400	5504500	2M 1F	5M 5F		2M 1F		X
59	451100	5551000			2M	X	X	X
60	550300	5554900	3M 2F	3M 2F		X	X	X
67	500600	5603800			1M 1F			
68	601200	5608100			3M 1F	4M 3F		
69	309100	5608400		3M 3F		5M 2F		
70	401000	5607200	2M 2F	7M 6F	6M 3F			
71	505200	5609900		6M 4F				
72	603200	5603300		1M	6M 3F	1M		
79	653900	5653300	2M 2F	4M 4F	2M 1F	X	X	X
80	350000	5657200		3M 4F	2M 2F	X	X	X
81	458800	5652800	1M 1F	1M	1M 1F	X	X	X
82	554200	5658800			1M 1F	X	X	X
83	657900	5659700		1M 1F		X	X	X
96	505800	5506800	X	X	X	1M 1F	X	X

^a From D. Borgege (unpubl. data).

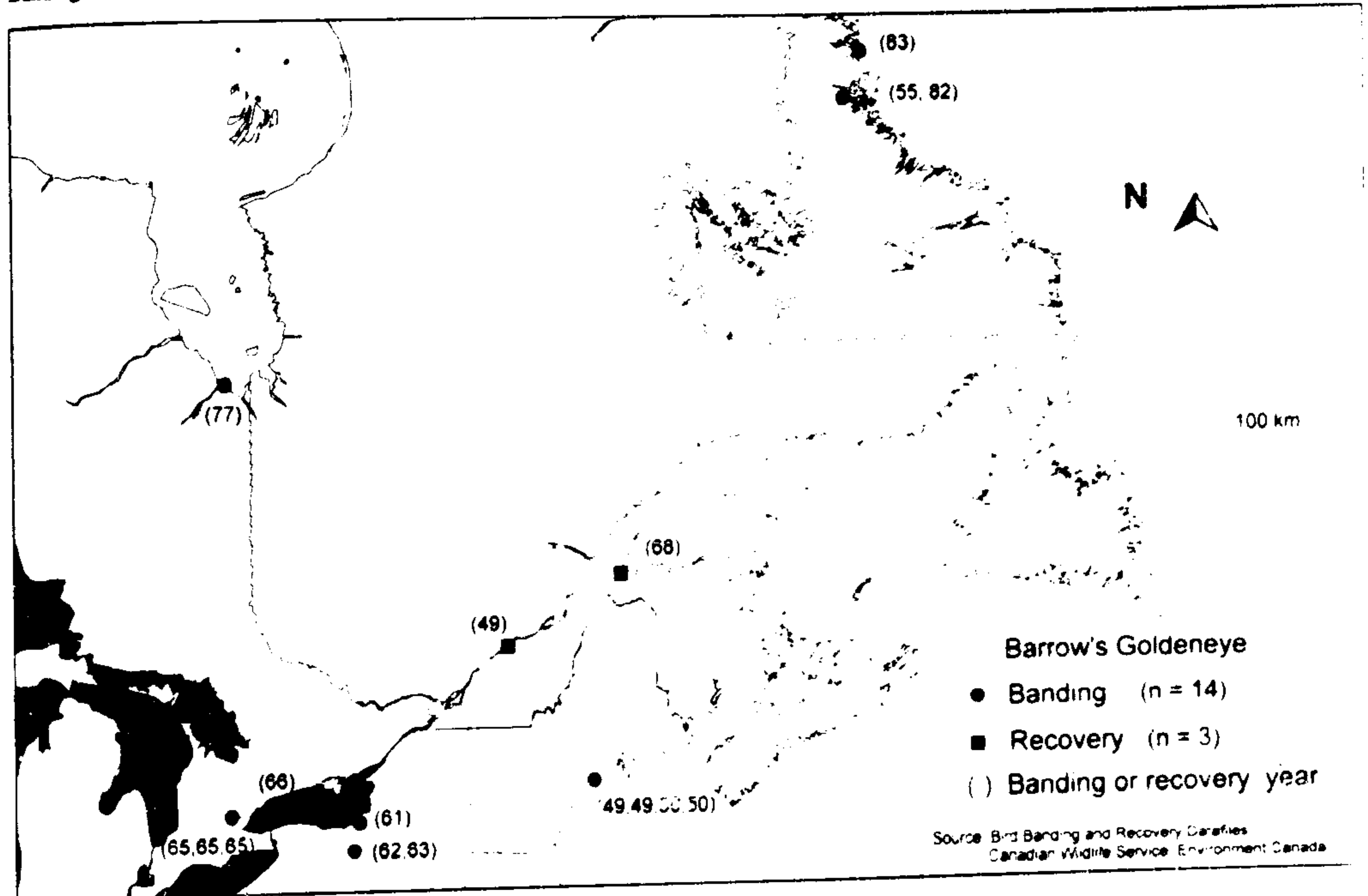
^b Each quadrat is 10 × 10 km.

^c Observers not as efficient in separating the two goldeneye species.

^d M = male; F = female.

^e Not surveyed.

Figure 2
Banding recoveries of Barrow's Goldeneye in eastern North America



the population is certainly not large. Clearly, better and more comprehensive winter surveys are required to better refine our estimates.

4.0 Hunting pressure

Barrow's Goldeneyes are hunted locally on the east coast, and an unknown number of individuals are killed each year (Lehoux et al. 1985). Localized concentrations of Barrow's Goldeneye are reflected by the rarity of Barrow's Goldeneye decoys in Quebec. The few decoys found were mostly from the Tadoussac area, with a few from Maritime Canada (P. Dupuis and A. Bourget, pers. commun.).

Between 1968 and 1993, 223 wings were returned by Quebec hunters in the National Waterfowl Harvest Survey (Cooch et al. 1978). The annual number of wings returned each year is too low to determine adequately the number of Barrow's Goldeneye harvested. Most birds were killed in October and November, and the proportion of adults in the kill increased from September to December (Fig. 4). The geographical distribution of the kill reflects to some extent the presumed breeding distribution as well as the wintering distribution, with one important difference: the regular presence of Barrow's Goldeneye in the upper St. Lawrence and in the Montreal area (29% of wings received) (Figs. 5-7). Barrow's Goldeneyes are not sighted in any great numbers in that sector (Savard 1990), but they show up regularly in the Composition Harvest Survey of that area. Their underrepresentation in regular bird sightings is likely due to the difficulty of differentiating adult female and

immature Barrow's Goldeneyes from Common Goldeneyes in the fall. Most adult males were killed in October and November throughout the St. Lawrence estuary (Fig. 5); however, as adult males are considered trophy birds by waterfowlers elsewhere, they may not show up as they should in the Composition Harvest Survey. Proportionally more adult females than males were killed in September, but most females were killed in November. Some of the females killed inland may indicate possible fall staging areas or breeding areas (Fig. 6). Most young were killed in November, and inland kills may reflect breeding areas (Fig. 7). Adults and young killed were similarly distributed throughout the St. Lawrence.

In contrast to the situation with Common Goldeneye more Barrow's Goldeneyes are killed in the St. Lawrence estuary (71%) than in the upper St. Lawrence River (Fig. 8). Also, proportionally more adult Barrow's than Common Goldeneye are killed (Fig. 8). This is a cause for concern, as the low and localized hunting pressure has remained more or less stable in the St. Lawrence estuary, while decreasing by nearly 30% in the upper St. Lawrence (Fig. 9). In eastern Canada, most Barrow's Goldeneyes are harvested in Quebec (65%) and New Brunswick (20%), with the remaining harvest distributed among Nova Scotia (8%), Newfoundland (5%), and Prince Edward Island (2%) (n = 325 wings from 1969 to 1993). Based on the 223 wings received from Quebec, more immatures (57%) were killed than adults (43%); among adults, an equal proportion of males (48%) and females (52%) were killed. The situation is quite different in New Brunswick and Nova Scotia, with only 28%

Figure 3
Location of wintering concentrations of Barrow's Goldeneye and aerial survey sections within the St. Lawrence estuary

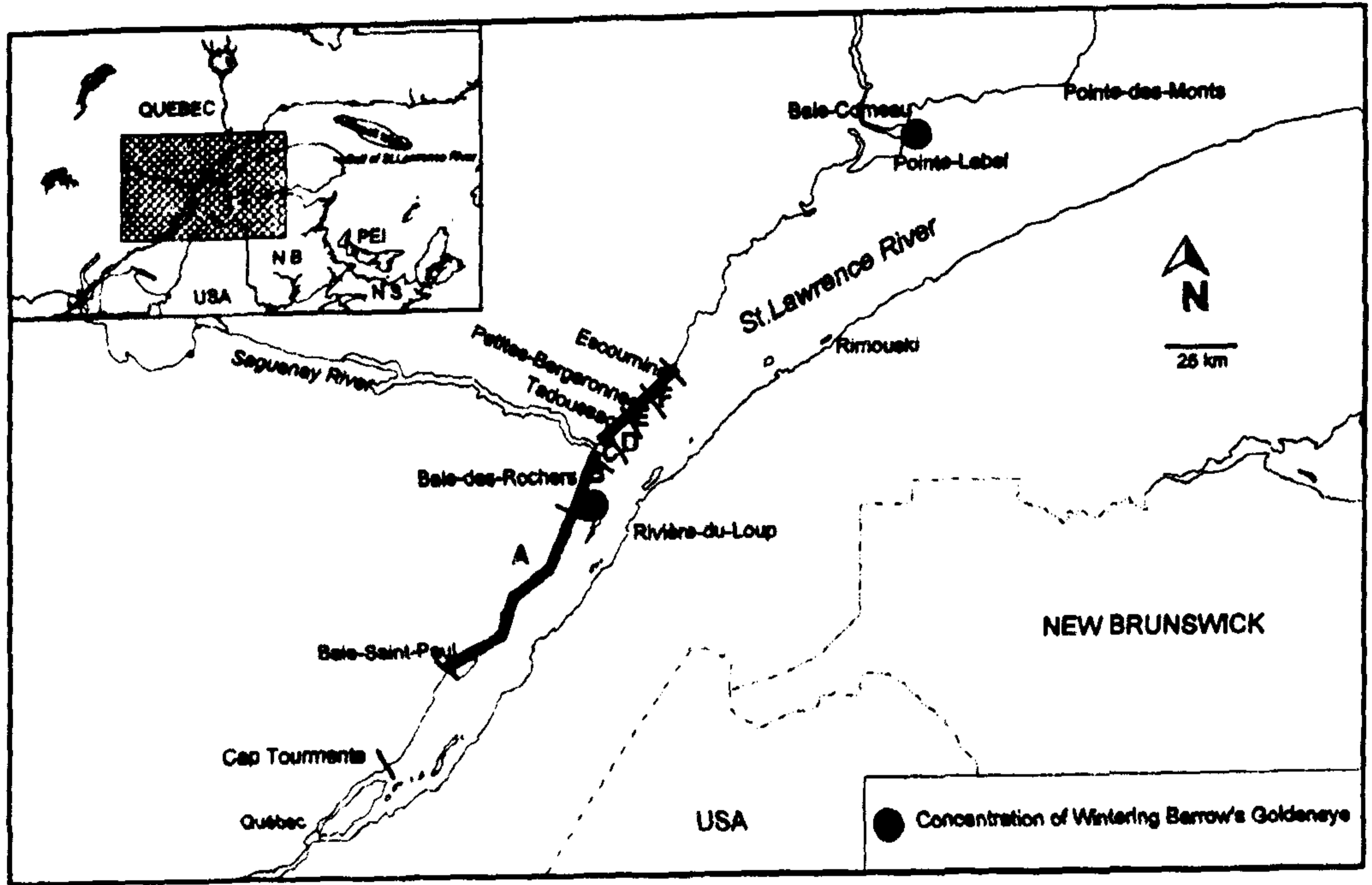


Table 2
Abundance of Barrow's and Common goldeneyes in selected Christmas Bird Counts

Location	n ^a	Barrow's Goldeneye		Common Goldeneye	
		Mean	Maximum	Mean	Maximum
Quebec					
Baie Comeau	3	372 ± 68	495 (1991-1992)	262 ± 154	568 (1991-1992)
Forillon	6	83 ± 25	185 (1994-1995)	49 ± 26	141 (1991-1992)
Percé	6	64 ± 21	148 (1995-1996)	108 ± 24	224 (1995-1996)
Tadoussac	6	8 ± 4	12 (1995-1996)	3064 ± 873	6357 (1995-1996)
Maine					
Mount Desert Island	6	2 ± 1	6 (1992-1993)	168 ± 26	244 (1996-1997)
Orono	6	15 ± 5	34 (1994-1995)	48 ± 9	70 (1996-1997)
Waterville	6	4 ± 1	6 (1991-1992)	103 ± 3	154 (1992-1993)
Massachusetts					
Nantucket	5	5 ± 1	9 (1993-1994)	1823 ± 546	3814 (1993-1994)

^a Based on counts between 1991 and 1997 (LeBarron 1992, 1993, 1994, 1995, 1996, 1997). Year of the maximum is indicated in parentheses.

of the 92 wings received being immature birds and 72% being adults. Among adults, males dominated the harvest (68%, n = 65). These proportions should be used cautiously, given the low sample sizes and the 30-year period over which they were collected.

5.0 Research and action needs

5.1 Breeding areas

It is urgent to identify breeding areas and confirm breeding in Quebec. This will permit an assessment of the breeding distribution of the species and to characterize breeding ponds. Knowledge of the breeding location of the species will also permit the identification of potential threats

Table 3
Proportion of goldeneye identified as Barrow's Goldeneye during the February 1976 survey^a

	Goldeneye						Total
	Common		Barrow's		Unknown		
	No.	%	No.	%	No.	%	
Estuary							
Cap Tourmente - Saguenay	7	(-)	852	(21)	3 253	(79)	4 112
Saguenay - Cap Bon Désir	488	(16)	198	(7)	2 290	(77)	2 976
Cap Bon Désir - Pointe-Lebel	395	(28)	173	(12)	836	(60)	1 404
Pointe-Lebel - Pointe-des-Monts	174	(26)	171	(26)	323	(48)	668
Gulf (North Shore)							
Pointe-des-Monts - Sept-Îles	60	(9)	281	(42)	334	(49)	675
Sept-Îles - Mingan	45	(12)	155	(42)	172	(46)	372
Mingan - Kégaska	10	(2)	355	(68)	159	(30)	524
Lower north shore	0	(0)	4	(25)	12	(75)	16
Anticosti Island	0	(0)	74	(30)	172	(70)	246
Total estuary	1 064	(12)	1 394	(15)	6 702	(73)	9 160
Total gulf	115	(6)	869	(47)	849	(46)	1 833
Gaspé Peninsula	0	(0)	212	(77)	63	(23)	275
Total	1 179	(10)	2 475	(22)	7 614	(68)	11 268

^a From Dupuis (1976).

Table 4
Abundance of wintering goldeneyes in the St. Lawrence estuary in 1976, 1988, and 1994

Section (see Fig. 3)	1976 ^a		1988 ^b				1994 ^c	
	4 Feb.	28 Jan.	5 Feb.	11 Feb.	18 Feb.	25 Feb.	11 Feb.	23 Feb.
A) Baie-Saint-Paul - Baie-des-Rochers	547	-	-	215	457	25	30	25
B) Baie-des-Rochers - Pointe-aux-Alouettes	1253	1104	367	500	215	418	362	418
C) Batture-aux-Alouettes	2339	633	2554	693	2823	983	251	251
D) Tadoussac - Petites-Bergeronnes	169	776	521	612	303	314	655	251
E) Petites-Bergeronnes - Cap du Bon Désir	2626	1417	597	1266	345	648	1233	833
F) Cap du Bon Désir - Escoumins	30	0	0	1	3	1	3	3
Total	6964	3930	4039	3287	4146	2389	2534	2496
		(4387) ^d	(4496) ^d					
Maximum each year	6964			4496			2534	

^a Dupuis (1976).

^b Savard (1990).

^c Savard et al. (1997); Savard and Falardeau (1997).

^d Total assuming 457 birds for section A.

Table 5
Summary of ground waterfowl surveys conducted in February between Baie-Sainte-Catherine and Godbout by the Manicouagan Ornithology Club^a

	Common Goldeneye	Barrow's Goldeneye	Unknown Goldeneye	Unknown duck	% Barrow's
1984	2563	80	0	1160	3 ^b
1985	2788	174	610	21	6 ^b
1986	2053	333	0	45	14
1987	2255	850	40	0	27
1988	2753	609	0	0	18

^a From Savard (1990).

^b Too many unidentified ducks for an accurate ratio.

to these locations and will facilitate the monitoring of population trends. Among potential threats are clearcutting activities in the presumed breeding areas, which, if significant, may require the implementation of a nest box program.

5.2 Moulting areas

These sites are important, as they concentrate and support most of the males of the population at a vulnerable time during the flightless period. We need to determine if a goldeneye drakes moult along the Labrador coast and which habitats they are using. We also need to devise an effective method to monitor these populations. Moulting sites have often been neglected in waterfowl management, and we know relatively little of this aspect of waterfowl ecology, especially in sea ducks (Savard 1988a).

5.3 Wintering areas

None of the wintering sites has been adequately described in terms of physical structure and food availability. The size and age structure of wintering flocks vary considerably within and between years at these sites, and the

Figure 4
 Monthly distribution and age composition of Barrow's Goldeneye harvest in Quebec between 1968 and 1993

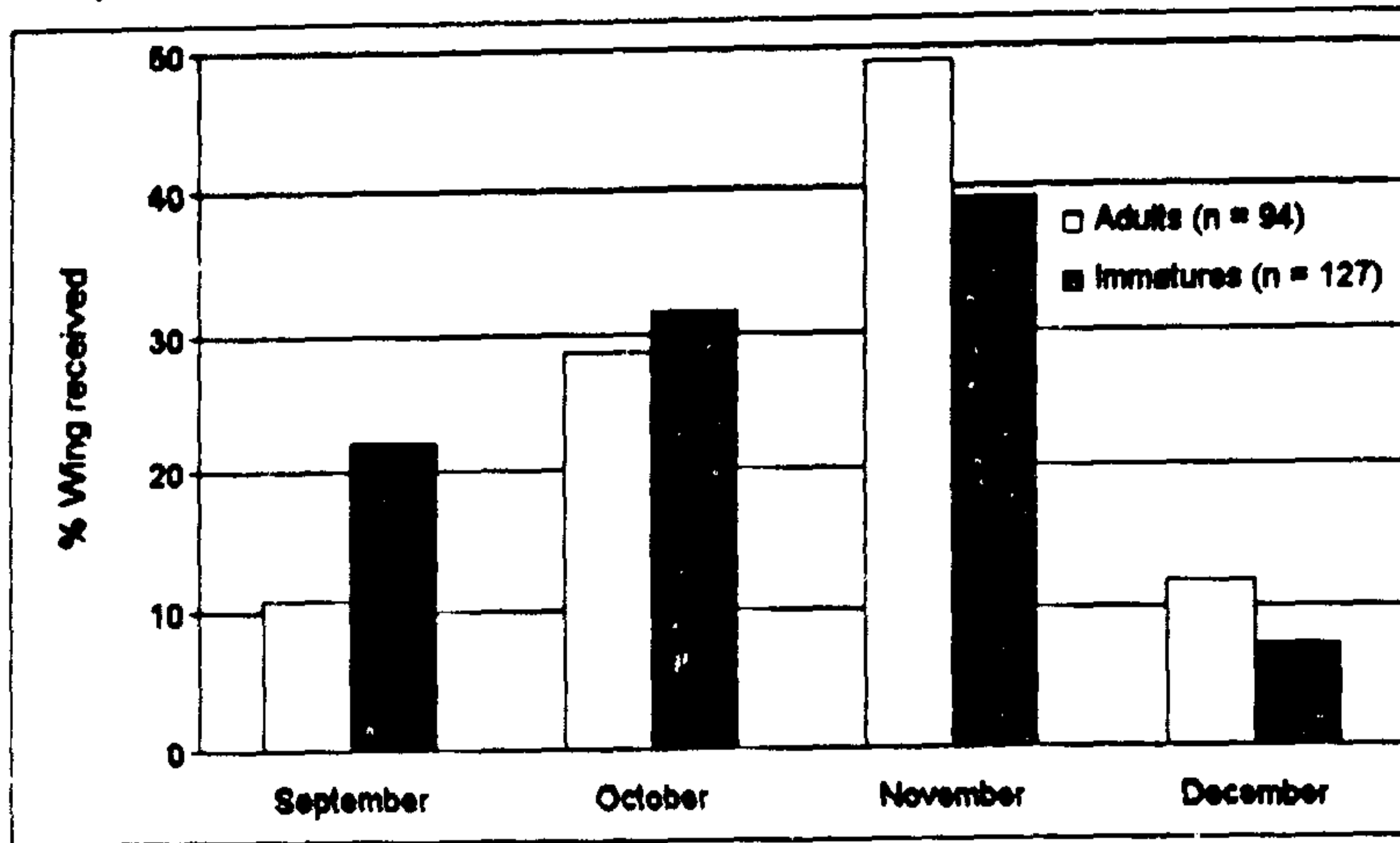
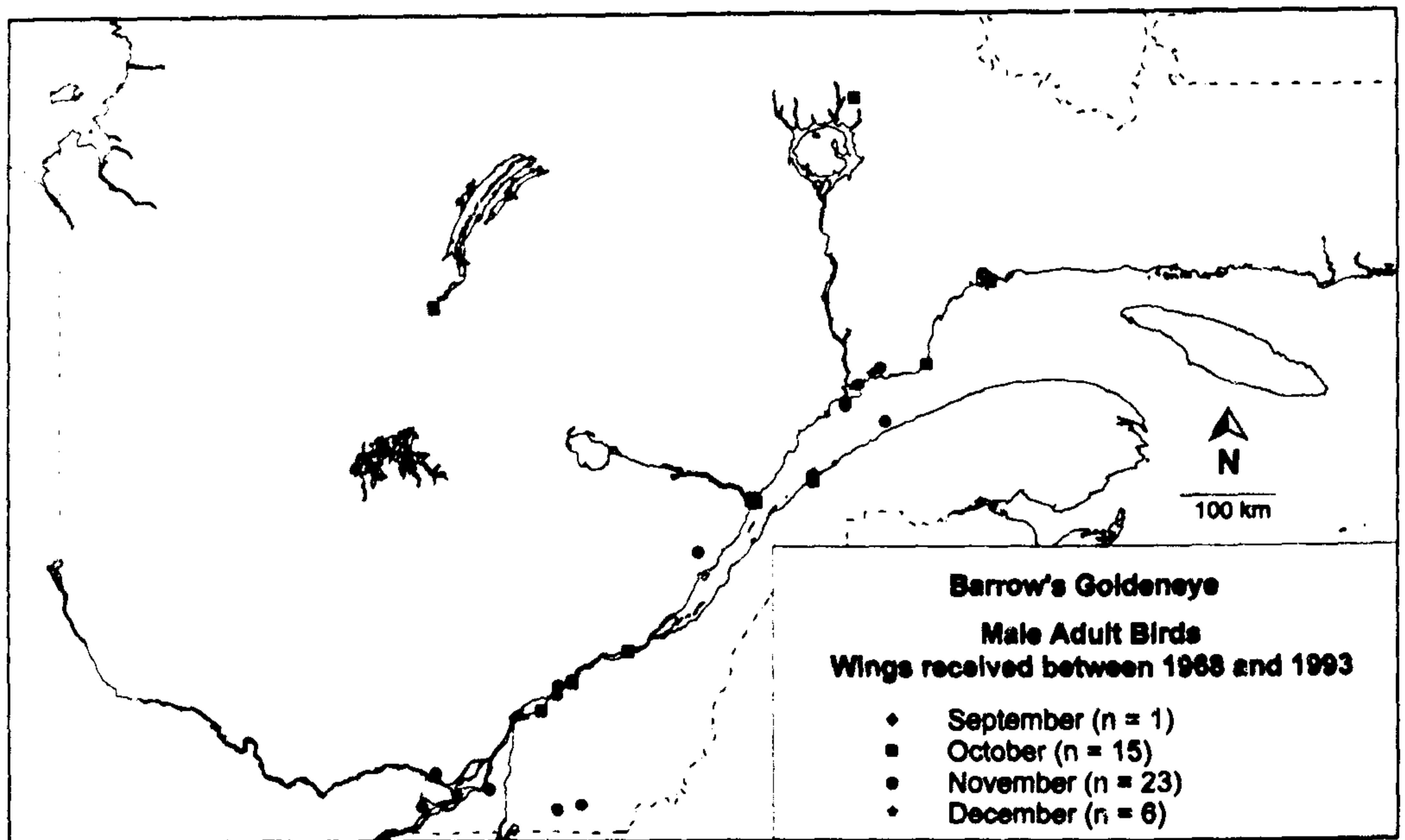


Figure 5
 Monthly distribution and location of the harvest of adult male Barrow's Goldeneye in Quebec



dynamics and causes of these changes are unknown. No protective status is currently given at any of the known wintering sites, two of which possibly support as much as 50% of the estimated eastern population. More surveys are needed to assess whether there are other important wintering locations and to monitor population fluctuations. Use of

known wintering sites in relation to tide and ice conditions needs to be documented.

Figure 6
 Monthly distribution and location of the harvest of adult female Barrow's Goldeneye in Quebec

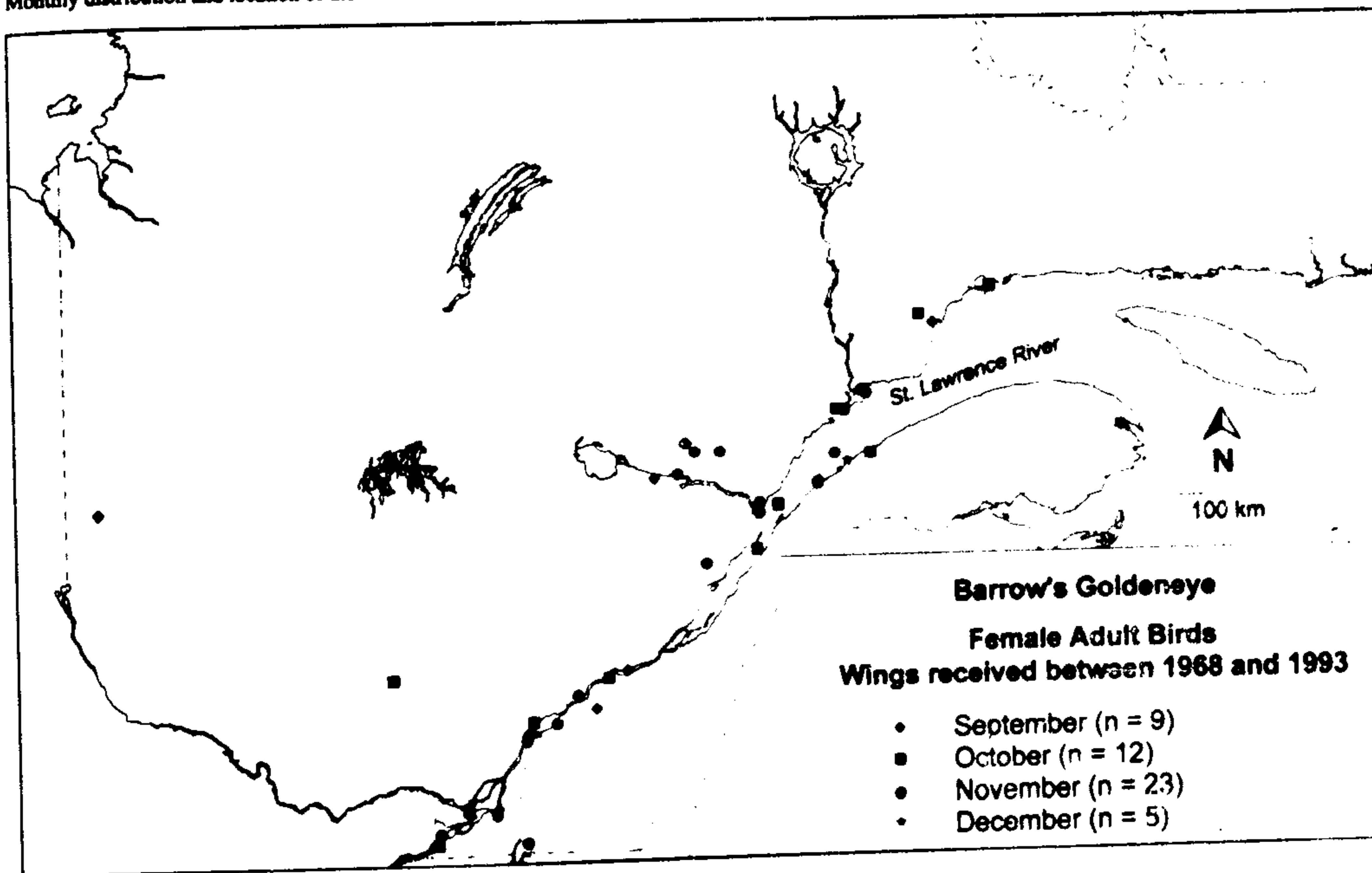


Figure 7
 Monthly distribution and location of the harvest of juvenile Barrow's Goldeneye in Quebec

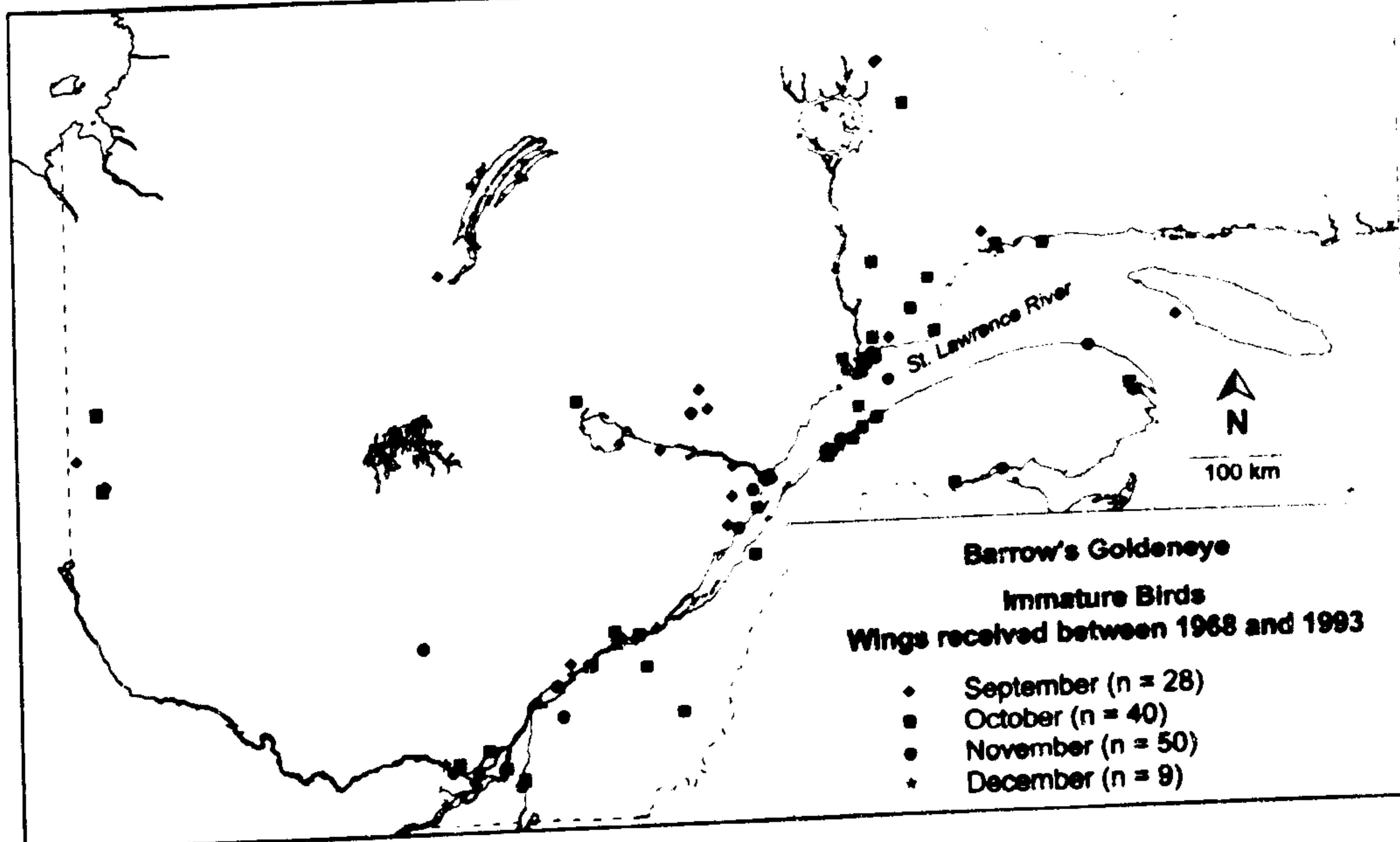


Figure 8
Comparative harvest of Barrow's and Common goldeneyes in Quebec according to hunting area and age

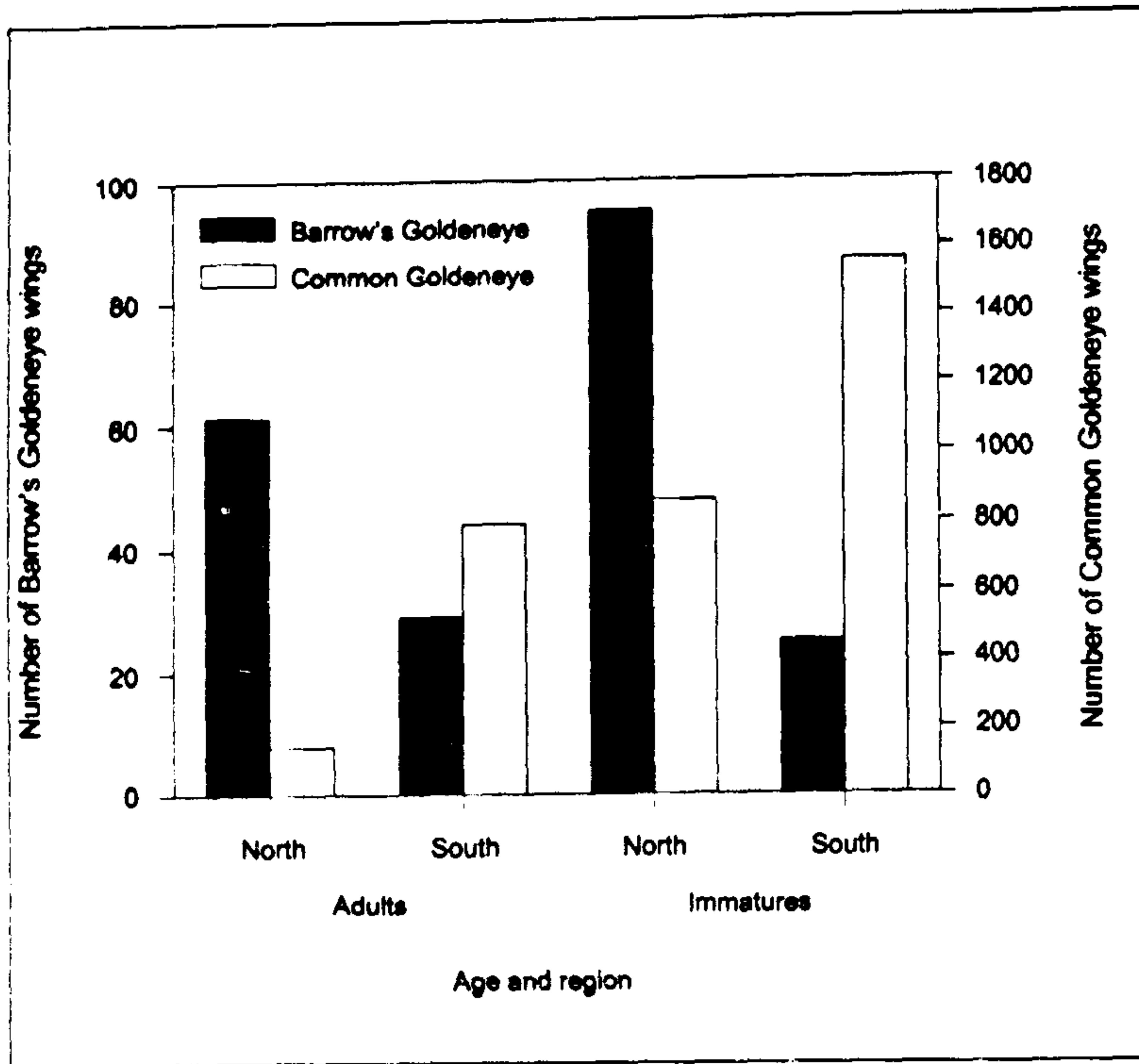
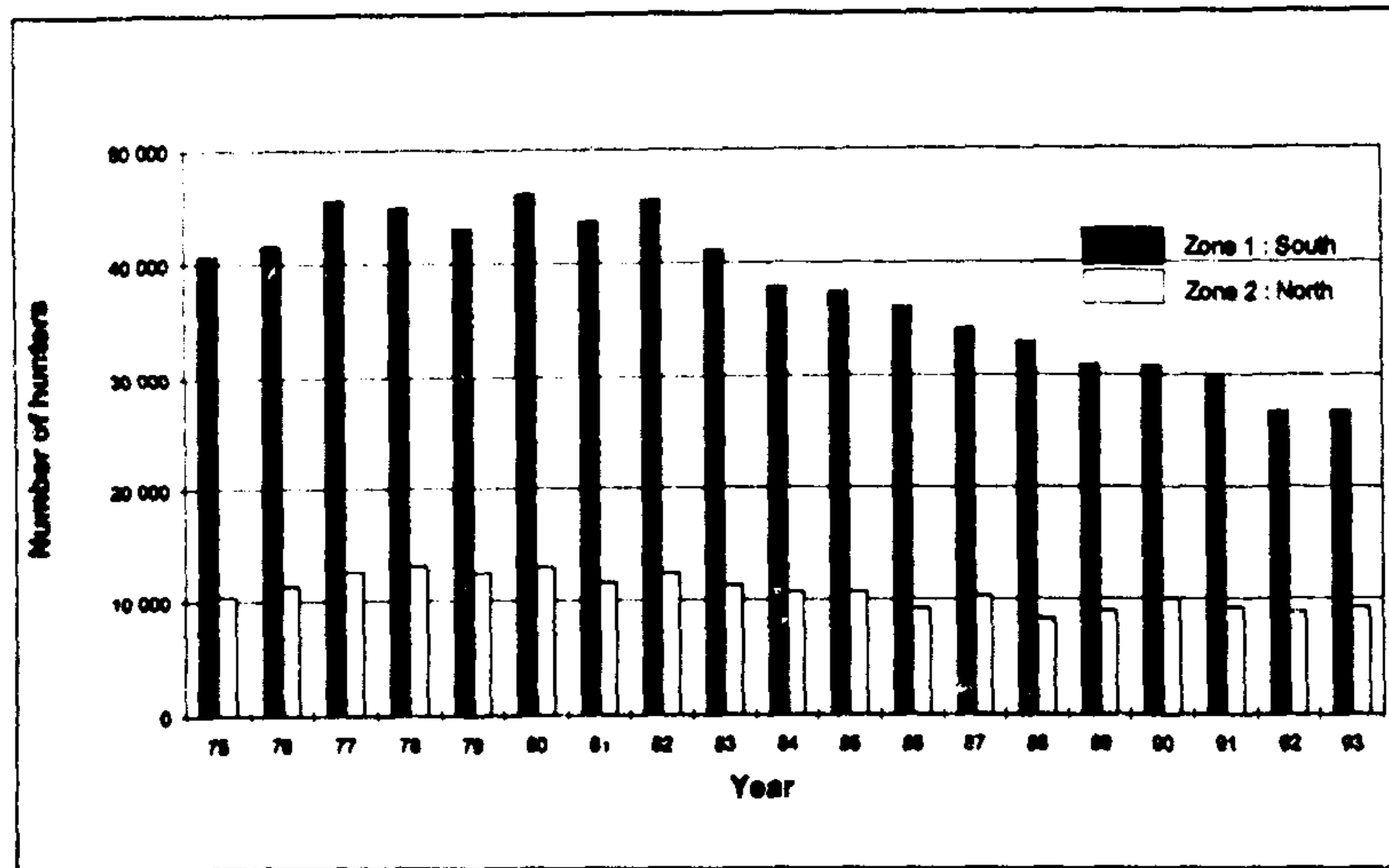


Figure 9
Number of active hunters in Quebec between 1975 and 1993



5.4 Hunting

Hunting mortality has to be better quantified and possibly regulated. Hunters should be informed of the status of Barrow's Goldeneye in the east and encouraged to avoid hunting them or at least participate in the monitoring of the goldeneye harvest. Given the localized nature of the harvest and, occasionally, the specialized equipment needed to hunt goldeneyes, it may be possible to identify groups that target Barrow's Goldeneye in their hunting activities.

We need more intensive monitoring of the Barrow's Goldeneye harvest to see whether any special regulations and/or information programs are successful. Also, given the general decline of goldeneyes in the eastern flyway and in Quebec (Wyndham and Dickson 1995), closer monitoring of both goldeneye species is warranted.

5.5 Monitoring

We need to better assess the size of the eastern population and monitor it. Which type of surveys (breeding pair, moulting, or winter) will prove the most efficient remains to be determined.

5.6 Migration and staging areas

Harvest surveys suggest different migration and staging areas for adult males, adult females, and juveniles. Because these patterns affect their vulnerability to hunting, they need to be better understood. Inland areas used by Barrow's and Common goldeneyes in August, September, and October are poorly known in Quebec. Whether the birds are widely scattered or concentrated at a few staging sites needs to be determined.

5.7 Genetic status

There are currently three isolated populations of Barrow's Goldeneye: one in Iceland (600–1200 birds), one in eastern North America (2000–4000 birds), and one in western North America (over 100 000 birds) (Savard 1987). There have been no morphometric or genetic comparisons of these three populations. If eastern North American Barrow's Goldeneyes prove to be genetically distinct, this would provide us with further cause to conserve this unique population.

6.0 Discussion

It is quite obvious that we know little about the eastern population of Barrow's Goldeneye. All evidence suggests a small population (2000–4000 birds) wintering mainly within the St. Lawrence estuary. Some immature birds may winter with large flocks of Common Goldeneye in the upper St. Lawrence River, but this remains to be confirmed and quantified. Based on breeding pair sightings, the Barrow's Goldeneye breeding area may be large in Quebec but could be impacted by intensive logging activities within the boreal forest, as the birds rely on tree cavities for nesting. Whether they require special kinds of breeding lakes is unknown, but a preference for highly productive fishless lakes (as in the western population) is a strong possibility. If

such a preference exists, fish enhancement or introduction programs by outfitters and the provincial government would have to be reviewed. Once breeding areas are confirmed, the impact of logging could be reduced by undertaking a nest box program. Such a program has proved successful in increasing the population in British Columbia (Savard 1988b).

The fact that the species is still hunted is a cause for concern. Possible ways of reducing hunting mortality were considered in the new hunting restrictions implemented in Quebec in 1995. Goldeneye hunting was closed in November and December within the St. Lawrence estuary, a time when most Barrow's Goldeneyes arrive and start concentrating at several known wintering sites. Most of the kill is concentrated at three locations within the St. Lawrence valley, and, along with special regulations, special hunter information programs should be considered for these areas. Because of the difficulties of identifying Common and Barrow's goldeneyes in the fall, a complete ban of Barrow's Goldeneye hunting may prove difficult to achieve without a similar ban on Common Goldeneye hunting. This is why it is urgent to increase our knowledge of Barrow's Goldeneye in the east. By better understanding their ecology, the hunting pressure they endure, and the other threats they face, we may be able to maintain this population without drastic measures. In this approach, the Canadian Wildlife Service has successfully obtained the agreement of small groups of waterfowlers to locally monitor the composition of the goldeneye kill. Prevention was the guiding light in promulgating the new hunting restrictions in Quebec in 1995. However, we currently do not have the necessary mechanisms to more efficiently address the case of the Barrow's Goldeneye.

The concern with populations of Barrow's Goldeneye and Harlequin Ducks in the east highlights some of the weaknesses in our waterfowl management system. Little attention was paid to the eastern population of Harlequin Duck until it was given endangered status by the Committee on the Status of Endangered Wildlife in Canada. Will the eastern population of the Barrow's Goldeneye have to be classified as "threatened" or "endangered" before we spend research and monitoring efforts towards understanding its ecology? It is time that we put more efforts on our vulnerable and sensitive species (species with small populations or species that we know little about). Currently, money diverted to endangered species is spent only on threatened and endangered species, and the program is not set up to address vulnerable or sensitive species. Regular waterfowl management research, and operations usually focus on the most exploited species, such as American Black Ducks *Anas rubripes* and geese. There are various ways of addressing vulnerable species, but it is crucial that we do so soon. One way of addressing this problem is to create a program devoted to vulnerable and sensitive species. Another way is to make our endangered species programs more forward-looking and productive by putting some efforts into prevention (i.e., 20–25% of endangered species funds allocated to vulnerable and sensitive species). Although this seems an obvious approach, it has not been encouraged. There should be an official list of vulnerable species as well as one for sensitive species, and funds should be allocated within each category so that the prioritization of projects is done within, rather than between, categories.

We need to replace our reactionary approaches with more proactive ones. This problem is not unique to species management but also applies to ecosystem management, where efforts are often concentrated totally on endangered ecosystems with no efforts put towards protecting healthy sensitive ones. Proactive conservation is essential for the long-term efficiency of our actions. It is actively being advocated (Tear et al. 1993; Noss et al. 1995), and it is an essential part of a holistic vision of conservation.

Acknowledgments

We would like to thank D. Bordage, S. Gilliland, I. Goudie, M. Bateman, P. Kehoe, and P. Hicklin for the information they provided. Thanks go to P. Laporte, L. Bélanger, P. Kehoe, I. Goudie, M. Bateman, and A. Bourget for their comments on earlier drafts of the manuscript, and special thanks are extended to M. Melançon for the production of the figures.

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