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The kill of ducks and geese in Canada by non-resident hunters

by F.G. Cooch[1]

Abstract

In 1976–81, non-resident hunters, defined as persons not hunting in their province or state of residence, constituted about 9% of hunters in Canada and took 11% of the ducks and 16% of the geese reported killed. Their distribution was highly concentrated along provincial or international borders, and in areas where there are large concentrations of waterfowl. Both Canadian and US non-resident hunters were generally more successful than resident hunters. Waterfowl hunting by non-resident Canadians has decreased since 1976. Hunting by US hunters has increased or remained steady.

[1]CWS, Ottawa, Ontario K1A 0E7.

Introduction

Important considerations to be taken into account in setting Canadian waterfowl hunting regulations for a province or zone include forecasts of the fall flight and probable resulting kill by hunters who purchase Canada migratory game bird hunting (MGBH) permits in that province or zone. For many years concern has been expressed about the impact of non-resident hunting on various stocks of migratory game birds, and Saskatchewan and Manitoba have imposed special restrictions on hunting by non-residents. In Saskatchewan, provincial regulations have stipulated since 1974 that hunters not resident in the province may not hunt until early October, though the seasons in all zones open on various dates in September. In Manitoba, non-residents of Canada may not hunt Sandhill Cranes at all, and may not hunt ducks and geese in the southern parts of the province until 5–7 days after the general opening date. The non-residents are believed to be largely US hunters.

The sales record of MGBH permits provides a means not only of measuring kill by Canadians and non-Canadians but also of assessing the numbers of Canadians who hunt in provinces other than their province of residence. Cooch (1978) used this sales record to describe the impact of US hunters in Canada in the 1976 season, finding it to be geographically restricted but of local importance. Cooch (1982) examined factors influencing changes in origin, numbers, and distribution of all non-resident waterfowl hunters in Canada. This paper presents estimates of the kill of waterfowl by both categories of non-residents, who are defined as those hunting in provinces other than their province or state of residence. Canadian non-residents, termed OP (out-of-province) hunters (Cooch 1982), generally travel shorter distances to hunt than US hunters do. Since 1976 they have been declining in numbers more rapidly than US hunters. This is especially true with regard to OP hunters travelling to western Canada from Ontario and Quebec. Non-resident hunters of both categories now represent about 9% of the active waterfowl hunters in Canada.

While data are available throughout Canada, I have restricted the major analysis to Alberta, Saskatchewan, Manitoba, and Ontario, where the greatest impact by non-residents is recorded. The analysis could not be extended earlier than 1976 because of the lack of a specialized operational survey for US hunters before that year.

Results

From 1976 to 1981 inclusive, about 3.5 million ducks and 590 000 geese were killed each season by sport hunters in Canada. Of that number, US hunters killed an average of 218 000 ducks and 56 000 geese annually, and OP hunters killed 155 000 ducks and 37 000 geese. Table 1 shows the concentration of non-resident hunters in central Canada. Annual variations in kill in each CWS administrative region are given in Table 2, making plain the decline since 1976 in the kill of ducks by OP hunters in the Western and Northern Region.

On average, non-residents nationally constitute 8.3% of all active hunters and 8.9% of all successful hunters. In many localities these values are considerably higher. To demonstrate differences between residents and non-residents, average activity and success by residency class are shown by province in Table 3, and annual variations by CWS region in Table 4. Mobile hunters are clearly more successful than residents.

Data for those National Harvest Survey (NHS) provincial sampling zones where there is high non-resident activity (Cooch 1978) are given in Tables 5, 6, and 7 and in Figures 1 and 2. Zonal summaries such as these do not completely capture the concentration of non-resident hunters in some favoured areas, nor completely show changes occurring in response to changing conditions. Figure 3 indicates the location of 14 reference areas that, in 1976, accounted for about 65% of all kill by non-resident hunters in Canada. Table 8 shows the changes in kill of ducks and geese by OP, US, and resident hunters in each of those reference areas, and the changes that occurred between 1976 and 1979 and 1981. Decreases in kill and presence of OP hunters in some areas may be related to increases in cost of travel, changes in regulations (prior to 1979) as shown in Cooch (1982), or the reduced numbers of birds available during the hunting season. Without a specialized socio-economic survey of mobile hunters, the factors determining their decision to travel are unknown.

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Cooch (1982) was able to show changes in numbers in both categories of non-resident and resident hunters occurring annually between 1972 and 1981. Because of limitations in the ways in which the data were tabulated and stored, I could not compute the kill of individual US hunters from 1972 to 1975, and the results presented in Table 2 are thus restricted to the 6-year period of 1976–81. This table shows the marked decrease in kill by OP duck hunters in western Canada after 1976. The increase there in the kill of geese by US hunters was almost entirely caused by increased opportunity in Manitoba, and a shift of some hunters from Ontario zone 03 to Manitoba, while the kill by US hunters in Saskatchewan and Alberta stayed nearly constant.

Tables 9 and 10 show average kills of ducks and geese by province of hunt and by state of residence of US hunters.

The data base uses the assumption that Canadians buy MGBH permits in their province of residence. Thus, though I could estimate the kill by OP hunters by province of hunt, I could not allocate that kill by province of residence with similar precision. Estimated totals by province of assumed residence and kill of ducks and geese by OP hunters are presented in Tables 11 and 12. I have also incorporated the standard NHS provincial estimates of OP hunters for comparison with summed estimates by province of residence. Most of the disparities are trivial, though in Saskatchewan and Alberta about 10% of the kill by OP hunters cannot be assigned by province of residence.

Discussion

The kill and activity of OP hunters most closely resembled those of experienced (sample D) resident hunters. Non-resident hunters of US origin were generally more successful than either of the two groups of Canadians, though hunting on fewer days. Kill by all non-resident hunters was generally more consistent and, where populations were in decline, closer to long-term averages than that by any of the resident samples (including D), though there was considerable regional variation.

Here are three examples. First, in southern Ontario (NHS) zone 01, I found the distinction between US hunters and resident hunters consistently greater than in any other zone of Canada. Despite hunting on fewer days (7.3 vs. 9.4) US hunters killed an average of 21 ducks per season, compared with 10 by successful residents. One possibility is that quality areas in which to shoot are very limited in southern Ontario and access to those areas may be controlled by ownership and cost, whereas in an area like Saskatchewan the hunters compete for birds but not necessarily for a place to hunt. Although no significant national change has been observed in the ratio between NHS samples A, B, D, or E over the 5 years in Ontario zone 01, the OP sample largely disappeared, apparently in response to a change in regulations (Cooch 1982). The numbers of ducks available to hunters in southern Ontario are relatively stable, except those of diving ducks of western origin. As the number of specialist hunters is probably small, we expect that, given a relatively stable fall flight, annual variations in success rate and daily and seasonal bag will not be great. This does not necessarily apply to geese, whose presence or absence in the area is more variable. The success rate of goose hunters in zone 01 reflects that variability. The consistency of numbers available is also reflected in the consistency of both the total number of hunters in each sample and the relative proportions of each sample cohort within the hunting community.

Second, in prairie Canada, waterfowl populations are more variable. Success generally fluctuates in direct response to the supply of birds. For example, the numbers of potential and active hunters in Saskatchewan in all resident sampling groups have been declining since 1976, with the most dramatic decrease in 1981, when a scarcity of ducks was associated with public concern over the possibility that Endrin applied to winter wheat in Montana may have "poisoned" the flesh of ducks. Active hunters of geese were apparently largely unaffected by the presumed danger from Endrin.

Non-resident hunters do not appear to have been as affected by reduced numbers of waterfowl as do residents as a whole. Between 1976 and 1981 inclusive, most duck populations in Saskatchewan fell, and age ratios (unadjusted for vulnerability) in the principal quarry species, the Mallard, have been below 2.0 since 1976 (Cooch and Boyd 1983). This low level of productivity has tended to switch resident hunters in the southeast (zone 03) from ducks to geese. By 1980 there were more successful resident goose hunters than duck hunters among samples B and D. In 1981 this was also observed in sample A. US hunters (sample E) have traditionally gone to southeast Saskatchewan for geese. OP hunters in the same zone initially had characteristics similar to resident sample D, but by 1978 had also switched to geese.

Third, southern Manitoba zone 01 was traditionally a duck hunting area with a large and stable cadre of experienced resident hunters. Although regulations and a declining population of ducks impinged on OP hunters and, to a lesser extent, on residents (Cooch 1982), a massive increase in the fall flight has caused geese to replace ducks as the principal quarry. This increase in geese was associated in part with the development of Oak Hammock Provincial Waterfowl Refuge and also with increases in the numbers of Lesser Snow Geese and Canada Geese breeding along the west sector of Hudson Bay, south of Queen Maud Gulf and on Southampton Island. Manitoba suffered a decline in its duck populations earlier than Saskatchewan and imposed severe regulations (reduced bag limits and delayed opening dates) between 1972 and 1975 (Cooch 1982). This apparently discouraged new and intermittent waterfowl hunters (samples A and B).

Southern Manitoba zone 01 is most comparable to Saskatchewan zone 03 in that the supply of ducks has decreased since 1976 while the number of geese has increased. Although the sample structure of active resident hunters remained relatively constant (except for a slight decrease in 1981), the number of US hunters increased from 2400 to 3700 (54%) between 1977 and 1981 inclusive. Among all classes of hunters, the proportion taking geese has been increasing. In the first 2 years after the major influx of US hunters (Cooch 1982), resident D hunters were more successful than the tourists in killing geese, but less successful in killing ducks. This switched in 1979 and now US hunters are more successful than resident D hunters in killing geese and comparable to D in killing ducks. I surmise that American hunters have now learned how to shoot geese under Manitoba conditions and are abandoning duck hunting or merely taking ducks incidentally while in pursuit of geese.

Although in Ontario zone 01, with stable populations, little had changed between 1976 and 1981, Saskatchewan zone 02, 01, and 03, in that order, showed how declines in duck numbers resulted in hunters switching to geese as an alternative, with an increase in the proportion of experienced hunters (sample D). Finally, Manitoba zone 01 represents an advanced stage of the decline in duck hunting and the growing importance of goose hunting.

Non-resident hunters reflect these changes as well. In prairie Canada, residents of the United States traditionally sought geese, and most OP Canadians ducks. Although OP hunters have redirected their efforts more quickly toward geese than have residents, the impact of the decline in ducks and of restrictive regulations before 1976 has greatly reduced their activity in western Canada. OP hunters from British Columbia are gradually retreating from the duck areas in Saskatchewan and have even begun pulling back from the Peace River District of Alberta. At the same time, the number of OP hunters has remained near the long-term average in areas where geese constitute a significant proportion of the kill.

As a general rule, as populations of ducks or geese decline, the number of new and intermittent resident hunters (NHS samples A and B) declines and an increasing proportion who purchase permits do not exercise their option to hunt. The deletion of the inexperienced cohorts (A and B) has the effect of bringing the average seasonal kills by resident, OP, and US hunters closer together.

Cooch (1982) stated that non-resident hunters could have unanticipated impacts on management plans designed to protect local stocks of waterfowl. An example of this sort of impact occurred in Manitoba, where restrictive regulations to increase breeding populations of ducks (primarily the Mallard) were put into effect in 1973 and continued in some form through 1981 (a bag limit of four Mallards per day compared with the standard limit of eight ducks of all species in each prairie province). However, anticipated reductions in the kill of Mallards have fallen short of expectations because of the influx of US hunters, largely seeking geese but killing ducks as well. This was analysed in some detail by Cooch and Boyd (1983). Data on kill by US hunters do not extend back before 1976, but records of kill by OP and resident hunters do. As shown in Cooch (1982), OP hunters had declined by 1974 to 40% of the 1825 present in 1972, and have not since exceeded 65% of the base of 1825 OP hunters. Active resident hunters increased slowly from 30 000 in 1972 to 32 000 in 1978, and declined to 30 000 in 1982. Hunters of US origin (largely from Minnesota, but increasingly from North Dakota) rose by 142% from 1542 in 1972 to 3733 in 1982, and their kill of geese by 368% from 8882 to 32 674 between 1976 and 1982. Although their principal quarry was geese, their kill of ducks has become increasingly significant (plus 2%) and, as noted, has helped to blunt the efforts being made to restore the breeding populations of Mallards in Manitoba. Although some reduction resulted from discouraging OP hunters from coming to Manitoba, no reduction of kill of Mallards by US hunters was achieved, because of increasing numbers attracted by burgeoning populations of geese.

The numbers of ducks and geese taken in Canada by residents of Michigan, Wisconsin, and Minnesota are compared to the numbers of birds reported taken within those states in Table 13. The apparent stability of their kill in Canada in comparison to the kill within states is quite marked. Even more impressive is the fact that, in 1980, residents of Minnesota killed 80 000 geese in that state and another 36 000 in Canada. Some of this kill was transferred to populations of Canada Geese, for which concern about possible overhunting in Canada has recently been expressed in Mississippi and Central Flyway technical committee meetings.

Another case in point is the Black Duck. Historically, more Black Ducks have been killed in the United States than in Canada. That relationship has recently been reversed. However, if the kill of Black Ducks in Canada by 15 000 US hunters was subtracted from the kill in Canada and considered as part of the American kill, the historic relationship would be more nearly balanced (310 000 vs. 305 000).

Conclusion

Between 1976 and 1981, OP and US non-residents as defined killed at least 10.6 and 15.7% respectively of the ducks and geese killed by sport hunters in Canada. As shown previously (Cooch 1982), US hunters responded to increased opportunity more quickly than did their Canadian counterparts. Hunters from the three states which contribute most US hunters to Canada (Minnesota, Michigan, and Wisconsin) generally have shorter distances to travel to suitable areas within Canada than do most OP Canadians.

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I use these examples to indicate that kill by mobile hunters can have an effect on management plans if the geographic (political) area selected is too small, the time-frame before re-examination too short, or questions of allocation of harvest not addressed. Who would have forecast in 1974 that by 1981 another 2000 US hunters would have gone to Manitoba in addition to those already going to other provinces or that, in a period of declining duck numbers in prairie Canada, the kill of ducks by mobile hunters would largely remain steady and their kill of geese increase greatly?

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Table 1
Average seasonal kill (in thousands) of ducks and geese by province of kill according to place of residence of hunters, 1976–81

Residence	Nfld.	PEI	NS	NB	Que.	Ont.	Man.	Sask.	Alta.	BC	NWT	YT	Total
Ducks													
OP	0.6	2.0	4.0	3.0	25.9	21.7	13.7	37.6	43.9	2.4	0.4	Tr	155.2
%	(0.5)	(6.9)	(3.4)	(5.0)	(4.0)	(2.4)	(4.2)	(7.2)	(6.4)	(1.1)	(2.2)	(2.4)	(4.4)
U.S.	Tr *	Tr	Tr	0.3	3.7	104.0	49.0	50.5	9.8	1.1	Tr	Tr	218.5
%	Tr	Tr	Tr	(0.5)	(0.6)	(11.6)	(14.9)	(9.7)	(1.5)	(0.5)	Tr	Tr	(6.2)
Residents	118.8	27.5	110.8	56.2	510.9	773.7	266.7	434.7	637.0	209.7	18.9	3.1	3168.1
%	(99.5)	(93.1)	(96.6)	(94.5)	(94.5)	(86.0)	(80.9)	(83.1)	(92.1)	(98.4)	(97.8)	(97.6)	(89.4)
Total	119.4	29.5	114.8	59.5	540.5	899.4	329.5	522.8	690.8	213.1	19.4	3.2	3541.9
Geese													
OP	0.1	0.7	0.3	0.5	4.6	2.5	4.3	14.1	9.9	0.3	Tr	Tr	37.4
%	(1.1)	(4.3)	(3.1)	(12.8)	(5.6)	(3.8)	(3.2)	(9.7)	(8.5)	(2.1)	(5.0)	(6.7)	(6.3)
US	0.0	Tr	0.0	Tr	2.4	10.7	18.7	19.1	5.6	12.3	0.0	0.0	56.6
%	0.0	Tr	0.0	(0.5)	(3.0)	(16.4)	(13.8)	(13.2)	(4.8)	(0.8)	0.0	0.0	(9.4)
Residents	11.3	14.7	7.9	3.2	75.0	52.0	112.2	111.8	100.5	14.6	1.3	0.3	504.9
%	(98.9)	(95.7)	(96.9)	(86.7)	(93.2)	(79.8)	(83.0)	(77.1)	(86.6)	(97.1)	(95.0)	(93.3)	(84.3)
Total	11.4	15.4	8.2	3.7	82.0	65.2	135.3	145.1	115.9	15.0	1.4	0.3	598.9

*Tr = trace.

Table 2
Annual variations in kill (in thousands) of ducks and geese by CWS administrative region, 1976–81, according to place of residence of hunters

	Atlantic				Quebec				Ontario				Western and Northern				Pacific and Yukon				Canada			
Year	OP	US	Res.	Total	OP	US	Res.	Total	OP	US	Res.	Total	OP	US	Res.	Total	OP	US	Res.	Total	OP	US	Res.	Total
Ducks																								
1976	12.3	0.5	310.3	323.1	19.0	3.7	582.6	605.3	36.6	122.5	774.8	933.9	164.3	132.6	1733.1	2030.0	3.4	0.9	227.0	231.3	235.6	260.2	3627.8	4123.6
1977	8.7	0.7	341.9	351.3	36.6	4.3	590.4	631.3	15.8	95.0	802.5	913.3	84.5	88.8	1376.0	1549.3	1.6	1.1	256.9	259.6	147.2	189.9	3367.7	3704.8
1978	6.6	0.5	341.0	348.1	16.6	2.8	508.6	528.0	18.9	105.8	819.5	944.2	83.8	98.6	1288.2	1470.0	0.3	1.1	208.8	210.2	126.2	208.8	3166.1	3501.1
1979	7.7	0.2	272.7	280.6	16.8	3.4	448.8	469.0	17.6	105.4	721.4	844.4	96.7	127.0	1422.3	1646.0	2.6	1.1	200.7	204.4	141.4	237.1	3065.9	3444.4
1980	8.7	0.3	313.5	322.5	28.9	4.6	466.8	500.3	20.9	100.2	791.6	912.7	70.0	108.6	1288.9	1467.5	0.9	0.9	183.9	185.7	129.4	214.6	3044.7	3388.7
1981	12.7	0.3	300.2	313.2	37.3	3.6	468.1	509.0	20.4	94.8	732.5	847.7	72.1	76.7	946.0	1094.5	5.6	1.4	180.6	187.6	148.1	176.8	2627.4	2952.3
M	9.5	0.4	313.3	323.2	25.9	3.7	510.9	540.5	21.7	104.0	773.7	899.4	95.2	105.4	1342.4	1543.0	2.4	1.1	209.7	213.2	154.7	214.6	3149.9	3519.2
%	2.9	0.1	97.0		4.8	0.7	94.5		2.4	11.6	86.0		6.2	6.8	87.0		1.1	0.5	98.4		4.4	6.1	89.5	
% NR*		3.0				5.5				14.0				13.0				1.6				10.5		
Geese																								
1976	1.9	Tr†	42.2	44.2	1.9	1.5	49.2	52.6	3.4	11.4	30.5	45.3	32.7	33.3	286.0	352.0	0.6	0.1	10.8	11.5	40.5	46.3	418.7	505.5
1977	1.0	Tr	41.5	42.6	3.5	2.9	65.6	72.0	1.6	9.5	55.7	66.8	21.0	34.6	256.1	311.7	0.2	0.1	10.4	10.7	27.3	47.1	429.3	503.8
1978	1.5	Tr	33.3	34.9	2.8	2.3	103.9	109.0	3.4	10.1	50.8	64.3	26.9	41.0	286.6	354.5	0.1	0.2	12.3	12.6	34.7	53.6	486.9	575.3
1979	0.7	Tr	32.2	32.9	3.6	2.7	73.7	80.0	1.7	15.3	58.8	75.8	28.6	44.2	380.2	453.0	0.3	0.1	16.7	17.1	34.9	62.3	562.0	659.2
1980	1.2	Tr	41.2	42.4	6.1	3.1	113.8	123.0	3.7	10.2	72.1	86.0	25.8	56.3	392.9	475.0	0.2	0.2	18.1	18.5	37.0	69.8	638.1	744.9
1981	3.1	Tr	33.2	36.3	9.7	1.6	44.7	56.0	1.2	7.4	44.2	52.8	35.1	56.4	323.4	414.9	0.5	0.1	19.0	19.6	49.6	65.5	464.5	579.6
M	1.6	Tr	37.3	38.9	4.6	2.4	75.1	82.1	2.5	10.7	52.0	65.2	28.4	44.3	320.8	393.5	0.3	0.2	14.5	15.0	37.3	57.4	499.9	594.6
%	4.1	Tr	95.9		5.6	2.9	91.5		3.8	16.4	79.8		7.2	11.3	81.5		2.0	1.3	96.7		6.3	9.7	84.0	
% NR*		4.2				8.5				20.2				19.5				3.3				16.0		

*NR = Non-resident regardless of citizenship.
†Tr = trace.

Table 3
Average numbers of active and successful hunters, by place of residence and by province, 1976–81

Hunters		Nfld.	PEI	NS	NB	Que.	Ont.	Man.	Sask.	Alta.	BC	YT	NWT	Total	% Canadian total kill
OP	Active	180	378	416	441	2 816	2 110	1 316	3 583	4 253	285	14	14	15 806	4.1
	Success (1)*	102	209	331	316	2 302	1 789	1 113	2 847	3 462	186	14	14	12 690	4.2
	Success (2)†	42	190	86	117	796	555	730	2 302	1 833	89	3	4	6 747	6.0
	% (1)	56.6	55.3	79.6	71.7	81.8	84.8	84.6	79.5	81.4	65.2	100	100	80.3	
	% (2)	23.3	51.3	20.7	26.5	28.3	26.3	55.5	64.3	43.1	31.2	21.0	29.0	42.6	
US	Active	7	3	21	88	569	7 118	4 952	4 067	980	142	2	2	17 971	4.6
	Success (1)	7	3	21	50	407	6 347	3 782	3 507	744	107	2	2	14 979	4.9
	Success (2)	0	3	0	7	292	1 624	2 676	2 809	737	38	0	0	8 186	7.3
	% (1)	100	100	100	62.5	71.5	89.2	76.4	86.2	75.9	75.4	100	100	83.4	
	% (2)	0	100	0	8.0	51.3	22.8	54.0	69.1	75.2	26.5	0	0	45.6	
Res.	Active	21 590	4 664	10 546	8 755	53 174	104 863	35 378	41 018	56 355	17 431	501	727	355 002	91.3
	Success (1)	14 400	3 285	8 207	6 808	43 586	80 250	25 850	32 757	45 751	14 069	367	567	275 897	90.9
	Success (2)	3 144	2 374	1 977	929	14 344	15 548	19 224	17 967	17 296	3 857	90	124	96 874	86.6
	% (1)	66.7	70.4	77.8	77.8	82.0	76.5	73.1	79.9	81.2	80.7	73.2	78.0	77.8	
	% (2)	14.6	50.9	18.8	10.6	27.0	14.8	54.6	43.8	30.7	22.1	18.0	17.0	27.5	
Total	Active	21 777	5 045	10 983	9 284	56 559	114 091	41 646	48 668	61 585	17 858	517	743	388 769	
	Success (1)	14 509	3 497	8 559	7 174	46 295	88 386	30 745	39 111	49 957	14 362	383	586	303 564	
	Success (2)	3 186	2 567	2 063	1 053	15 432	17 727	22 630	23 078	19 866	3 984	93	128	111 807	
	% (1)	66.6	69.3	77.9	77.3	81.9	77.5	73.8	80.4	81.1	80.4	74.1	78.9	78.1	
	% (2)	14.6	50.9	18.8	11.3	27.3	15.5	54.5	48.7	39.8	22.3	18.0	17.2	28.9	

*(1) = successful duck hunters.
†(2) = successful goose hunters.

Table 4
Annual variation in numbers of successful duck and goose hunters by region, 1976–81, according to place of residence

	Atlantic				Quebec				Ontario				Western and Northern				Pacific and Yukon				Canada				OP	US
Year	OP	US	Res.	Total	OP	US	Res.	Total	OP	US	Res.	Total	OP	US	Res.	Total	OP	US	Res.	Total	OP	US	Res.	Total	%	%
Ducks																										
1976	1 002	92	30 138	31 232	1 746	414	42 934	45 094	2 467	6 832	76 664	85 963	11 020	8 782	117 460	137 262	161	86	14 102	14 349	16 396	16 206	281 298	313 900	5.2	5.2
1977	973	129	35 523	36 625	2 138	405	46 119	48 662	1 380	6 297	84 539	92 216	7 107	7 268	109 760	124 235	197	101	16 091	16 389	11 795	14 200	292 032	318 027	3.7	4.5
1978	757	89	37 808	38 654	1 692	376	45 031	47 099	1 822	6 711	86 114	94 647	6 782	7 937	113 179	127 898	74	132	14 541	14 747	11 127	15 245	296 673	323 045	3.4	4.7
1979	975	44	30 510	31 529	2 126	420	40 791	43 337	1 498	6 405	78 608	86 511	7 354	7 876	107 407	122 279	190	112	13 896	14 198	12 143	14 859	270 852	297 854	4.1	5.0
1980	793	64	31 545	32 402	2 872	439	45 116	48 427	1 557	6 278	80 717	88 552	6 141	8 051	103 444	117 032	135	96	14 061	14 292	11 498	14 928	274 883	301 309	3.8	5.0
1981	1 243	69	30 685	31 997	3 235	389	41 526	45 150	2 010	5 559	74 855	82 424	6 218	8 294	78 574	93 086	443	129	13 921	14 493	13 149	14 440	239 561	267 150	4.9	5.4
M	957	81	32 702	33 740	2 302	407	43 586	46 295	1 789	6 347	80 250	88 386	7 436	8 036	104 927	120 399	200	109	14 436	14 745	12 684	14 980	275,880	303,544	4.2	4.9
%	2.8	0.2	96.9		5.0	0.9	94.1		2.0	7.2	90.8		6.2	6.7	87.2		1.3	0.8			4.2	4.9	90.9			
% NR*		3.0				5.9				9.2				12.9				2.1				9.1				
Geese																										
1976	474	25	8 271	8 770	485	262	9 290	10 037	646	1 622	9 662	11 930	6 075	6 156	52 891	65 127	124	31	2 937	3 092	7 804	8 096	73 761	89 661	8.7	9.0
1977	545	11	8 812	9 368	758	382	12 387	13 527	434	1 533	17 509	19 476	3 962	5 757	45 115	57 834	77	26	2 900	3 003	5 778	7 709	89 723	103 210	5.4	7.5
1978	357	7	9 002	9 366	731	260	18 828	19 819	485	1 540	14 297	16 322	4 738	5 904	54 929	65 571	5	47	3 790	3 842	6 311	7 758	100,846	114 915	5.5	6.8
1979	249	3	7 752	8 004	837	302	15 631	16 770	577	2 192	17 594	20 363	5 171	5 718	61 895	72 784	76	31	3 941	4 048	6 910	8 246	106 813	121 969	5.7	6.8
1980	356	7	8 985	9 348	1 145	360	19 040	20 545	728	1 557	19 929	22 214	4 307	6 800	59 096	90 203	98	31	4 929	5 058	6 634	8 755	111 979	127 368	5.2	6.9
1981	638	7	7 716	8 361	817	186	10 889	11 892	459	1 300	14 296	16 055	4 957	7 000	51 185	63 142	171	59	5 203	5 433	7 042	8 552	89 289	104 883	6.7	8.2
M	437	10	8 423	8 870	796	292	14 344	15 432	555	1 624	15 548	17 727	4 867	6 223	54 611	65 702	92	38	3 947	4 077	6 747	8 187	96 874	111 808	6.0	7.3
%	4.9	Tr†	95.0		5.2	1.9	91.6		3.1	9.2	87.7		7.4	9.5	83.1		2.3	0.9	96.8		6.0	7.3	86.6			
% NR*		5.0				7.1				12.3				16.9				3.2				13.3				

*NR = non-resident regardless of citizenship.
†Tr = trace.

Table 5
Average kill (in thousands) of ducks and geese by provincial zone and place of residence of hunters, 1976–81, in zones where kill by non-residents is greater than 5% of total kill of ducks and/or geese

Province	Quebec		Ontario			Manitoba		Saskatchewan			Alberta		Total
Zone	01	02	01	02	03	01	02	01	02	03	01	02	
Ducks													
OP	21.3	4.0	4.7	12.9	3.6	10.3	3.4	14.5	9.2	13.5	11.5	31.4	140.4
%	5.2	3.9	2.0	2.7	2.3	4.8	3.3	9.0	7.1	6.1	5.4	6.8	4.8
US	2.7	0.9	54.8	7.2	37.9	29.4	18.3	16.0	8.4	24.7	5.1	4.6	210.5
%	0.6	0.9	23.3	1.5	23.7	13.4	17.9	10.2	6.4	11.1	2.4	1.0	7.3
Resident	388.9	97.2	175.9	455.2	118.9	179.3	80.8	130.8	112.5	183.4	196.4	428.9	2548.1
%	94.2	95.2	74.7	95.8	74.0	81.8	78.8	80.8	86.5	82.8	92.2	92.2	87.9
Total	412.9	102.2	235.4	475.3	160.4	218.0	102.5	161.3	130.1	221.6	213.0	464.9	2899.0
Geese													
OP	3.0	1.4	0.5	1.4	0.6	2.8	1.5	9.5	2.4	2.8	5.2	4.5	35.5
%	5.2	7.3	2.7	5.0	3.1	2.8	5.0	11.7	15.0	6.3	7.9	9.3	6.7
US	0.9	1.4	4.1	0.2	6.2	13.3	4.3	13.3	1.4	4.0	4.5	1.1	54.6
%	1.6	7.7	23.3	0.7	32.8	13.3	14.0	16.4	8.5	9.1	6.8	2.3	10.4
Resident	53.7	15.9	12.9	30.0	12.0	83.7	24.9	58.2	12.5	37.8	56.1	42.4	436.2
%	93.2	85.0	74.0	94.3	64.1	83.9	81.0	71.9	76.5	84.6	85.3	88.5	82.8
Total	57.6	18.7	17.4	27.6	18.7	99.8	30.7	80.9	16.4	44.7	65.8	48.0	526.3

Table 6
Average number of days hunted per active hunter and kill per day by successful hunters, by place of residence, 1976–81

Province	Quebec		Ontario			Manitoba		Saskatchewan			Alberta		Total
Zone	01	02	01	02	03	01	02	01	02	03	01	02	
Days/active hunter													
OP	9.1	8.0	7.0	8.8	10.7	6.5	7.1	5.7	7.8	7.9	5.4	6.1	7.1
US	5.6	5.4	7.6	5.9	6.0	5.1	5.0	5.3	5.2	5.5	5.1	6.3	5.8
Resident	9.1	9.5	8.5	6.6	8.3	6.8	7.7	6.7	7.8	9.1	6.8	7.3	7.5
Ducks/day/successful hunter													
OP	1.3	1.2	2.5	1.2	1.1	2.1	1.4	2.2	2.5	1.8	1.9	2.4	1.8
US	1.8	1.2	2.8	1.7	2.3	2.7	3.0	2.2	3.3	3.1	2.1	2.6	2.6
Resident	1.4	1.2	1.2	1.4	1.1	1.4	1.5	1.9	2.1	1.5	1.7	2.1	1.5
Geese/day/successful hunter													
OP	0.4	0.7	1.2	0.5	0.5	0.7	0.7	1.1	0.8	0.6	1.0	0.7	0.7
US	0.7	2.3	0.7	0.5	1.4	1.2	1.1	1.3	0.9	0.9	1.6	1.2	1.1
Resident	0.6	0.5	0.4	0.5	0.6	0.9	0.7	1.0	0.7	0.6	0.9	0.7	0.7

Table 7
Average kill of ducks and geese per season by active and successful hunters by place of residence, 1976–81

Province	Quebec		Ontario			Manitoba		Saskatchewan			Alberta		Total
Zone	01	02	01	02	03	01	02	01	02	03	01	02	
Ducks/active hunter													
OP	9.7	7.3	17.4	9.4	10.0	11.5	8.5	8.8	17.5	12.9	7.4	13.1	10.7
US	8.0	3.6	19.9	7.9	11.1	12.0	13.6	8.7	15.1	16.8	8.1	13.5	12.8
Resident	10.5	8.8	7.6	7.1	6.7	6.7	9.0	9.5	14.1	11.9	9.0	13.0	9.2
Ducks/ successful hunter													
OP	12.1	9.9	18.4	10.8	12.1	13.6	9.5	12.3	19.1	14.1	10.1	14.7	12.9
US	10.2	6.4	21.0	9.8	13.6	13.7	15.0	11.4	17.1	16.7	10.6	16.5	15.0
Resident	12.6	10.9	10.4	9.5	8.8	9.8	11.5	12.3	16.5	13.8	11.7	15.1	11.6
Geese/active hunter													
OP	0.9	2.5	2.7	1.0	0.04	2.3	3.2	4.7	2.6	2.4	2.8	1.0	2.2
US	2.2	6.6	1.5	0.2	1.8	3.7	2.6	6.0	2.4	2.4	7.0	3.1	3.0
Resident	1.4	1.3	0.5	0.4	0.8	2.9	2.7	3.5	1.4	2.0	2.4	1.2	1.4
Geese/ successful hunter													
OP	3.6	5.6	8.4	4.2	5.0	2.7	5.1	6.2	5.9	5.0	5.4	4.3	5.2
US	6.4	8.7	5.4	2.8	8.4	4.2	5.5	7.9	4.9	5.0	7.9	7.3	6.5
Resident	5.3	4.8	3.0	3.0	4.7	4.2	3.5	4.5	5.0	5.5	5.8	5.0	5.2

Table 8
Kill of waterfowl in areas of concentration of non-resident hunting in 1976, 1979, and 1981

Area	Year	Kill of ducks						Kill of geese					
		OP	%	US	%	Res.	%	OP	%	US	%	Res.	%
1	1976	2 103	15.6	0	—	11 416	84.4	14	1.9	0	—	714	98.1
	1979	3 133	24.8	14	Tr	9 466	75.0	17	2.4	2	Tr	700	97.5
	1981	3 590	22.6	35	Tr	12 246	77.3	491	41.0	0	—	708	59.0
2	1976	21 366	12.8	1 360	0.8	144 309	86.4	722	11.8	0	—	5 432	88.9
	1979	16 875	11.4	2 442	1.7	128 149	86.9	2 451	19.1	0	—	10 382	80.9
	1981	18 525	12.1	1 650	1.1	133 060	86.8	1 650	21.1	36	Tr	5 712	79.7
3	1976	5 574	6.0	6 228	6.7	80 846	87.3	842	20.5	51	1.2	3 224	78.3
	1979	2 998	3.9	9 477	12.5	63 410	83.6	435	11.5	318	21.8	2 504	66.6
	1981	23	Tr*	5 554	10.2	48 759	89.7	0	—	177	4.0	4 285	96.0
4	1976	12 247	10.6	59 846	52.0	43 110	37.4	997	13.9	4 240	59.1	1 937	27.0
	1979	280	Tr	42 652	42.8	56 766	56.9	23	Tr	4 773	40.7	6 919	59.1
	1981	1 251	0.3	42 136	48.3	43 835	50.3	23	0.4	2 510	43.1	3 268	56.2
5	1976	2 402	5.3	37 144	81.6	5 995	13.2	89	13.5	315	48.0	253	38.5
	1979	2 282	4.2	32 252	59.6	19 608	36.2	225	8.8	773	30.4	1 547	60.8
	1981	1 277	3.0	17 747	41.6	23 675	55.4	48	2.8	75	4.4	1 567	92.7
6	1976	7 696	7.9	13 776	14.2	75 694	77.9	2 692	6.3	5 520	12.9	34 512	80.8
	1979	1 561	1.1	16 904	12.0	121 963	86.9	3 284	3.1	11 345	10.7	91 606	86.2
	1981	3 575	3.2	21 673	19.5	85 908	77.3	2 430	3.4	14 744	20.8	53 648	75.8
7	1976	8 964	6.9	10 934	8.4	110 069	84.7	271	1.5	601	3.4	16 952	95.1
	1979	7 397	6.8	20 012	18.4	81 168	74.8	1 741	4.2	6 325	15.3	33 262	80.5
	1981	5 174	6.2	15 330	18.3	63 226	75.5	1 723	4.0	11 113	25.8	30 177	70.2
8	1976	441	1.6	12 912	45.7	13 353	47.3	14	Tr	560	26.6	1 529	72.7
	1979	671	2.0	12 988	40.2	18 617	52.7	90	5.5	55	3.3	1 510	91.2
	1981	98	0.4	8 256	35.3	16 018	65.7	0	—	288	9.5	2 756	90.5
9	1976	5 962	12.6	5 753	12.2	35 481	75.2	354	9.6	238	7.3	3 092	84.0
	1979	298	Tr	8 886	19.1	35 061	80.2	0	—	1 349	15.0	5 607	85.0
	1981	0	—	4 288	33.4	8 553	66.6	0	—	1 014	31.8	2 178	69.2
10	1976	10 191	5.9	23 119	13.4	139 530	80.7	1 507	6.0	3 173	12.6	20 547	81.5
	1979	12 465	7.9	23 224	14.7	121 903	77.4	4 279	12.9	3 868	11.6	25 127	75.5
	1981	7 473	11.6	7 052	10.9	50 062	77.5	2 875	10.0	1 785	6.2	24 189	83.9
11	1976	19 889	16.9	23 312	19.8	74 516	63.3	12 930	18.4	12 383	17.6	44 948	64.0
	1979	3 525	8.0	6 736	15.9	32 024	75.7	5 276	9.7	9 612	17.7	39 487	72.6
	1981	4 629	13.7	5 968	17.7	23 086	68.5	8 144	15.2	11 570	21.6	33 814	63.2
12	1976	9 173	11.7	8 289	10.6	61 016	77.8	3 679	11.4	4 953	15.4	23 570	73.2
	1979	5 590	10.4	4 392	8.2	43 538	81.4	1 510	5.8	3 176	12.2	21 288	82.0
	1981	2 899	8.0	3 616	10.0	36 318	82.0	2 479	9.0	2 794	10.0	22 446	81.0
13	1976	20 225	8.6	1 089	0.5	213 028	90.9	1 601	4.5	836	2.3	33 199	93.2
	1979	11 472	6.1	736	Tr	176 346	93.5	1 546	4.7	557	1.7	30 674	93.6
	1981	9 910	5.2	4 006	2.1	177 501	92.7	4 855	10.3	786	1.7	41 313	88.0
14	1976	12 521	21.5	136	Tr	45 666	78.3	3 052	41.5	122	1.7	4 175	56.8
	1979	12 116	21.8	763	1.4	42 670	76.8	2 256	14.9	740	4.8	12 187	80.3
	1981	5 998	15.1	1 892	4.8	31 918	80.1	2 674	14.6	371	2.0	15 311	83.4
Total	1976	138 754	9.9	203 898	14.6	1 054 029	75.5	28 764	10.8	32 992	12.4	204 490	76.8
	1979	80 655	6.7	180 928	14.9	950 689	78.4	23 133	6.6	43 393	12.4	282 800	81.0
	1981	64 422	6.5	139 203	14.1	784 165	79.4	27 392	9.1	47 263	15.7	266 061	75.2
Change	76–79	−58 099	−41.9	−21 970	−10.8	−103 340	−9.8	−5 631	−19.6	10 401	31.5	78 310	38.3
	76–81	−74 332	−53.6	64 695	−31.7	−269 864	−25.6	−1 372	−4.8	14 271	43.3	21 571	10.6

*Tr = trace.

Table 9
Average kill (in thousands) of ducks by US hunters in Canada, 1976–81, according to state of residence and province of kill where their kill exceeds 1000 ducks

State of residence	Province of kill						Total	% US kill in Canada
	Que.	Ont.	Man.	Sask.	Alta.	BC		
California	Tr*	0.1	0.1	0.8	0.7	0.2	1.9	0.9
Iowa	Tr	1.4	1.7	2.0	0.4	—	5.4	2.5
Illinois	Tr	2.9	3.3	2.2	0.2	—	8.5	3.9
Indiana	0.1	1.0	1.1	0.8	0.1	—	3.1	1.4
Michigan	0.1	50.8	5.6	4.5	0.2	Tr	61.3	28.0
Minnesota	Tr	25.1	22.2	20.0	2.6	Tr	69.9	32.0
Montana	—	—	0.1	0.2	0.9	—	1.2	0.5
North Dakota	—	0.2	1.0	0.7	—	—	1.9	0.9
New York	1.3	8.0	0.1	0.3	—	—	9.7	4.4
Ohio	0.5	6.9	0.2	2.3	Tr	Tr	9.9	4.5
Pennsylvania	0.1	2.0	0.3	0.8	Tr	—	3.2	1.5
Washington	Tr	—	0.1	0.3	1.5	0.6	2.5	1.1
Wisconsin	Tr	3.5	11.9	12.2	1.1	—	28.8	13.2
Others	1.6	2.0	1.3	3.2	2.1	0.3	11.3	5.2
Total	3.7	104.0	49.0	50.5	9.8	1.1	218.5	—

*Tr = trace.

Table 10
Average kill (in thousands) of geese by US hunters in Canada, 1976–81, according to state of residence and province of kill where their kill exceeds 500 geese

State of residence	Province of kill					Total	% US kill in Canada
	Que.	Ont.	Man.	Sask.	Alta.		
California	0.1	Tr	Tr	0.3	0.1	0.6	1.0
Florida	Tr*	0.2	0.1	0.2	0.1	0.6	1.0
Iowa	—	0.2	0.9	0.6	0.1	1.7	3.0
Illinois	Tr	0.4	1.2	0.3	Tr	1.9	3.0
Indiana	—	0.1	0.5	0.5	Tr	1.1	2.0
Michigan	0.1	5.4	1.5	1.5	Tr	8.6	15.0
Minnesota	Tr	1.1	10.9	11.7	1.9	25.6	45.0
Montana	—	—	0.1	0.9	1.0	2.0	3.0
North Dakota	—	Tr	1.1	0.2	—	1.3	2.0
New York	0.7	0.6	—	—	—	1.2	2.0
Ohio	0.2	0.8	Tr	0.3	Tr	1.4	2.0
Pennsylvania	0.1	0.4	Tr	0.1	—	0.6	1.0
Washington	—	—	Tr	0.2	0.8	1.1	2.0
Wisconsin	—	0.4	2.2	1.4	0.5	4.4	8.0
Others	1.4	1.0	0.2	0.9	1.2	4.0	8.0
Total	2.7	10.7	18.7	19.1	5.6	56.6	98.0

*Tr = trace.

Table 11
Average kill of ducks by OP hunters according to province of residence and province of kill, 1976–81

Province of residence	Province of kill												Total
	Nfld.	PEI	NS	NB	Que.	Ont.	Man.	Sask.	Alta.	BC	NWT	YT	
Nfld.	—	101	188	3	1 010	104	29	94	—	—	—	—	1 529
PEI	22	—	128	312	—	—	4	37	—	—	—	—	503
NS	36	868	—	1 956	6	55	2	187	227	—	—	—	3 337
NB	42	699	2 758	—	1 385	108	49	92	152	—	—	—	5 285
Que.	481	62	194	333	—	17 217	26	523	1 379	—	9	—	20 224
Ont.	10	41	645	64	19 780	—	8 440	8 812	4 858	102	240	—	42 992
Man.	26	—	—	—	96	1 487	—	3 886	418	62	51	—	6 026
Sask.	—	—	—	—	866	582	2 804	—	3 908	256	11	—	8 427
Alta.	—	—	—	—	372	616	395	10 421	—	1 841	15	16	13 676
BC	—	—	—	—	—	34	951	8 980	26 538	—	—	17	36 920
NWT	—	—	—	—	—	3	19	318	1 581	3	—	32	1 956
YT	—	—	—	—	—	—	2	53	254	52	47	—	408
Est. total*	617	1 771	3 913	2 668	23 515	20 206	12 721	33 403	39 315	2 316	373	65	140 883
NHS total	626	2 034	3 954	2 954	24 867	21 705	13 738	37 589	43 895	2 387	421	77	155 247

*Estimates of kill by province of kill subject to error (see text).

Table 12
Average kill of geese by OP hunters according to province of residence and province of kill, 1976–81

Province of residence	Province of kill												Total
	Nfld.	PEI	NS	NB	Que.	Ont.	Man.	Sask.	Alta.	BC	NWT	YT	
Nfld.	—	88	—	—	418	140	—	—	—	—	—	—	646
PEI	—	—	46	125	—	—	11	—	—	—	—	—	171
NS	4	278	—	80	2	6	5	48	97	—	—	—	520
NB	—	168	117	—	419	143	34	—	50	—	—	—	931
Que.	106	40	32	147	—	1 790	143	161	77	—	45	—	2 541
Ont.	—	38	39	40	3 507	—	2 707	2 240	809	—	22	—	9 402
Man.	—	—	—	—	65	148	—	2 492	131	—	—	—	2 836
Sask.	—	—	—	—	80	70	450	—	1 803	101	—	—	2 504
Alta.	—	—	—	—	50	160	407	3 896	—	200	3	13	4 729
BC	—	—	—	—	—	10	404	3 636	4 958	—	—	10	9 018
NWT	—	—	—	—	—	—	121	136	965	2	—	—	1 224
YT	—	—	—	—	—	—	—	25	82	—	—	—	107
Est. total*	110	612	234	392	4 541	2 467	4 282	12 634	8 972	303	70	23	34 629
NHS total	127	711	253	473	4 597	2 493	4 322	14 133	9 888	315	70	23	37 405

*Estimates of kill by province of kill subject to error (see text).

Table 13
Kill (in thousands) of ducks and geese by US hunters in Canada, 1976–81, compared with kill in state of residence

State	Ducks						Geese					
	Province of kill					Kill in resident state	Province of kill					Kill in resident state
	Ont.	Man.	Sask.	Other	Total		Ont.	Man.	Sask.	Other	Total	
Michigan												
1976	68.7	1.6	4.3	0.1	74.7	455.8	6.2	0.3	0.9	0.2	7.6	26.9
1977	46.9	2.9	1.7	0.1	52.2	243.1	3.6	0.3	0.7	0.4	5.0	30.7
1978	49.7	6.0	8.2	0.3	64.2	277.8	5.7	1.1	3.2	0.2	10.2	22.7
1979	49.1	7.8	8.3	0.3	65.5	314.8	0.2	9.1	1.5	0.2	11.0	35.7
1980	44.6	5.5	2.2	0.5	52.8	292.1	4.5	0.5	1.7	0.1	6.8	34.5
1981	45.8	9.7	2.1	0.9	58.5	238.7	4.0	6.2	0.9	0.1	11.2	32.0
Wisconsin												
1976	4.0	11.3	23.1	1.1	39.5	637.4	1.0	1.1	1.6	0.5	4.2	46.5
1977	2.5	9.2	11.3	0.5	23.5	471.1	0.2	1.6	1.2	Tr*	3.0	87.7
1978	3.4	12.4	12.6	1.6	30.0	513.3	0.4	1.8	1.2	0.5	3.9	86.1
1979	3.1	14.2	11.0	1.8	30.1	568.9	0.3	2.8	1.2	Tr	4.3	66.2
1980	5.9	9.7	9.1	0.8	25.5	558.2	0.3	2.3	1.7	0.5	4.8	64.8
1981	2.1	14.3	6.2	2.7	25.3	438.9	0.2	3.8	1.3	0.2	5.5	46.6
Minnesota												
1976	30.9	23.7	30.4	3.9	88.9	612.0	0.2	5.3	12.9	2.4	20.8	63.6
1977	24.9	18.5	17.4	3.4	64.2	686.5	1.9	5.1	14.2	1.7	22.9	57.7
1978	30.5	17.3	15.0	2.3	65.1	109.7	1.6	5.7	9.3	1.6	18.2	71.6
1979	27.0	22.7	21.9	3.9	75.5	1104.1	1.5	11.3	9.5	1.1	24.8	99.1
1980	17.0	26.3	20.6	2.0	65.9	811.5	0.8	21.4	11.6	1.9	35.7	79.6
1981	19.5	24.5	14.6	1.3	59.9	806.5	0.8	16.9	12.5	1.2	31.4	93.0

*Tr = trace.

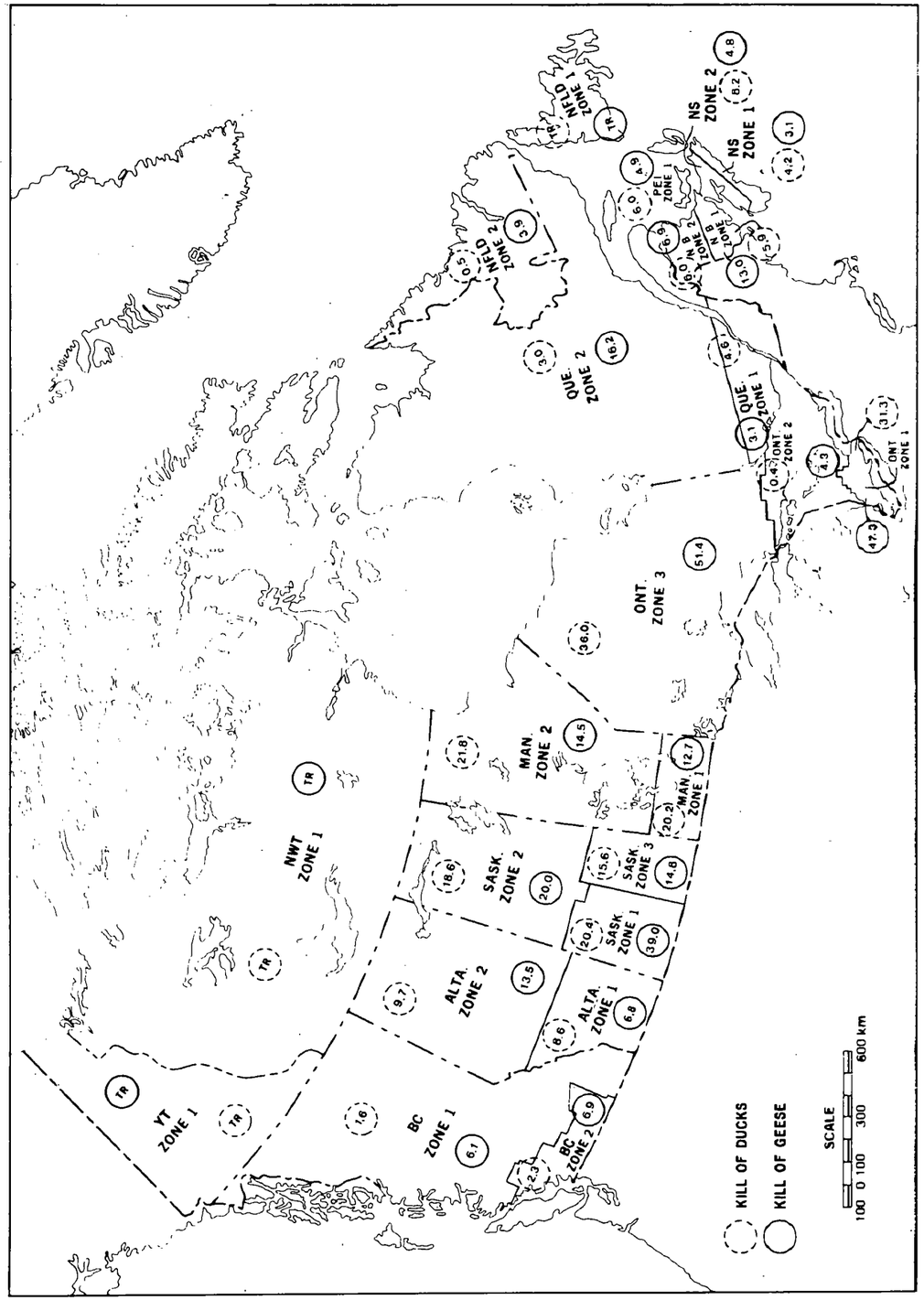

Figure 1
Kill of ducks and geese by non-resident hunters as percentages of kill in a zone, 1976 (TR = trace)

Figure 2
Kill of ducks and geese by non-resident hunters as percentages of all kill in a zone, 1981 (TR = trace)

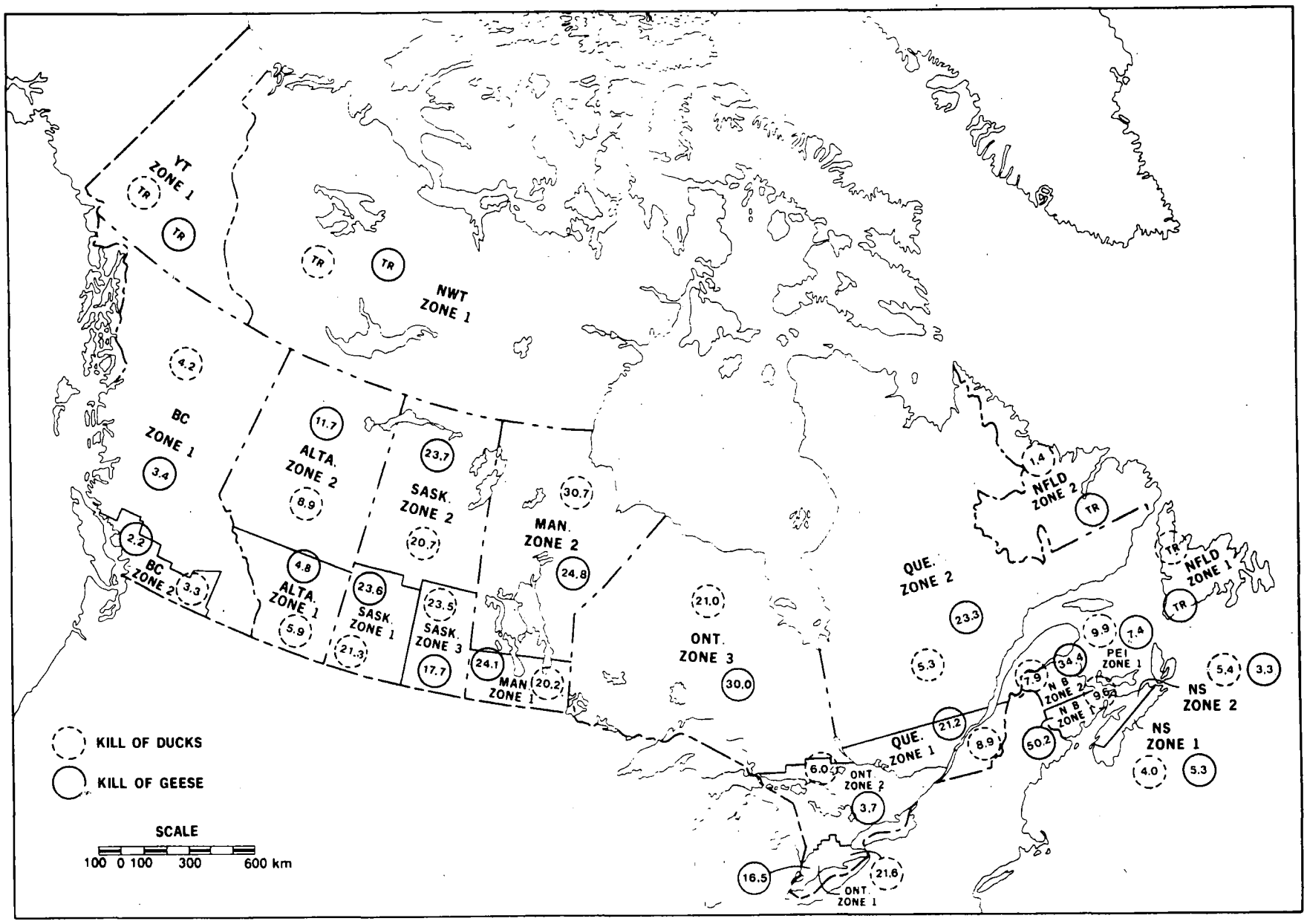

Figure 3
Areas of concentration of non-resident hunters