

**Recent changes in sales of Migratory Game
Bird Hunting Permits and prospects for
the near future**by H. Boyd¹ and F.G. Cooch¹**Abstract**

Sales of Migratory Game Bird Hunting Permits rose from 368 000 in 1966, the year when the permit was introduced, to 525 000 in 1978, then fell to less than 415 000 in 1984. Although the recent declines have been steepest in the prairie provinces, where decreasing hunting activity and success have accompanied a great reduction in numbers of the preferred game ducks, they have occurred throughout the country, even in the Atlantic provinces, where hunting success has recently increased. As waterfowl hunters are predominantly male (97% in 1966-71, \geq 90% in 1981), the age-distribution of permit buyers has been compared with that of the entire male population aged 15 years and over. Prior to 1978 the rate of increase in permit sales in some regions was greater than the rate of population growth. Recently the sales per 1000 males have fallen in all regions. Most of the decrease has been in sales to persons under 35, the participation rates of older men having been maintained, with those of men over 65 increasing. The number of males entering the population aged 15 years and over will be substantially less in the decade 1985-94 than it was in 1975-84. Thus, even if prairie duck populations were to be restored, it seems likely that the demand for waterfowl hunting, as expressed in permit sales and in the activities of permit holders, will continue to fall, to perhaps 329 000 in 1991, although it may then level out or increase again. Increasing the number of ducks may not be a sufficient incentive to reverse the drift away from duck hunting by young Canadians.

Introduction

Effective management of migratory game bird hunting requires information about the demand for hunting as well as the supply of quarry species. The Migratory Game Bird Hunting Permit (hereafter, the permit) was introduced in Canada in 1966 in order to help monitor the demand and its effect on waterfowl and other migratory game birds. Hunters, other than Indians and Inuit, are legally obliged to be in possession of a permit while hunting. A permit has to be bought each year, so that the sales records provide one crude measure of demand. In addition, the names and addresses of permit buyers provide the sampling frames for the National Harvest Survey (NHS) and Species Composition Survey (SCS), two mail questionnaire surveys used by the Canadian Wildlife Service (CWS) to estimate the number of active and successful hunters, how often they hunt, what species they take, where and when, and the sex- and age-composition of the retrieved kill. The

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working of the Canadian permit and survey system was described in detail by Cooch *et al.* (1978). Subsequent operational changes in the system have been few and minor, so that consistent sets of data are available from 1972 onwards.

The Canadian permit system and the NHS and SCS were preceded by similar data-generating systems in the USA, where the sampling frame is provided by the requirement to buy a Federal Waterfowl Hunting Stamp (the duck stamp). The evidence from permit sales in Canada and duck stamp sales in the USA is that legally demonstrated demand for waterfowl hunting has declined substantially in both countries in recent years (Boyd 1985). US duck stamp sales averaged 2.2 million in 1949-58, fell during the 1960s, rose again to 2.4 million in 1970 and 1971 and have since fallen to 1.77 million in 1983 and 1984, nearly 27% below the peak (US Fish and Wildlife Service Environmental Impact Statement 1975 and subsequent administrative reports). In Canada permit sales rose from 380 000 in 1966 to 525 000 in 1978, falling to less than 415 000 in 1984. In both countries the recent decline has been general.

The North American Waterfowl Management Plan (NAWMP) has as one objective to "provide the opportunity for 2.2 million hunters to harvest 20 million ducks in Canada and the United States in an average year" (USFWS/CWS draft plan, November 1985, page 10). The annual objective of 2.2 million active waterfowl hunters compares with the combined sales of 2.18 million duck stamps and permits in 1984 (well below the 2.8 million sold in the US peak year of 1970-71). Thus one apparent management task is to halt the slide in the number of active hunters.

Understanding the reasons for falling permit sales is therefore important to waterfowl managers. In the prairie provinces, where the slump in duck hunting has been greatest, it is generally assumed that the falling off of hunting activity has been closely tied to the great reduction in Mallard *Anas platyrhynchos* and other dabbling ducks breeding in the parklands and grasslands during the drought that has persisted for the last 7 years, and to the extremely low breeding success of these depleted stocks. Yet the reduction in permit sales is a national, not just a regional, phenomenon, which cannot be accounted for so simply.

This report examines changes in Canadian permit sales and in the reported activities of waterfowl hunters nationally and in five major regions, ignoring smaller-scale differences (some of which are considerable). Age-related differences having been found to be particularly important, one section is devoted to comparisons between the age-composition of permit-buyers and of the male population aged 15 years and over, from which nearly all waterfowl hunters are drawn. In 1966-71 only 3% of permit buyers were female. (The sex of applicants has not been asked for since 1971.) The Labour Force Survey of 1981 (Filion *et al.*

1983) suggested that only 10% of the people who claimed to have hunted any form of wildlife that year were women. The lower limit of 15 years for the age of waterfowl hunters is only a rough approximation. There are differences between provinces in the imposition of an age-limit on the handling of firearms, and there seem to be cultural differences affecting the age at which people start hunting in different parts of the country. There is no clear upper limit either. Relatively few men over 60 hunt waterfowl regularly, although their numbers are increasing (see below).

This inquiry deals only with permit-buying Canadians. Changes in the numbers and activities of American and other visiting waterfowl hunters were studied by Cooch (1978, 1982). The analyses are based on province of permit purchase. There are important differences in the behaviour and success of "mobile" and "sedentary" hunters (Cooch 1982) but they too are outside the scope of this investigation.

Waterfowl hunting in the Yukon and Northwest Territories has been omitted from this study. The number of permits sold in these territories is small (less than 1350 in 1954) and most of the hunting is by indigenous peoples, whose hunting activity is not sampled by the National Harvest Survey.

Most of the analyses deal with the years 1971-83, some with 1974-84. Only sales records are looked at for the entire period 1966-84 for which the permit has been in use. The restricted periods are a consequence of some data from earlier years not having been collected in the same ways as in later years and of some other early information not being readily retrievable.

A study of public interest in wildlife conducted by Statistics Canada for the CWS and provincial wildlife agencies (Filion *et al.* 1983) suggested that in 1981 about 700 000 Canadians hunted waterfowl. In 1981 only 465 000 permits were bought. This discrepancy raises the possibility that as much as one-third of active waterfowl hunters do not buy permits, so that their activities are not sampled. (The proportion of "unlicensed" waterfowl hunting in the USA may be even higher: see Boyd 1985.) Thus, some of the apparent rise and fall in demand indicated by changing permit sales may be due to changes in the proportion of hunters choosing to buy, rather than to variations in the total annual amount of waterfowl hunting. As there is no other independent information on this point, the subsequent account and discussion are based on the assumption that fluctuations in permit sales reflect corresponding changes in waterfowl hunting activity, i.e. that the ratio of permit-buying to non-buying hunters has remained constant. That assumption is obviously a hazardous one.

Results

Regional changes in permit sales, 1966-84

The numbers of permits sold in the early years were about 140 000 in each of two regions (Ontario and the prairies) and 33 000-40 000 in each of the other three (Fig. 1). In the prairies, Atlantic, and Quebec sales climbed fairly steadily for more than a decade, then began to fall, steeply in the prairies and mildly in the east. In Ontario sales

decreased from 1967 to 1972, then climbed to a peak in 1976 before falling back to near the initial level. In British Columbia sales fluctuated gently between 1966 and 1973, fell rather abruptly to 1975, recovered a little, then remained very steady from 1977 to 1981 before falling, in line with those in the other regions, in the three most recent years. The general dip in sales in 1974 was attributed to an increase that year in the permit fee, from \$2.00 to \$3.50.

Growing sales in the early years have been attributed in part to gradual public realization of the legal requirement to possess a permit (Cooch *et al.* 1978). It seems unlikely that sustained increases for a decade or more can be accounted for entirely in that way, and the patterns in British Columbia and Ontario are sufficiently distinct to suggest that no single set of explanations can account for the changes in all parts of the country.

The NHS has shown that appreciable numbers of permit buyers report that they did not hunt despite having bought a permit, while many of the active hunters report that they failed to bag any migratory game birds (Cooch *et al.* 1978). Filion (1980) investigated the reasons given by permit buyers for not using their permits, by means of a special survey in New Brunswick early in 1978. "The study revealed sociological and opportunity cost reasons to be more important than constraints imposed by age, health or attitudes" (Filion *loc. cit.*). (No attempt was made to relate reported waterfowl hunting activity to the provincial supply of waterfowl, but hunters did not rank scarcity of waterfowl or poor hunting success as important deterrents to hunting.)

The permit application form contains a question asking whether the applicant bought a permit in the previous year. Though the surveys do not provide a continuous record of the annual migratory game bird hunting activities of individuals, the sample information makes it possible to see whether there are many hunters who do not buy permits regularly and whether there are differences between regions and over time in the proportions of permit buyers who go hunting and who are successful in taking at least one bird.

In the latest 11 years (1974-84) nearly four-fifths of permit applicants said that they had bought a permit in the previous year (Table 1), the proportion being highest in Ontario and lowest in British Columbia. The proportion of repeat buyers was increasing in four regions, and decreasing in British Columbia. The greatest increase in repeats was in the Atlantic provinces.

Table 2 summarizes the proportion of active and of successful hunters among permit buyers. The prairie provinces showed the highest percentages of both but also the greatest rate of decline in activity and success. Quebec, with the second highest proportion of active and successful hunters, also showed substantial reduction in activity through the decade. Elsewhere there were few trends in activity, although in the Atlantic provinces, and to a smaller extent in Ontario, the ratio of successful to active hunters was increasing.

Numbers of permits bought by hunters of different ages, 1971-84

Permit sales to buyers in each region according to their age (in 10-year groupings) are illustrated in Figure 2. In all regions, the frequency of sales decreases with increasing age. Sales to older hunters have been maintained, or even increased, while those to hunters under 35 rose until the late 1970s and then fell. In the Atlantic, Quebec, and prairie regions sales to hunters of 15-24 years were greatest until the most recent years. In Ontario and British Columbia (since 1974) 25-34 year-olds provided the largest class of buyers.

Figure 3 emphasizes how strongly and uniformly across the country the proportion of all permit buyers under the age of 25 years has been falling for most of the period, the fall having begun before the total sales had peaked.

Permit buyers as a proportion of the male population 15 years of age and older

The numbers of males 15 years of age or older (Statistics Canada 1979, 1983, 1984), from whom most permit buyers will come, have grown in all five regions (Fig. 4), though more rapidly in the west than in the east, especially between 1976 and 1981. Permit sales might have been expected to increase in company with population growth. In Figure 5, permit buyers are expressed as a proportion of each 1000 adult males. This does not greatly change the shape of the lines in Figure 1 but substantially alters their relative positions. The proportion of males buying permits is much higher in the prairie and Atlantic regions than in the regions with the largest populations.

Cooch *et al.* (1978) compared the regional participation rates in 1966 and 1976: they were increasing in the Atlantic, Quebec, and prairie regions and decreasing in Ontario and British Columbia. As the regional rates of increase in participation were greater than the rates of population growth, Cooch *et al.* inferred that increasing hunting pressure on migratory game bird populations was to be expected. Figure 5 indicates that this is no longer the case, nationally or regionally.

Regional differences in the age-distribution of permit buyers

In Figure 6 permit sales per 1000 males are used to exhibit the participation of different age-groups. The rate for men aged 25-34 years is highest in all regions, though less clearly so in British Columbia and the prairies than further east. Except in the prairies, the participation of hunters over 45 has been maintained or has tended to increase in the most recent years, during which the participation of younger hunters, especially those under 25, has fallen everywhere. The differences between regions in the relative popularity of waterfowl hunting are shown most strikingly by comparing the prairies and Quebec: even in the most recent years, more than three times as many males per 1000 aged 25-34 were buying permits in the prairies and the proportion of prairie men over 65 that bought permits was as high as in the 25-34 year old group in Quebec.

The numbers of males aged 15-24 years increased between 1971 and 1980 (Fig. 7), so that their reduced buying of permits after 1978 was not immediately due to a

shrinking age-group. After 1976 they decreased as a proportion of the total male population and, except in Québec, as a proportion of the male population aged 15 and over, which might account for some, but certainly not for all, of their relative decline in permit buying (Fig. 2). Since 1980 the numbers of men in the age-group 15-24 years have started to fall, most steeply in Quebec (Fig. 7), so that the potential recruits to waterfowl hunting are decreasing and will continue to do so for several more years before levelling out in the 1990s.

Age-related differences in renewals and non-renewals in Ontario

More permits are bought in Ontario than in any other province and the Province is less dependent on prairie ducks than are those further west, so that Ontario forms a convenient region for examining changes in the pattern of permit buying. It has been shown above that, in Ontario as elsewhere, sales to young hunters have decreased far more than those to older hunters. Using a double dichotomy, by age of buyer (under 25 years old or 25 years and older) and by whether a permit had been bought in the previous year (renewal) or not (non-renewal), Figure 8 shows that the changes in sales over time differed in form for renewals and non-renewals and in slope, rather than in form for young and for older hunters.

Non-renewals (as near to an index of "first purchasers" as the NHS questionnaire enables us to reach) peaked as early as 1973 for both young and older hunters, fell substantially though erratically to 1979, and changed relatively little from 1979 to 1984. Over the entire period, and estimating the change from fitted linear regression lines rather than from the values for the years 1972 and 1984 themselves, non-renewals showed a reduction of 15.7% for hunters of 25 years and older and of 45.3% for hunters under 25 years old.

For both young and older hunters renewals increased substantially from 1971 to 1978, after which they fell even more steeply for young hunters and rather gently for older ones. Fitting separate regression lines to the data for 1972-78 and 1978-84, the percentage changes were: 1972-78 increase of 30.2% for young hunters and 22.9% for those over 25; 1978-84 decrease of 32.0% for young hunters and 4.2% for older ones.

These results suggest that recruitment of new hunters (or irregular ones) decreased much more among young people than older ones and that their drop out rate after 1978 was much higher than that of older hunters, although in 1971-78 the numbers of young hunters renewing permits had grown more rapidly. Evidently older hunters are more attached to waterfowl hunting than are young ones.

Projections of permit sales to 1991

Cooch *et al.* (1978) used linear extrapolations of sales in 1968-77 to estimate sales in 1978-85. Recalling that sales peaked in 1978, it is not surprising that their estimates were far from being realized. They forecast national sales of about 575 000 permits in 1984, whereas the actual sales were not quite 415 000: i.e. a forecast increase of 10.5% over 1977 turned out to be a real decrease of 20.3%. As

the adult male population had continued to increase, the failure of that forecast must have been due to changes in their preference and/or opportunities for waterfowl hunting. The national nature of the recent decline, even in the eastern regions, which are scarcely at all affected by the reduced number of ducks being produced in the southern prairies, suggests that the supply of ducks is not the principal determinant of hunting effort in Canada. The respondents to the 1978 special survey in New Brunswick stated that duck numbers had little influence on their decisions whether or not to hunt (Filion 1980). Additional special surveys of attitudes and behaviour will be needed to establish why men decide to hunt waterfowl and why fewer young men have chosen to do so in recent years. Biologists who are actively involved with the waterfowl hunting community have suggested several reasons for reduced participation, including the continuing decline in the number of people living on farms, and greater difficulty in gaining access to possible hunting areas, due to the growth of "no hunting" posting by landowners.

Forecasts of future permit sales can be derived from recent records of sales and male population size. It is convenient to use 1986 and 1991, the next two census years, as the target years. Linear extrapolation from the trend of permit sales in the years 1976-84 indicates sales of 413 000 in 1986 and 358 000 in 1991. Records from earlier years are excluded because of the general reversal of sales trends in the late 1970s. More reliable forecasts may be derived by first calculating the likely size of the male population aged 15 years and over and then multiplying the population size (in thousands) by the participation rate. Population forecasting involves allowance for immigration and emigration as well as births and deaths. Inspection of recent data (Statistics Canada 1984) suggests that, despite deaths, younger age-classes increase slightly over time, due to immigration. Initially I use simple extrapolation of the population trends for 1976-83, the latest year for which population estimates have been published (Table 3, Fig. 8), with conservative participation rates in the form of the national and regional values recorded in 1981, i.e. a set of constant rates. A rather more realistic alternative is provided by extrapolating the participation rates from the same years.

The national and regional permit sales forecasts summarized in Table 4 show several common features and a few divergencies. As noted earlier, if constant participation rates are used the estimates of future permit sales increase: nationally the total might return by 1991 to close to its 1978 peak of 525 000. The more likely results are those derived from decreasing participation rates. In most cases the projections are very close to those obtained by extrapolating from the sales records directly, as is to be expected. Perhaps the most interesting cases are the 1991 estimates for Ontario and the prairies. For Ontario, use of varying participation rates (estimate D) leads to an estimate of sales in 1991 well below the actual sales in 1984, while the sales projection indicates a lesser decline. For the prairies, changing participation rates also steepen the

decline of sales, suggesting that in 1991 permit sales may have fallen to only 64 000, just over half the 1984 sales and not much more than one-third of the 1977 peak.

In the Atlantic region the forecasts suggest that sales are likely to fall, but very slowly. In Quebec it seems more likely that they will increase up to 1986 but then stay much the same. In British Columbia future sales are likely to fluctuate within the range of values recorded between 1976 and 1984 (20 000 - 33 500). Nationally, if the constant participation estimates are set aside, the indications are that in 1986 sales will be at or rather above the 1984 level of 415 000. (These estimates ignore the impact of the additional \$4.00 that permit buyers were first required to spend in 1985 on a Wildlife Habitat Stamp, to be affixed to the permit.) By 1991 sales may have fallen to around 329 000, due very largely to the continued decline in the prairies. If attention is concentrated on the participation rates of hunters 15-34 years old, far more dramatic reductions in waterfowl hunting activity can be predicted, but initially it seems more useful to take a conservative view.

A reduction in Canadian permit sales from 525 000 in 1978 to a projected 329 000 in 1991, a drop of 37%, would result in a further decline in the Canadian share of harvested ducks, as has happened since the introduction of "stable regulations" in 1978-79 (Boyd 1985), even though the numbers of American hunters have also been falling. This does not seem to represent a sound national management strategy, given that a substantial majority of the ducks of North America, and a very great majority of the geese, are produced in Canada.

Outside the prairie region the forecast changes between 1984 and 1991 are smaller than those observed between 1978 and 1984 and include possible increases as well as decreases in permit sales. This suggests that over most of Canada a continuation of the long-standing waterfowl management policy of minimum intervention, with little change in hunting regulations and only a very small proportion of the fall waterfowl population afforded refuge on National Wildlife Areas and other protected sites, could well be adequate.

In the prairie region regulatory *laissez faire* seems unlikely to be enough to end the major decrease of duck hunter activity and success (Boyd 1985) and the accompanying fall in permit sales. Increasing the supply of prairie ducks would certainly help hunters in the USA, and to some extent in prairie Canada too. Yet, unless the national drift away from waterfowl hunting is reversed, Canadian investment in enhancing prairie waterfowl production is likely to yield poor returns to Canadian hunters. There are, of course, other good reasons for conserving wetlands in the prairies. The case for their conservation should be made on the widest possible grounds, not solely on the restoration of duck production.

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Table 1

Percentages of buyers of Migratory Game Bird Hunting Permits who reported having also bought a permit in the previous year ("renewals"), 1974-84

	Canada	Atlantic	Quebec	Ontario	Prairies	BC
Mean	79.1	77.8	77.8	82.7	77.9	75.8
Standard error	1.8	3.4	1.6	1.7	2.3	1.4
Change, 1974 to 1984, as % of 1974	6.8	11.3	6.1	5.5	7.3	-3.9

Table 2

Mean numbers of Migratory Game Bird Hunting Permits bought in Canada and the five major regions, 1974-84, with percentages of permit buyers who reported actively hunting waterfowl and success in obtaining at least one bird

	Canada	Atlantic	Quebec	Ontario	Prairies	BC
Permits bought ($\times 10^3$)	475.4	64.6	69.5	146.1	167.1	26.6
Standard error	33.7	5.2	5.6	7.2	18.1	2.2
% active	78.4	70.8	78.8	76.3	84.7	65.7
SE	2.7	2.4	3.6	1.2	4.8	2.9
% successful	65.6	52.6	67.3	60.9	75.3	54.4
SE	2.7	2.3	3.6	1.1	5.3	2.8
Successful/active, %	83.6	74.2	85.4	79.9	88.8	82.8
SE	1.0	2.8	1.3	1.5	1.9	2.8
Change, 1974 to 1984, as % of 1974						
Sales	0	0	0	0	-17.8	-13.5
Active	-8.8	0	-9.6	-3.0	-14.7	0
Successful	-9.1	0	-10.7	0	-17.3	0
Successful/active	0	7.2	0	4.0	0	0

Table 3

Numbers of males aged 15-24 years in Canada and in regional populations in the census years 1976 and 1981, in total (in thousands) and as percentages of the male population aged 15 years and older, with projections for 1986 and 1991 (in italics)

	Canada	Atlantic	Quebec	Ontario	Prairies	BC
Males, 15-24						
1976	2261.8	222.5	637.6	781.0	382.7	231.3
1981	2356.2	221.3	638.7	806.1	435.8	247.2
1986*	<i>2176</i>	<i>222</i>	<i>559</i>	<i>764</i>	<i>392</i>	<i>231</i>
1991	<i>1904</i>	<i>205</i>	<i>472</i>	<i>669</i>	<i>345</i>	<i>204</i>
Change, 1976-91	-358	-17	-166	-112	-35	-27
Males, 15-24 as percentage of males, 15+						
1976	26.8	28.9	28.6	25.7	27.7	24.9
1981	25.5	26.9	28.7	25.5	26.7	22.4
1986	<i>22.2</i>	<i>26.2</i>	<i>21.9</i>	<i>22.4</i>	<i>21.8</i>	<i>19.6</i>
1991	<i>18.2</i>	<i>22.9</i>	<i>17.4</i>	<i>18.5</i>	<i>17.3</i>	<i>15.6</i>
Change, 1976-91	-8.6	-6.0	-11.2	-7.2	-10.4	-9.3

*Circumflexes indicate forecast data.

Table 4

Forecasts of MGBH permit sales in the census years 1986 and 1991: A — from linear extrapolation of sales in 1976-84; B — from male population projections assuming participation rates return to and remain at their levels in 1981; C — from male population projections multiplied by gross participation rates (i.e. for all males 15 years and over), extrapolated from 1976-83; D — from male population projections multiplied by projected age-related participation rates. In thousands

		Canada	Atlantic	Quebec	Ontario	Prairies	BC
1986*	A	413.5	59.8	71.6	136.8	123.2	27.2
	B	492.4	65.5	80.4	152.9	170.8	30.1
	C	422.5	59.6	73.2	135.1	123.4	24.3
	D	358.0	57.1	61.6	122.0	109.0	24.2
1991	A	357.9	54.6	71.6	128.1	86.2	20.2
	B	525.1	69.1	85.4	162.3	191.3	33.6
	C	357.5	53.0	73.2	141.8	66.3	20.3
	D	329.3	53.9	68.5	115.0	64.2	22.7

*Circumflexes indicate forecast data.

Figure 1

Numbers of Migratory Game Bird Hunting Permits sold in Canada and in the major regions, 1966-84. (Thousands, to 0.1)

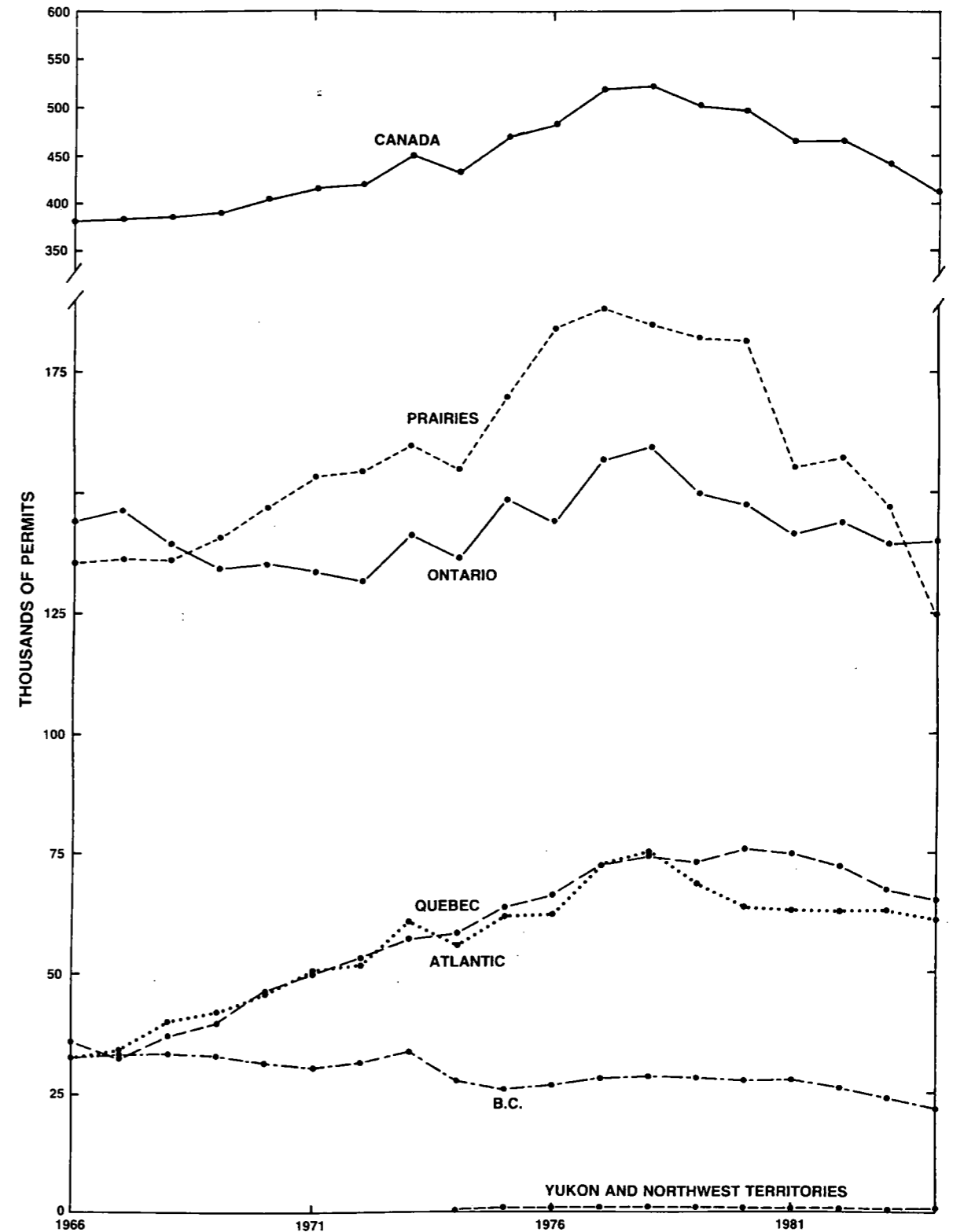


Figure 2
 Numbers of MGBH Permits sold regionally to purchasers of
 different ages, 1971-84. (Thousands, to 0.1)

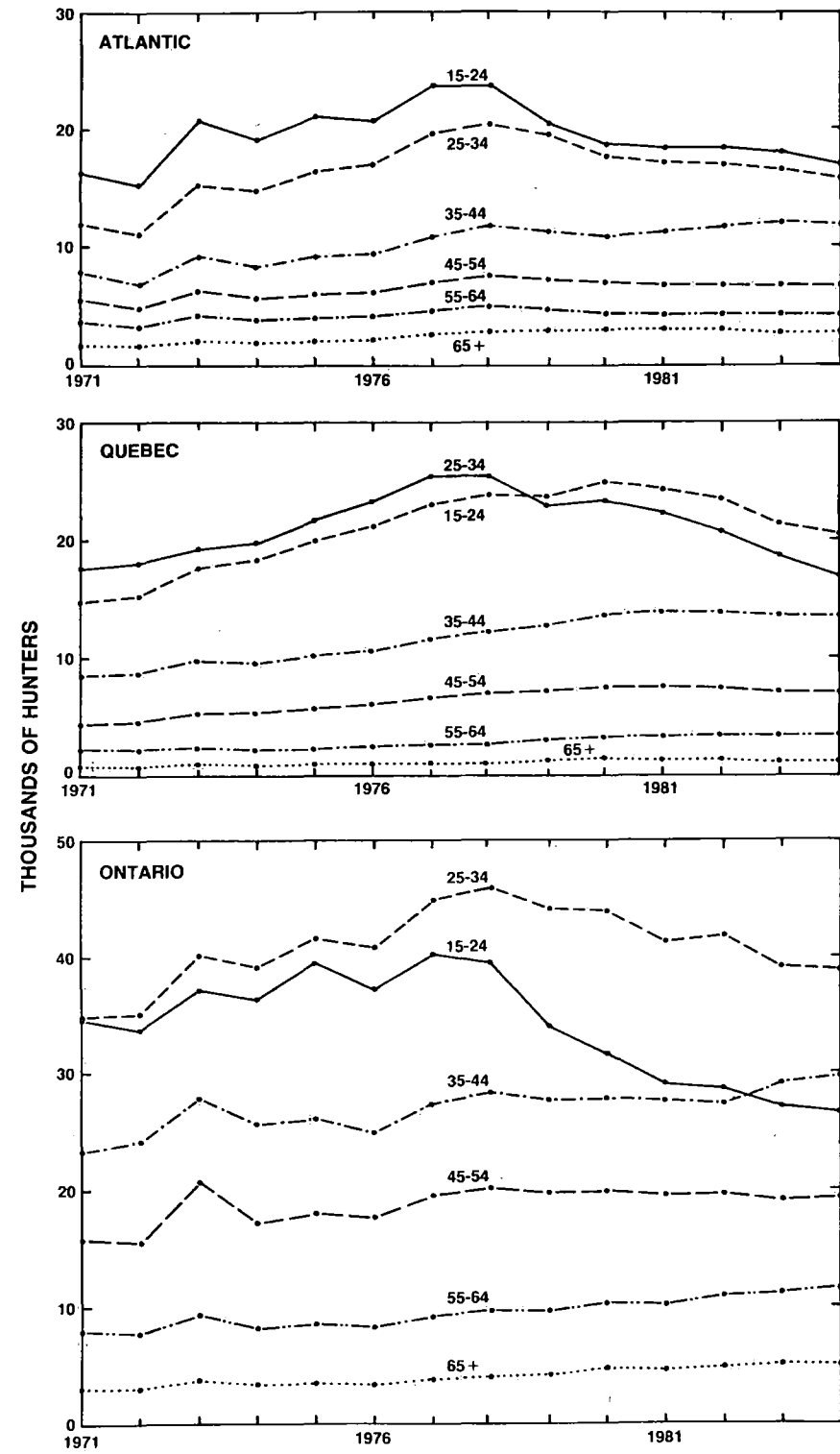


Figure 2 (continued)

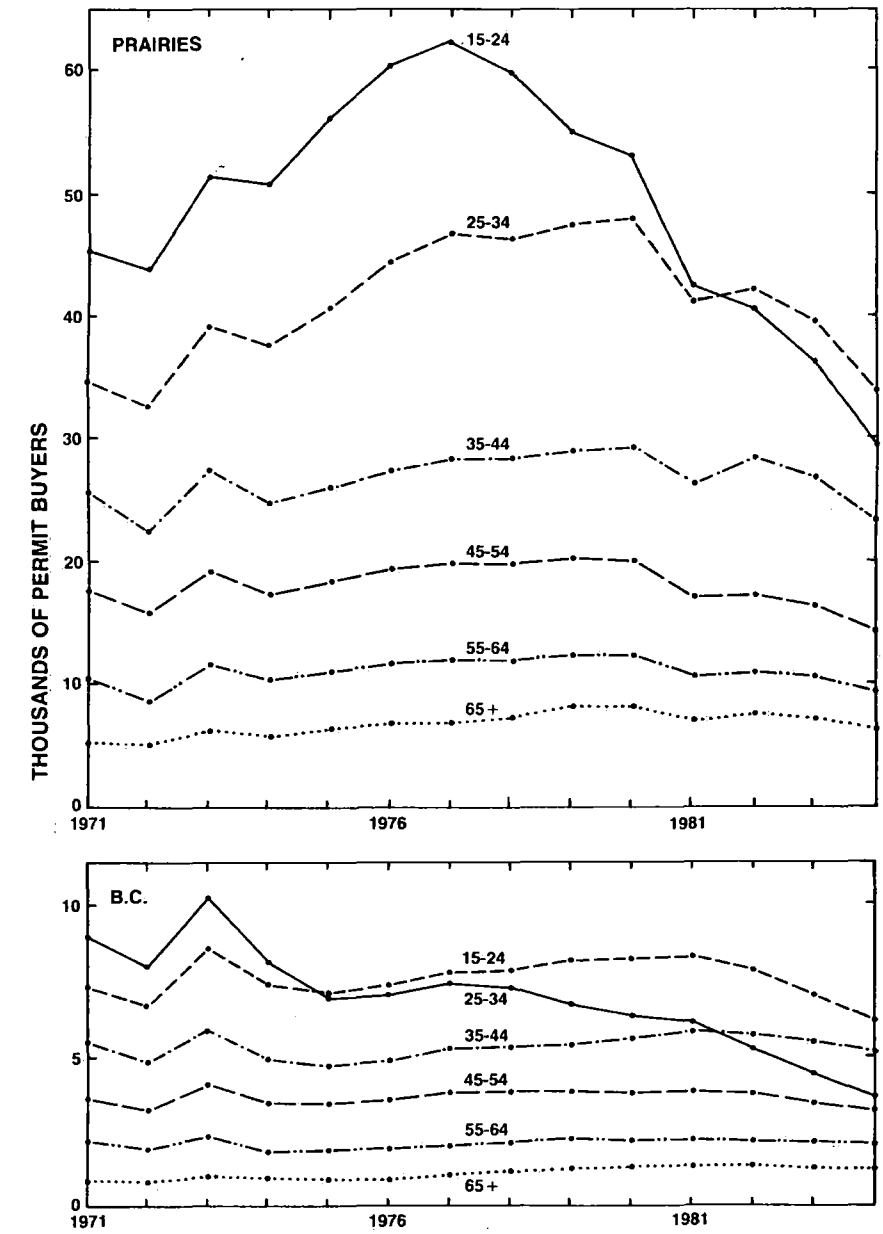


Figure 3
 Permit buyers under 25 years of age as percentages of all MGBH
 Permit buyers in the region, 1971-84

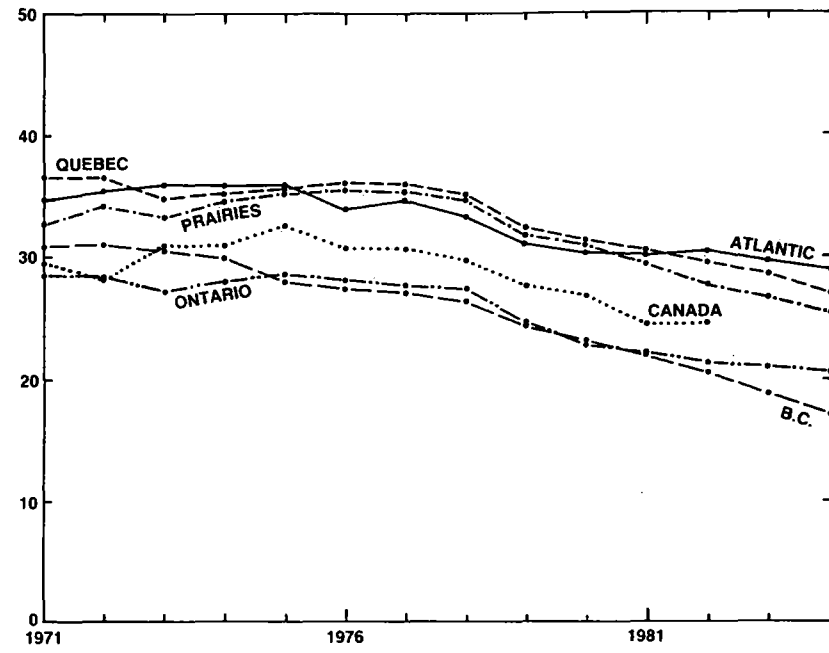


Figure 4
 Male population, 15 years and older, of Canada and the regions,
 1971-83. (Millions, to 0.01)

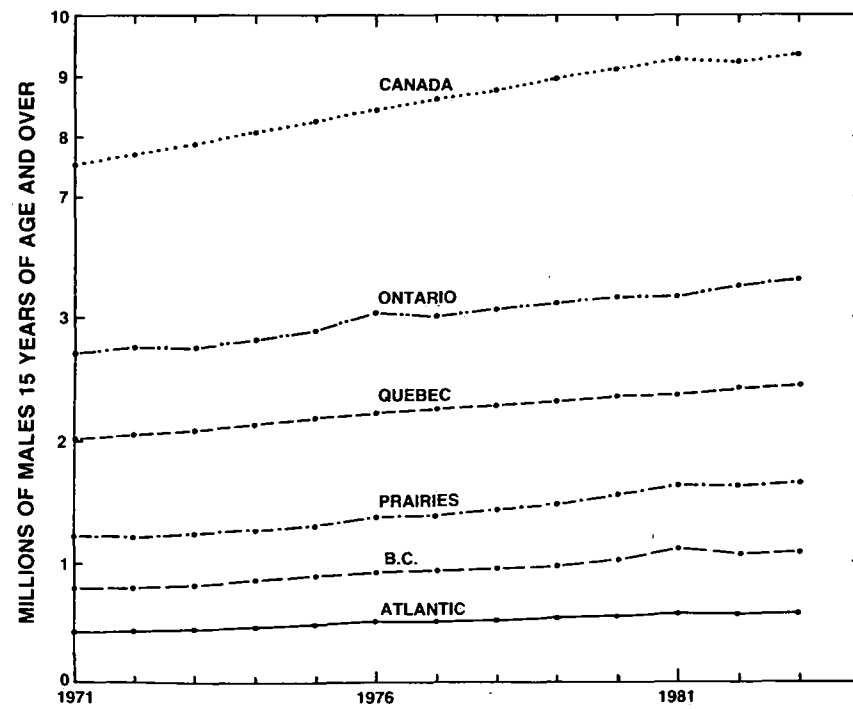


Figure 5
 Numbers of MGBH Permits sold per 1000 adult males in Canada
 and the regions, 1971-83

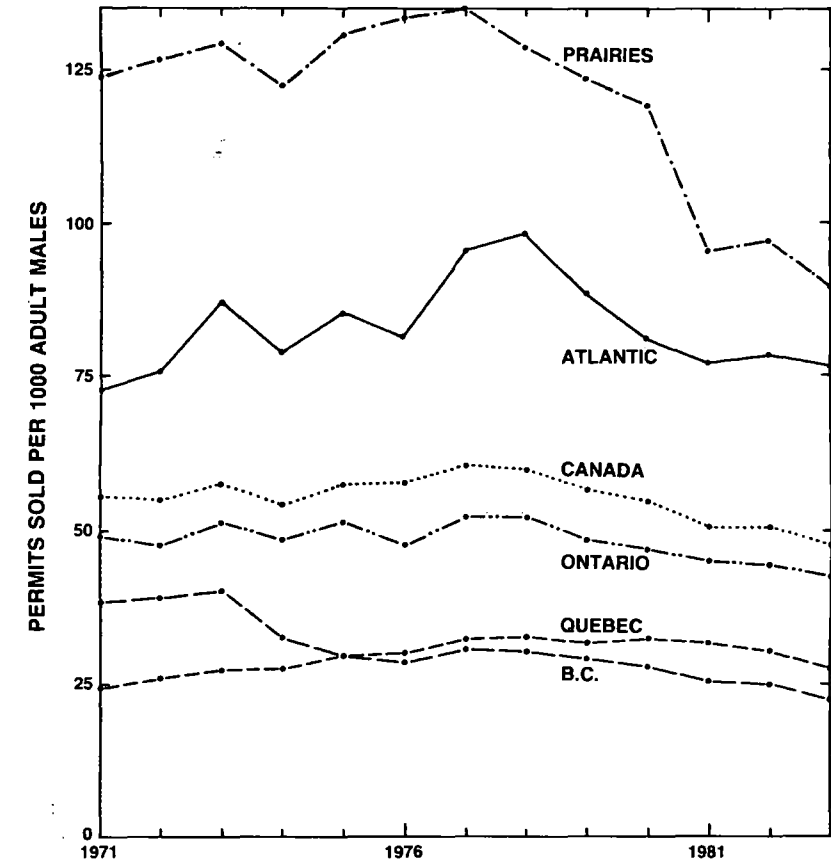


Figure 6
 Numbers of MGBH Permits sold per 1000 adult males in each
 10-year age group in the regions, 1971-83

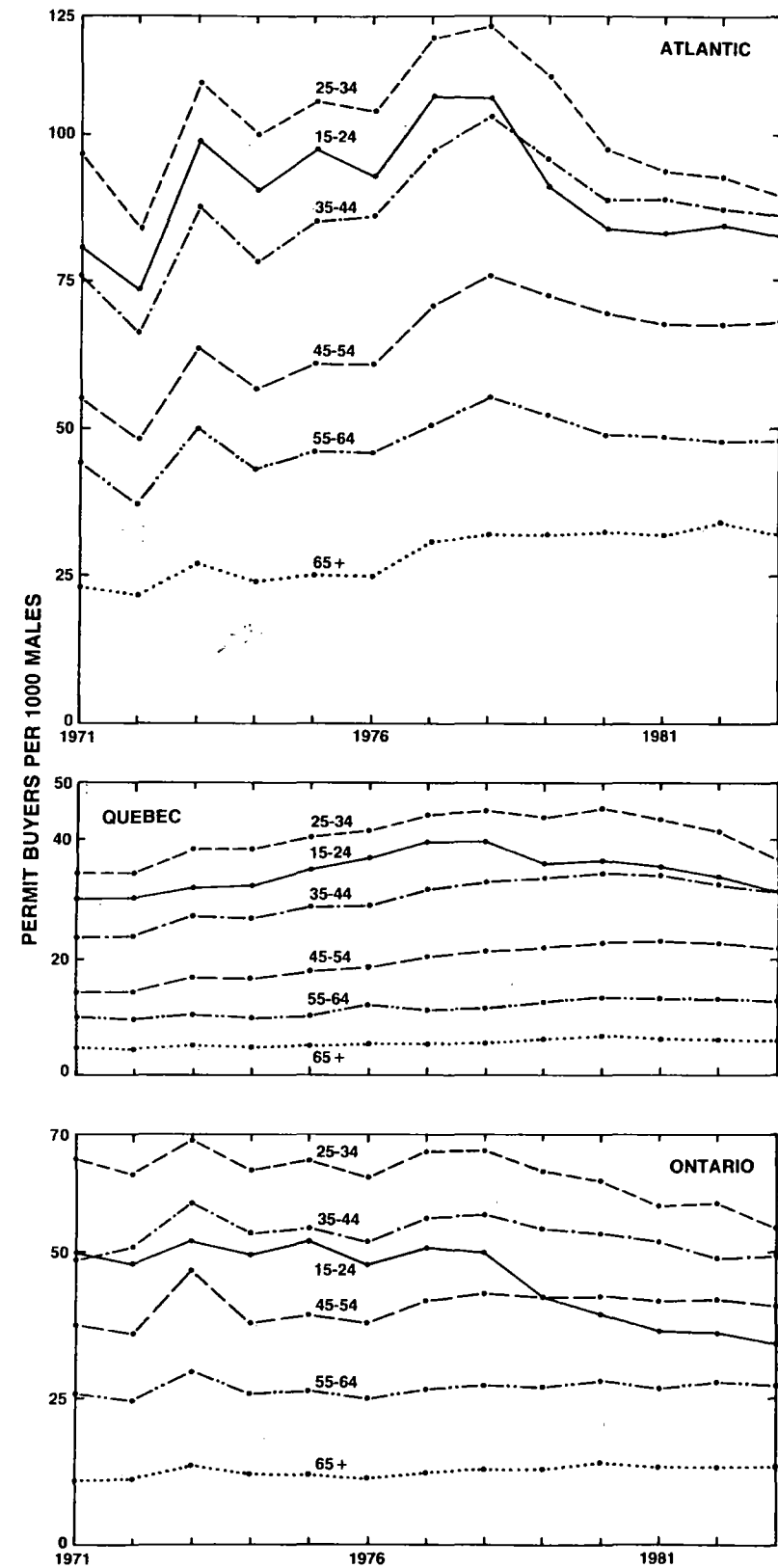


Figure 6 (continued)

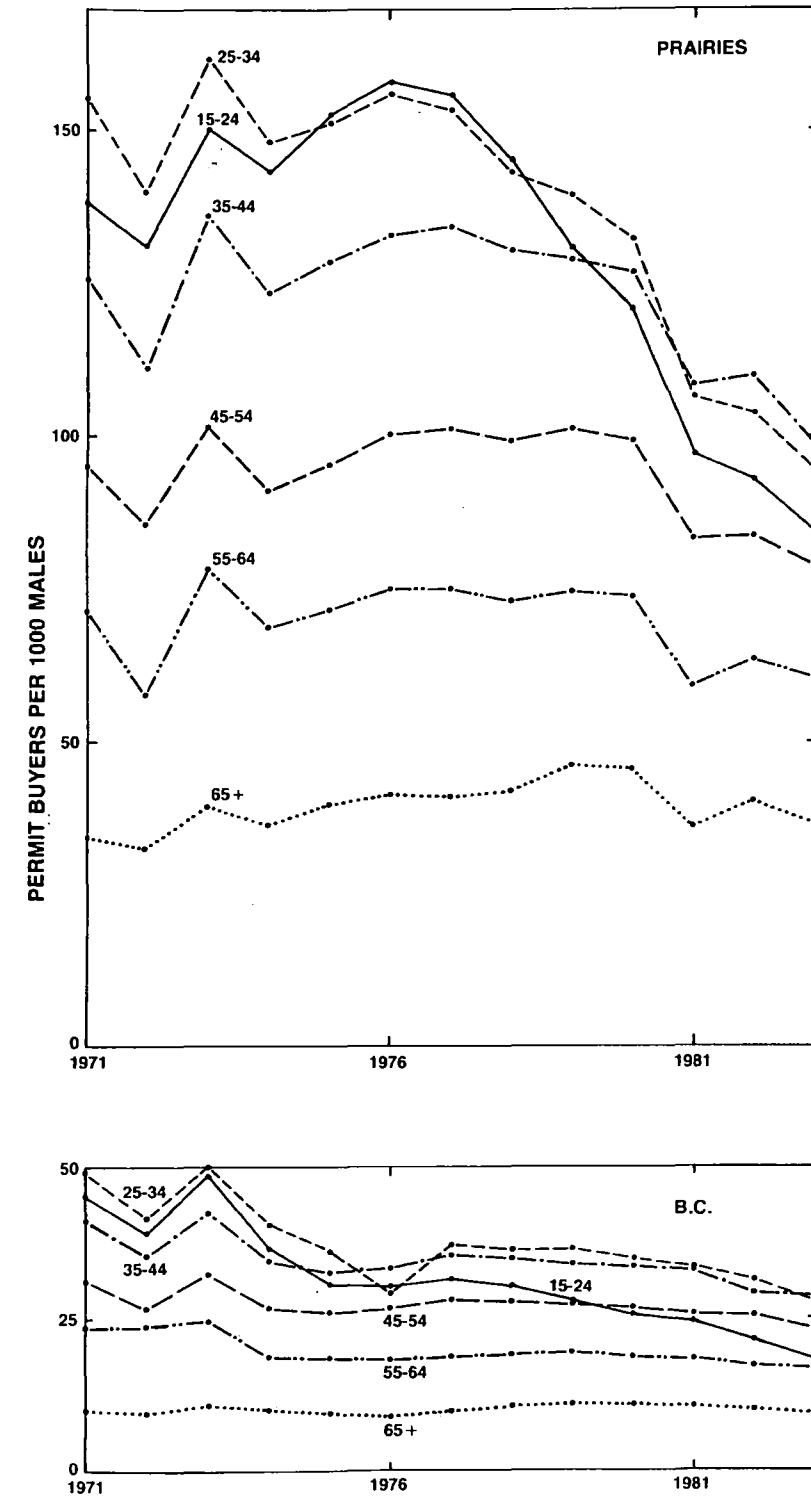


Figure 7
National and regional totals of males aged 15-24 years, 1971-83

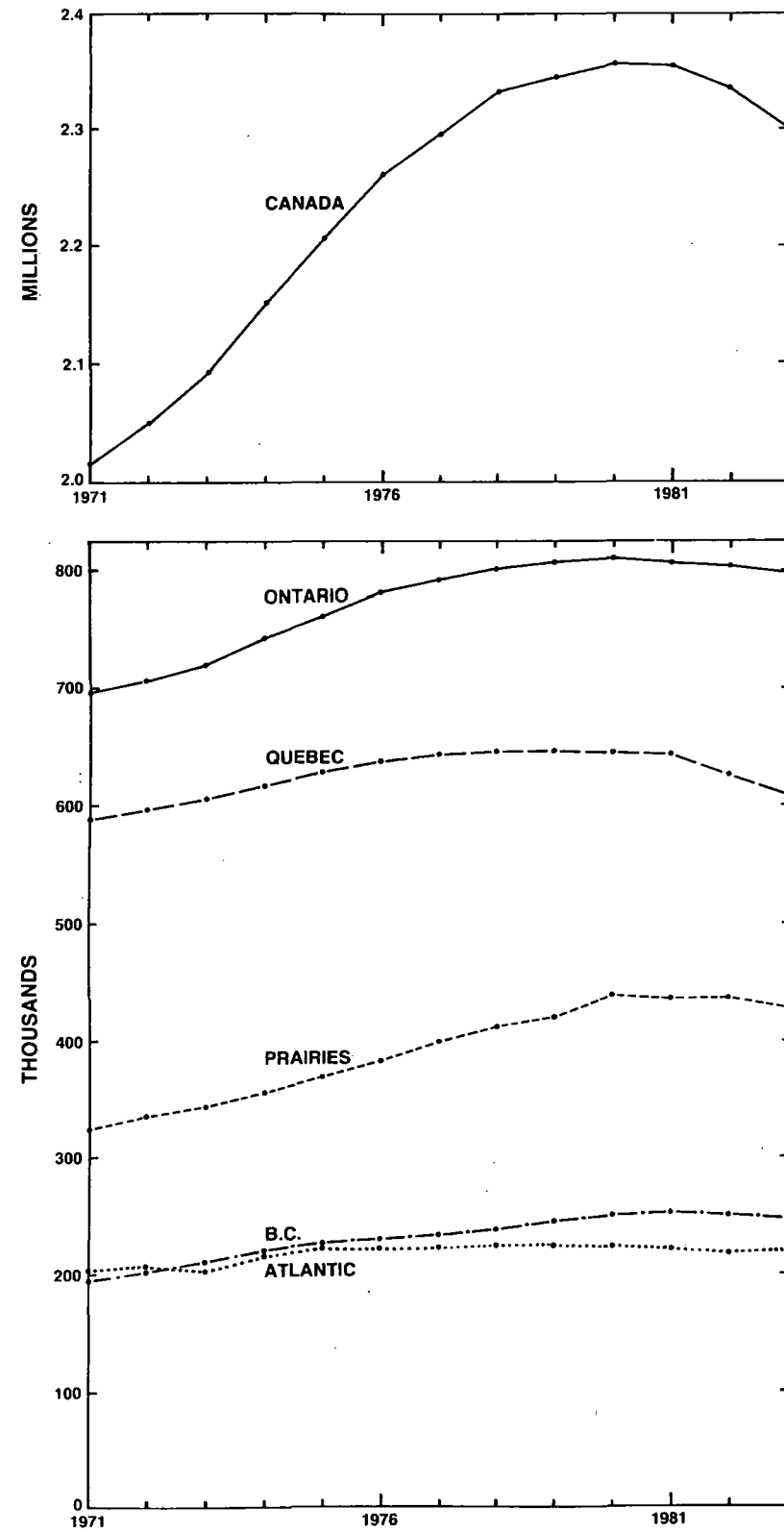


Figure 8
Renewals and non-renewals by MGBH Permit buyers in Ontario, 1972-84: under 25 years of age versus 25 years and older

