

**The Canada
migratory game bird
hunting permit
and related surveys
by D. A. Benson**



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Abstract

For the first time in Canada purchase and possession of a federal permit were required of persons hunting migratory birds for sport during the 1966-67 hunting season. This paper presents the background and describes the development of the permit system, outlines the mail surveys which sample the universe of hunters who have bought Canada migratory game bird hunting permits, briefly describes the parts survey which provides estimates of the species composition of the retrieved kill in each province and gives examples of the results of the system.

Résumé

Pour la première fois au Canada, l'achat et la possession d'un permis fédéral ont été exigés des personnes qui se sont livrées à la chasse sportive aux oiseaux migrateurs, pendant la saison de chasse 1966-67. Ce travail contient des renseignements d'arrière-plan et décrit l'évolution du système des permis; il traite des enquêtes par la poste, lesquelles fournissent un échantillon du monde des chasseurs qui ont acheté ces permis; il décrit brièvement les enquêtes partielles qui permettent des estimations quant à la composition des espèces tuées et rapportées, dans chaque province; il donne enfin des exemples des résultats du système.

Introduction

For many years, continental waterfowl management has had a major need for data relating to hunting in Canada. The permit system introduced in 1966, and surveys based on it, will provide the management information needed by the provinces and Canada as a whole. In addition, it will contribute substantially to the continental pool of data required for the management of a continental resource. The internal needs of Canada and the United States differ, as do the legal, financial, administrative and sociological environments within which they operate. The Canadian Wildlife Service has followed a general policy of designing a system to produce data for Canada comparable to those now available from the duck stamp for the United States. However, CWS has not restricted the system to providing those data; nor has it considered it necessary, or indeed possible, to set up methods identical to those of the United States.

According to the British North America Act, Canadian wild creatures belong to, and are managed by, the province in which they are found. However, Section 132 of the same act empowers the federal government to carry out the terms of a treaty with a foreign country. Migratory birds, therefore, continue to be a provincial property, but the federal government has the prime responsibility for their protection and management under the terms of the Migratory Birds Convention between Canada and the United States. In practice, the federal and provincial governments co-operate in all matters concerning migratory birds. The evolution of the permit system is an excellent example of how the two levels of government co-operate.

Initiation of a federal waterfowl survey was generally discussed at many annual federal-provincial wildlife conferences, and in more detail, with the provinces, inter-governmental agencies and private organizations - including the Federal-

Provincial Premiers' Conference, the Canadian Council of Resource Ministers and the Canadian Wildlife Federation. It was decided to issue a federal permit in the fall of 1966. The Migratory Birds Convention Act, the Migratory Birds Regulations and the Department of Northern Affairs and National Resources Act provided the necessary legal support.

The permit is only one small part of the interlocking activities of CWS. The large concept was formalized in a statement—made in the House of Commons on April 6, 1966, by the Honourable Arthur Laing, then minister of the Department of Northern Affairs and National Resources.*

In that statement, paragraph 4 of "General Policy Relating to Migratory Birds" reads as follows:

"Because migratory birds move back and forth across the continent, inter-governmental and international *consultation, co-ordination and co-operation in research and management will be continued and expanded.*"

Paragraph 3 of "Research Related to Populations" reads as follows:

"The use of waterfowl by hunters should be measured so that there can be an annual balancing of population gains and losses. This can be done most effectively by a national kill survey that will be carried out by mail questionnaires directed to a sample of persons hunting waterfowl. The statistical universe from which the sample will be selected will be provided by a list of names and addresses of hunters purchasing the Canada migratory game bird hunting permit, although it will be issued free of charge to Indians and Eskimos. This survey and associated inquiries will also yield information on the species of birds

*Department of Indian Affairs and Northern Development since June 6, 1966.

hunted, as well as when and where they are hunted. That sort of information will permit an evaluation of the effects of changes in regulations that have not previously been possible."

The balance of this paper describes the development of the permit system and related surveys.

Materials and methods

The permit system

Permits are sold at post offices throughout the country. The permit is a single perforated form printed on postcard stock in three major parts, which are separated at the time of sale. The permit itself is a wallet-sized card bearing a serial number and a space for the signature of the permittee which is required to validate the permit. Space is provided for the name and address of the hunter and the number of his provincial licence where applicable.

A part of the form is used for a message to the hunter. The remainder of the form is a prepaid postcard addressed to the director of CWS, Ottawa. The reverse of the postcard is the sales record which is the heart of the entire system. The permit forms are provided in separate sheets to ensure the return of each sales record as soon as a permit is sold.

The sales record bears a preprinted number matching that of the permit proper and the vending postmaster fills in the following information:

1. Vending post office number
2. Date of sale
3. Province of issue
4. Age and sex of permittee
5. Name and address of permittee
6. Whether or not the permittee is a Canadian resident
7. Whether or not the permittee purchased a permit during the preceding year. (This question was asked for the first time in 1967, the second year of sale of the permit).

The Canada Post Office, as vendor, accepts large blocks of permits at major depots across Canada and controls the operation from that point to the return of sales records.

The development of distribution lists was a major job for the first year of operation. The Post

Office Department supplied a record of all post offices in Canada, classified in various ways, in the form of punched cards and machine listings. CWS created a tape record of post offices.

The wildlife agencies of all ten provinces co-operated generously by providing detailed records of the number and location of sales of those provincial game licences required for the hunting of migratory game birds. CWS then allocated an appropriate number of permits to post offices on the basis of geographical proximity to provincial vendors. The known information was used by a computer program employing a type of proportional allocation to assign quotas to remaining post offices. Vending post offices were assigned a minimum of ten permits. Safety factors were added, and large reserves allocated to post office depots. The computer then produced distribution lists prepared by the district served by each post office depot. The distribution lists of the first year have since been replaced by actual records of sales kept by the Post Office Department.

Distribution lists cover the ten provinces. The permit provides a means of identifying all sport hunters of migratory game birds who hunt in the ten provinces of Canada. There are no exceptions for sport hunters on the basis of age. However, minimum age requirements are set under provincial game laws, and vary from province to province. The Yukon and Northwest Territories are not yet included, nor is subsistence hunting by native peoples.

It is essential that sales records be returned as soon as possible after the date of sale. About 400,000 individual records must be processed. The speed and efficiency of the Post Office Department make it possible to handle the workload which must be scheduled to complete all manual processing before the end of January by which time we, correctly, assumed most permit sales would have been made.

Sales records are scrutinized by CWS staff, the data is transferred to magnetic tape and various reports produced from the tape in the form of table listings. We have entitled that tape the "Permittee Tape".

The entire operation is dependent upon electronic data processing equipment. Several computers were used in the early stages of the project, but we now use an IBM 360/65 operated by the federal government's Central Data Processing Service Bureau.

That Bureau originally supplied computer programmers. But the Computer Systems Information Division of the Department of Indian Affairs and Northern Development now provides programs and computer systems assistance.

The harvest survey

The Harvest Survey samples the universe contained on the "Permittee Tape", using mail questionnaires.

In August, preceding the first opening date, we mail some explanatory literature, a brief report on the previous year's results and abstracts of the regulations for the coming season to all hunters who bought permits in the past year. Two mailing lists are used. Those hunters selected for the Harvest Survey sample are informed that they have been included and, in addition to the material just mentioned, receive a card for recording their kill. We mail questionnaires at the end of the season, and follow up with another to those who do not reply to the first. Questionnaires returned by persons who state they did not purchase a permit for the current season are excluded from the sample.

The results of the survey are presented by province. Provinces are the primary strata in the survey, and may be further broken down into substrata consisting of one or more hunting season zones.

The magnetic tape record of post offices is updated annually from records provided by the Post Office Department. CWS adds to the record the latitude and longitude of each post office. Thus, we can classify individual post offices by any geographical strata that can be defined by lines of latitude and longitude to the nearest minute, and identify the place where the permit was bought by province or by latitude and longitude. In addition, we can locate the residence of the hunter by province or state, assuming that we receive a complete and correct sales record.

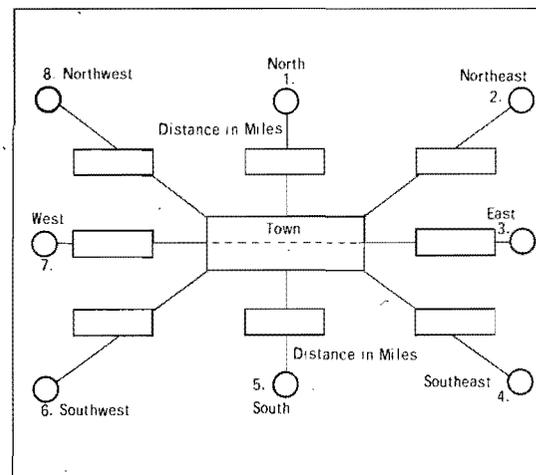
The next obvious step was to develop a means of identifying the location of the place where a survey respondent actually hunted. The method chosen enables the hunter to describe, in a way meaningful to him, the general area in which he "did most of his hunting." It was also necessary to design a system whereby the hunter's description could be translated into precise terms which would facilitate mass analysis of the answers by computer methods.

The "location finder" shown in Figure 1 was developed in 1968. The hunter provided the name of a nearby town or village and the distance and direction from that place to the place where he did most of his hunting. The questionnaires are then checked individually and the latitude and longitude of the place given by the hunter is entered on the questionnaire. We produce gazetteers by computer from our magnetic tape record of post offices. Post offices are listed alphabetically, each followed by its latitude and longitude. Any names of places not identifiable as post office names are located by reference to gazetteers and sets of maps of Canada.

The latitude and longitude of the "nearest town or village", the distance and the pre-coded direction to the place of hunting are transferred to magnetic tape. The computer is thereby provided with information needed to compute the latitude

Figure 1. Location finder used in the harvest and parts surveys.

Figure 1



and longitude of the place of hunting. That latitude and longitude is then recorded by a computer program in the appropriate substratum within the province. Since most hunters hunt in more than one place, and since the method of recording one place is not absolutely accurate, the result is approximate. However, it is adequate for stratification by large geographical areas.

The primary stratification of Canada will continue to be by province. Starting in 1968, the provinces have been broken down into substrata representing major hunting season zones. Substrata within the provinces may vary from year to year with changes in season zones. Those employed in the 1969 survey are shown on Figures 2 and 3.

Annual survey reports will continue to be useful as historical records, and as a source of information for examining trends. Exact substrata boundaries used in any year must be identifiable. They are, therefore, given precisely by latitude and longitude. That method of presentation was illus-

trated for the first time in CWS Progress Note No. 4 (Benson, 1968).

The stratification system is extremely flexible. It was designed primarily to provide a standardized procedure for summarizing results by substrata which, in general, represent geographical areas within which season dates and limits, or both, are uniform in any given year. However, any category of locations definable by latitude and longitude, such as post offices or places of hunting, may be substratified in other ways. For example, at the request of the province of Ontario, the boundaries of 23 forest districts were approximated by lines of latitude and longitude, and sales of permits in Ontario were then summarized by post office within forest districts. Provided the boundaries do not change, the necessary computer programs may be used annually to produce a standardized listing. The operation in no way interferes with the use of the data to summarize sales by survey substrata.

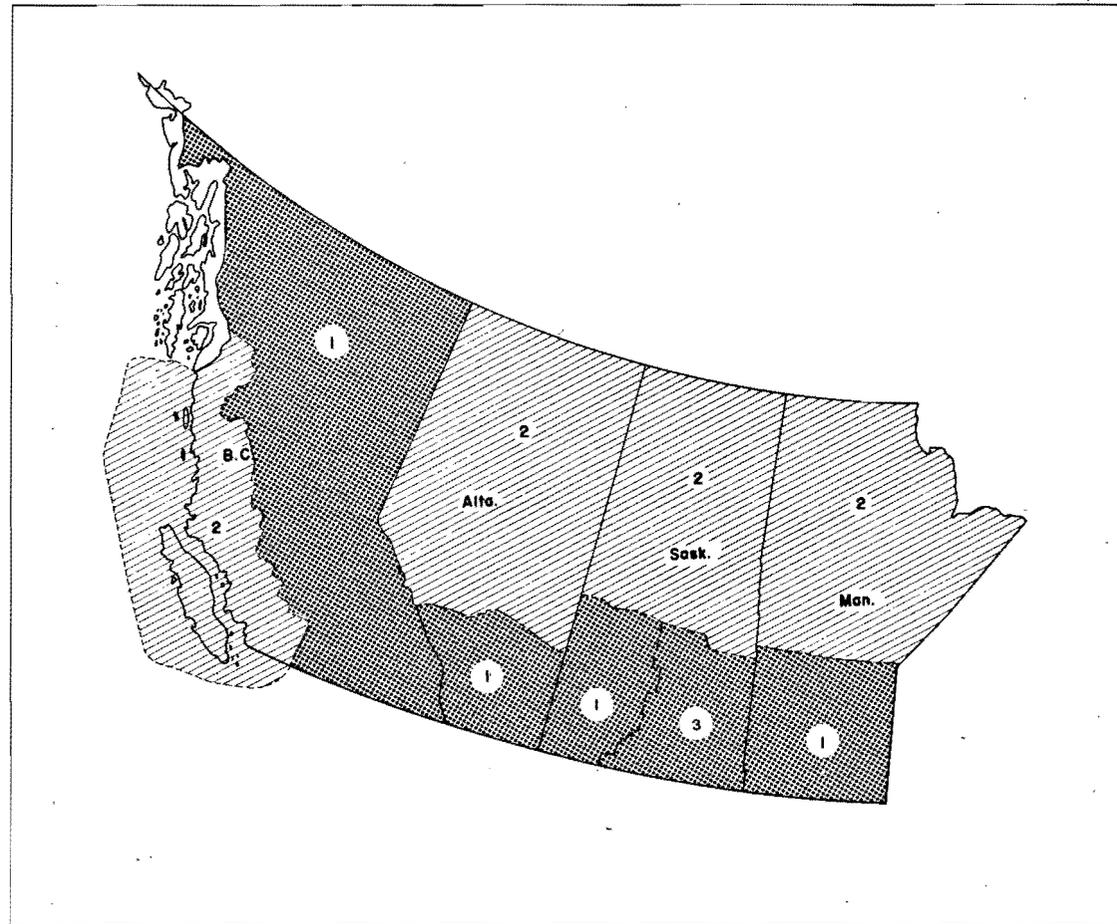
Species composition survey

The Species Composition Survey is the third part of the permit and related survey system. It is similar to the "parts" survey of the United States Bureau of Sport Fisheries and Wildlife and has the same general purpose—to provide data for determining the total harvest of birds by species. We use the term "parts survey" for convenience.

An explanatory letter, ten return envelopes and a postcard to request a further supply of envelopes are sent to a sample of hunters. Each one is asked to send, in separate envelopes, a wing of each duck and the tail feathers of each goose he shoots. The return envelopes are pre-addressed to one of five collection centres across Canada. Upon receipt, the wings are classified by species, age and sex. These data are recorded on the envelope, which already contains information provided by the hunter. The completed wing enve-

Figure 2. 1969-70 survey substrata western provinces.

Figure 2



lope is then sent to Ottawa for scrutiny and machine analysis.

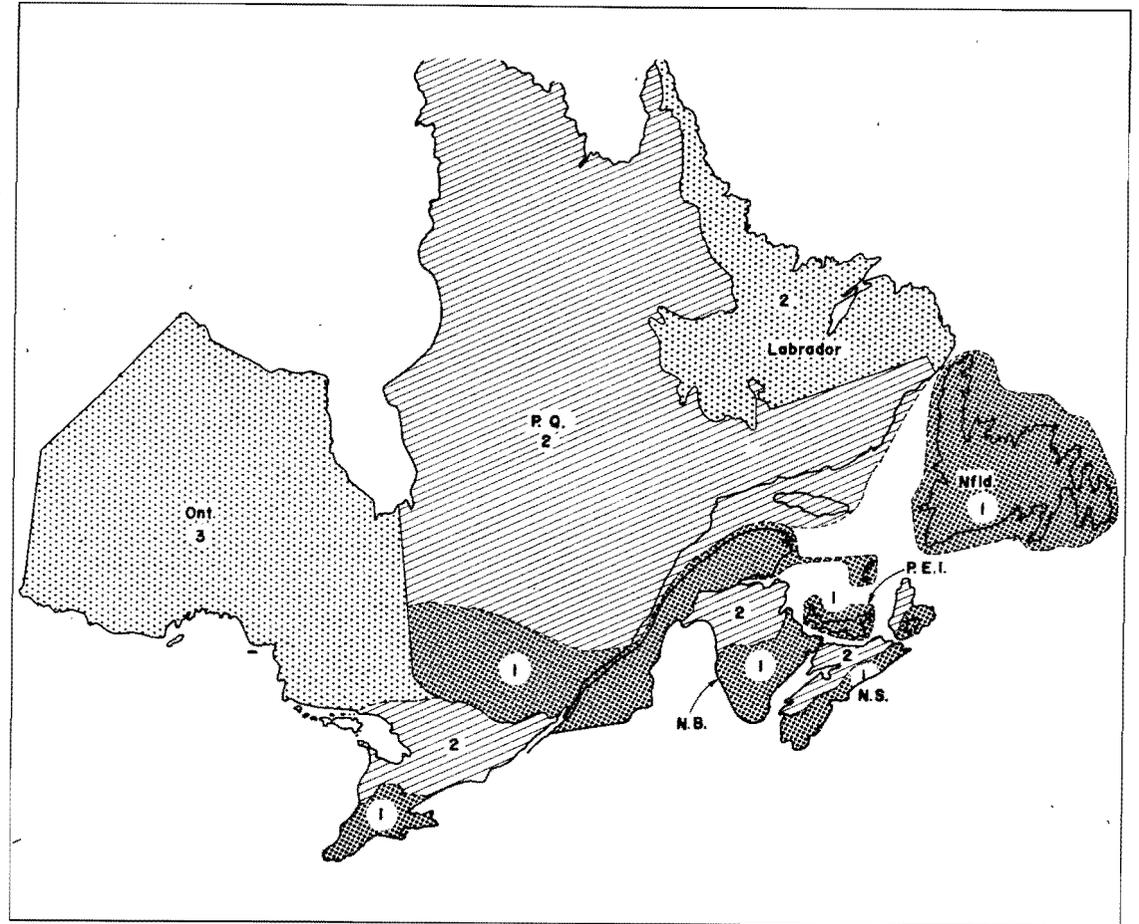
The location finder (Figure 1) is repeated on the wing envelopes thereby producing uniformity of stratification with the harvest survey. Both the harvest survey questionnaire and the wing envelope contain space for band data which, if pro-

vided, are copied and incorporated into the International Banding Program.

The parts survey evolved from experimental surveys carried out in co-operation with several provinces, notably Quebec and New Brunswick. At first, the sample was chosen from lists of provincial licences. Since 1967, the sale of the

Figure 3. 1969-70 survey substrata eastern provinces.

Figure 3



Canada migratory game bird hunting permit has provided a uniform statistical universe for all the provinces, and the sample has been based on the previous years' list of sales. The parts survey was operated manually in 1967. In 1968 it was merged with the computerized permit and harvest survey system.

Results

The results obtained from the permit and survey system have been presented in some detail in the CWS Progress Notes numbers 2, 4, 5, 7, 9, 10, 12, 14, 16 and 19 and the series will continue.

The system provides information not previously available. For example, we now know that nearly 400,000 persons—including about 15,000 non-residents most of whom are from the United States—purchase permits to hunt migratory game birds in Canada each year, and not all hunters purchase a permit every year. We estimate that at least half a million persons hunted migratory game birds in Canada in one, or more, of the past three years. The general nature of the results being achieved can be seen in the tables given for the 1968 and 1969 hunting seasons.

Table 1 summarizes five years' records of permit sales. The figures given are those actually received by CWS before the end of January. Since permits may legally be purchased until the end of March, this record is obviously incomplete. However, accounting records of the Canada Post Office have indicated that it comprises more than 95% of the total and is adequate as a base for analyses which must be performed each year before the post office accounts are available.

Table 2 consists of estimates from the harvest surveys of 1968 and 1969. Some birds for which there was no open season were reported harvested. These are considered as misidentifications, generally arising from variations in local names. For example, wings of "coots" (*Fulica americana*) seldom appear in our sample from the Atlantic provinces, yet many Atlantic hunters report they have harvested "coots". Detailed interpretation of results requires knowledge of local conditions, the terminology of the hunters and the methodology of the surveys.

Table 3 shows a species breakdown of the most important game ducks by order of abundance as estimated from the parts survey of 1969.

Table 1
Permit sales by province and substratum,
1966-69

Province	Year	Substratum*			Total
		1	2	3	
Nfld.	1966†				13,269
	1967	13,461	1,445		14,906
	1968	15,796	1,856		17,652
	1969	17,137	1,984		19,121
P.E.I.	1966				3,271
	1967	3,103			3,103
	1968	3,650			3,650
	1969	3,800			3,800
N.S.	1966				7,220
	1967	5,805	2,101		7,906
	1968	6,733	2,293		9,026
	1969	6,723	2,140		8,863
N.B.	1966				8,535
	1967	5,824	1,937		7,761
	1968	7,393	2,169		9,562
	1969	7,568	2,559		10,127
P.Q.	1966				35,868
	1967	28,130	4,455		32,585
	1968	31,529	5,596		37,125
	1969	33,544	5,999		39,543
Ont.	1966				144,063
	1967	47,533	75,533	23,853	146,919
	1968	44,571	71,732	22,935	139,238
	1969	42,088	69,554	22,618	134,260
Man.	1966				37,784
	1967	32,704	3,020		35,724
	1968	35,579	3,149		38,728
	1969	38,357	3,323		41,680
Sask.	1966				44,744
	1967	42,386	2,395		44,781
	1968	41,248	2,365		43,613
	1969	21,356†	2,488	21,578†	45,422
Alta.	1966				52,911
	1967	26,309	29,746		56,055
	1968	25,046	28,599		53,645
	1969	22,531	31,160		53,691
B.C.	1966				32,394
	1967	11,506	21,786		33,292
	1968	11,569	21,745		33,314
	1969	11,525	21,293		32,818
Total	1966				380,059
	1967				383,032
	1968				385,553
	1969				389,325

Table 2
Birds killed and retrieved estimated from reports by hunters

Province	Ducks (excluding sea ducks)		Geese (including brant)		Coots		Sea ducks		Snipe		Woodcock	
	1968	1969	1968	1969	1968	1969	1968	1969	1968	1969	1968	1969
Nfld.	44,276	62,671	4,868	5,746	521*	1,190*	18,020	30,570	11,166	14,484	*	*
P.E.I.	19,396	25,252	6,041	4,456	211*	318*	2,206	2,971	592	1,581	235	117
N.S.	54,864	50,143	5,501	5,295	11,519*	6,850*	21,020	15,739	3,483	4,473	3,924	6,789
N.B.	59,576	62,853	2,351	1,621	1,390*	486*	4,764	4,739	2,341	2,526	8,883	15,070
P.Q.	333,385	465,707	13,418	48,980	11,201	11,536	14,506	23,939	21,114	38,663	27,883	18,478
Ont.	794,067	928,112	24,432	50,230	21,371	27,990	10,525	16,608	8,645	13,365	55,952	76,232
Man.	295,683	467,276	20,063	37,188	4,464	5,334	670	795	5,059	3,675	*	*
Sask.	292,628	557,691	72,294	65,477	5,028	6,449	909	352	2,568	1,915	*	*
Alta.	459,071	778,247	59,050	83,090	4,105	6,312	450	578	7,620	4,689	*	*
B.C.	362,648	270,153	12,987	15,963	1,732	3,334	12,083	6,961	10,823	8,284	*	*

*No open seasons - see text

Table 3
Classification of wings of ducks (excluding sea ducks) - species in
order of abundance for each province (percentages in boldface).
Parts Survey 1969

Province	1	2	3	4	Other received	Total wings				
Nfld.	Black duck	38.44	Green-winged teal	23.08	Common goldeneye	11.94	Common merganser	9.31	17.23	219
P.E.I.	Green-winged teal	38.96	Black duck	28.88	Blue-winged teal	22.34			9.82	418
N.S.	Black duck	55.73	Green-winged teal	24.27	Common goldeneye	4.75			15.25	391
N.B.	Black duck	40.44	Green-winged teal	20.90	Blue-winged teal	17.00	Common goldeneye	7.05	14.61	1,292
P.Q.	Blue-winged teal	19.10	Black duck	18.98	Green-winged teal	16.71	Mallard	8.88	36.33	4,394
Ont.	Mallard	28.94	Black duck	12.00	Wood duck	9.30	Blue-winged teal	8.55	41.21	7,959
Man.	Mallard	58.81	Lesser scaup	8.50	Gadwall	5.12	Pintail	4.85	22.72	4,696
Sask.	Mallard	65.91	Gadwall	8.25	American widgeon	7.25	Pintail	6.58	12.01	3,755
Alta.	Mallard	62.96	Gadwall	8.82	American widgeon	8.20	Pintail	7.16	12.86	4,350
B.C.	Mallard	47.13	Green-winged teal	19.00	American widgeon	15.05	Pintail	9.28	9.54	3,060

Footnotes to Table 1:
*A substratum consists of one or more hunting season zones as described in the Migratory Birds Regulations for the year. See Figures 2 and 3.
†The stratification procedure was introduced in 1967. Provincial totals only are available for 1966.
‡The boundaries of the substratum were altered. The datum is not comparable with that for the previous year.

Discussion

We have been developing the Canada migratory game bird permit and system for five years. The permit and the two surveys based on it are established as parts of the continental waterfowl management scene. It is now appropriate to document the history and rationale of the system, to illustrate the type of results being obtained and to look very briefly to the future.

Auxiliary surveys are being conducted and studies are underway to assess the quality of the existing operation and to offer concrete proposals for improvement. Sampling procedures and the statistical design of the surveys are under investigation. Studies of non-response bias and other biases are high on our list of priorities.

Sample sizes within substrata are now being set with guidance from associated research. One of the purposes of this paper is to supply a broad background reference to detailed reports of such research (e.g. Sen, 1968).

We make no pretence of having produced a complete or a perfect system. We believe, however, that we have laid a sound mechanical and administrative foundation. The system is flexible now and must remain so, if it is to remain amenable to constant modification and improvement to meet needs which will arise over the years.

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