CANADIAN WILDLIFE SERVICE

Wildlife Management Papers

DELIVERED AT THE

TWENTY-FIRST to TWENTY-FOURTH

FEDERAL-PROVINCIAL WILDLIFE CONFERENCES

HELD IN

Ottawa — 1957
St. John's — 1958
Ottawa — 1959
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National Parks Branch

Department of Northern Affairs and National Resources

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Canadian Wildlife Service
National Parks Branch
Department of Northern Affairs and National Resources

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Issued under the authority of

The Honourable Walter Dinsdale, P.C., M.P.,

Minister of Northern Affairs and National Resources

ROGER DUHAMEL, F.R.S.C.
QUEEN'S PRINTER AND CONTROLLER OF STATIONERY
OTTAWA, 1961
Cat. No. R68–1860

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1960

SOME DOLLAR VALUES OF THE WILDLIFE RESOURCES OF THE ATLANTIC PROVINCES

by

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Department of Lands and Forests, Province of Nova Scotia.

In this paper an attempt is made to estimate the order of magnitude of some economic values of the wildlife resources of the Atlantic Provinces.

The annual reports of the four relevant government departments of the Atlantic Provinces for the fiscal year 1955-56 were examined. They were then interpreted with the aid of six other publications. All the sources used are listed at the end of this paper.

Seven facets of the economic foundation of the wildlife industry have been estimated.

Expenditure of Resident Big Game Hunters.....	$7,000,000.00
Expenditure of Resident Small Game Hunters.....	5,000,000.00
Expenditure of Non-Resident Big Game Hunters...	1,700,000.00
Value of Deer and Moose Meat Harvested.....	3,000,000.00
Value of Wild-Caught Hides and Furs.....	365,000.00
Revenue Accruing to Provincial Governments.....	1,100,000.00
Expenditure by Provincial Governments.....	300,000.00

In each case, the accuracy of the figures given above can be judged by the reader from the methods used to arrive at them.

Expenditure per resident big game hunter in 1955 was taken as being $70.00. The U. S. National Survey gives a figure of $73.38. The Province of British Columbia offers a very similar figure. Canadians may be less well equipped than their counterparts in the U.S.A., but their costs tend to be higher for each item purchased.

Resident big game licence sales are listed for all four provinces (except P.E.I., which has no big game) as being over 100,000. The resulting expenditure at $70.00 per hunter would be $7,000,000.00.

Small game presents a greater problem. The hunting of small game does not require a licence in all cases. It is therefore necessary to estimate the number of small game hunters. The availability of the U. S. National Survey and the work done in British Columbia elevates such an estimate from the level of a guess to the prestige of being an "educated guess" of modest proportions.

In the U. S. A., 3.7% of the population 12 years of age and over hunted big game in 1955 and 8.3% hunted small game.

In the Atlantic Provinces, 10% of the population over age 14 bought big game licences. Direct comparison with the U. S. figures would suggest that about 25% hunted small game. However, much of the United States does not contain big game, whereas the bulk of the Atlantic Provinces contains large herds of deer or moose. A safer assumption is that we have as many small game hunters as we have hunters of big game;10% or 100,000 persons. Using the figure of $50.00 expenditure per small game hunter in 1955 (U. S. Survey -- $50.30), we arrive at the sum of $5,000,000.00. Our estimate of costs may be high for this region, but the estimate of number of hunters is probably low.

Sales of non-resident big game licences in 1955 were about 6,700. Including licence fees of $40.00 to $50.00, total expenses are estimated at $250.00 per non-resident big game hunter. This amount appears low for Newfoundland due to extra costs for transportation and time required. It also appears low if estimated for one hunter. However, most non-residents hunt in parties, thus reducing costs of transportation and the services of guides. If we remember taxidermist fees, costs of shipping trophies, tips and gratuities, entertainment and such incidentals, $250.00 per hunter does not appear excessive. It indicates a total expenditure within the Atlantic Provinces of at least $1,700,000.00.

The value of moose meat and venison harvested is calculated at a rate of $0.50 per pound on a dressed weight of 75 pounds per white-tailed deer and 350 pounds per moose. Kill figures as published include approximately 3,500 moose (Nfld.) and 63,500 deer (N. S. and N. B.). The figure of $3,000,000.00 is easily calculated.

A valuation of about $90,000.00 is given for wild furs taken in Newfoundland (including Nfld. Labrador). Nova Scotia and New Brunswick values are estimated from royalty receipts. Most provinces attempt to levy royalties at a rate of approximately 10% of the value of the fur. The P. E. I. report does not give figures on that item. Their fur production is therefore omitted here. This helps to ensure that the final estimate of $365,000.00 is below the actual value of wild fur produced.

Revenue accruing to provincial government funds includes some income from sport fishing, birds, and fur royalties, as well as from the big game resource. Revenue for P. E. I. is not given in the report of that Province. It is estimated at $75,000.00, which is in approximate proportion to P. E. I.'s expenditure, as calculated from the ratio of income to expenditure in the other three provinces.

Some of this revenue is not clearly allocated to source, due to the combining of items in the reports, but the final estimate of $1,100,000 would seem to be reasonable.

The expenditures of provincial government departments are listed in their reports, but here again the combination of items and services is a disturbing factor. There would appear to be possibilities of error, particularly in the estimation of law enforcement costs. In different provinces, enforcement of the game laws is combined with enforcement of fisheries or forestry legislation and may include varying amounts of enforcement of federal Migratory Bird Regulations. Some expenditure in parks is included. Parks are a public service, but are not of direct benefit to the wildlife resource. On the other hand, provincial payments for the services of the Royal Canadian Mounted Police are probably not included.

The final estimate of $300,000.00 as government expenditure for the year 1955 seems low in relation to the other values involved, but the sources used offer no grounds for increasing that estimate.

Discussion

Wildlife as a natural resource is not organized as one industry in any of the Atlantic Provinces. Provincial authority in the wildlife field lies in the hands of various government departments: Lands and Forests (N.S.). Lands and Mines (N.B.). Mines and Resources (Nfld.), and Industry and Natural Resources (P. E. I.).

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Federal authorities hold the primary responsibility for migratory birds. Little or no mention of that part of the resource is made in provincial reports. No great amount of revenue is derived from waterfowl by the Atlantic Provinces, and enforcement of the Migratory Bird Regulations is largely carried out by the Royal Canadian Mounted Police.

There is also some variation in the sharing of responsibility in the sports fishery. Newfoundland, New Brunswick, and Prince Edward Island list revenue from the sale of fishing licenses. New Brunswick also includes mention of "leased waters". In the Nova Scotia report, sports fisheries are not mentioned as part of the responsibility of the provincial authority.

Estimates of money values involved in the harvesting of game fish and migratory birds could not be made from the publications referred to during the preparation of this paper. It is quite possible that the economic values involved in the harvesting of migratory birds and game fish may now, or in the future, equal or exceed the values involved in harvesting game animals.

The interpretation of figures found in provincial reports relies extensively on economic surveys carried out in the U. S. A. and the Province of British Columbia. No comparable studies have been made in Eastern Canada to date. However, criticism of the figures given in this paper will be difficult, because there would appear to be even less data available on which to base a criticism than there were on which to base the estimates as presented.

Conclusions

The conclusions suggested by this paper are very general in nature, albeit startling in content.

Wildlife represents a resource of participant interest to between 10% and 25% of the adult population of the Atlantic Provinces.

The value of this resource is to be measured in millions, or tens of millions of dollars annually.

These values are being realized without cost to Provincial Governments. Revenue amounts to two, three, or possibly four times the amount expended on the resource.

The economic potentialities of the wildlife resources of the Atlantic Provinces are practically unknown.

Report of the Department of Lands and Forests, fiscal year ending March 31, 1956. Queen's Printer, Halifax, N.S. 1956.

119th Annual Report of the Department of Lands and Mines of the Province of New Brunswick for the year ended 31st March, 1956. Government of the Province of New Brunswick, Fredericton, N. B. 1956.

Annual Report of the Department of Mines and Resources for the year ended 31st March, 1956. Province of Newfoundland.

Annual Report of the Department of Industry and Natural Resources of the Province of Prince Edward Island for the year ended March 31st, 1956. The Patriot Pub. Co., Ltd., Charlottetown, P. E. I. 1956.

National Survey of Fishing and Hunting. A report on the first nationwide economic survey of sport fishing and hunting in the United States, during the calendar year 1955. U.S. Dept. of the Interior. Fish and Wildlife Service Circular 44. Supt. of Documents, U. S. Government Printing Office, Wash. D.C. Price $0.40.

Wildlife Management Papers delivered at the Twentieth Federal-Provincial Wildlife Conference, held in Vancouver, June, 1956. Dept. of Northern Affairs and National Resources, National Parks Branch -- Canadian Wildlife Service, Ottawa, 1957.

Smith, S.B., Distribution and Economics of the British Columbia Sport Fishery, 1954. Management Publication No. 4 of the British Columbia Game Commission, 1955.

Hatter J., D.J. Robinson, P.W. Martin, L. G. Sugden, E.W. Taylor, and W.G. Smith "Inventory and Evaluation of Wildlife Resources of British Columbia." Reprinted from the 9th B. C. Natural Resources Conference Transactions, February, 1956.

Provincial Game Commission Report for the year ended December 31st, 1955. Province of British Columbia, Dept. of Attorney-General. Queen's Printer, Victoria, 1956.

Canada Year Book, 1956. Dominion Bureau of Statistics, Queen's Printer, Ottawa, $4.00.

LEASE OF EXCLUSIVE HUNTING OR FISHING RIGHTS

by

J. Duguay, Assistant Superintendent General,
Department of Game and Fish, Quebec.

I thought that the system of leasing exclusive hunting or fishing privileges which has been applied for some 70 years in Quebec might interest the Conference, as it is a system which, I think, has not been used by many other provinces.

In Quebec, the first mention of the system itself goes back as far as the last part of the nineteenth century. During the early eighties, game populations were depleted within the range of accessible areas; on the other hand, the tremendous area of the Province and the small budget available were decisive factors in favour of the policy of leasing exclusive hunting and fishing rights.

An Act concerning clubs for the protection of fish and game was passed, and section 13 of the Hunting Law of the Province, adopted in 1884, set the conditions for the leasing of hunting privileges on Crown lands. According to this Act, it was understood that only the non-colonizable lands would be leased for a period not exceeding five years. The lease, however, could be renewed.

The lessee, in return for these exclusive hunting rights in the territory described in the lease, would pay, per square mile, a certain yearly amount. The dues were based on the size of the area involved, its accessibility, the game and fish stocks, and so forth.

Those privileges were granted on the condition that they would not interfere with the interests of industries, such as pulp and paper companies, mining concerns, hydraulic development, and so forth.

Up to now, the lease could be made out to one person, but Act 48 Victoria, adopted in 1885, legalized the procedure for the incorporation of clubs for the protection of fish and game. After having paid certain fees, any organization could be incorporated as a hunting and fishing club on the condition that a petition, signed by at least five persons, be filed.

Another Act stated that, since the first of June 1884, sales and free grants of lands belonging to the Crown have been and are subject to a reserve, in full ownership by the Crown, of three chains in depth of the lands bordering on non-navigable rivers and lakes in the Province. This Act, 51-52 Victoria, chapter 17, adopted in 1888, authorized the leasing of fishing privileges on Crown lands to individuals or clubs. The lessee had the exclusive fishing privileges in so far as his rights were not in conflict with those of other persons or with other laws of the Province; thus, lumber driving or navigation could not be interfered with.

Among his duties and responsibilities, the lessee was responsible for preventing game-law violation on his territory, and he was obligated to hire a guardian that would reside on the territory and patrol it all year.

Subject to certain conditions, the lessee could also get permission to exploit his lease commercially.

As far as conservation was concerned, the clause relative to guardians was certainly the most important one, for it was the only clause justifying the policy of leasing hunting and fishing privileges on Crown lands.

The tremendous area of the Province could not be adequately controlled with the budget at the disposal of the fish and game authorities in those days, so this obligation was transferred to the lessee who, in return, had the exclusive hunting and fishing rights. One could believe that a large proportion of the citizens of the Province would ask for concessions. On the contrary, in 1906, that is to say 20 years after the scheme was started, a little more than 500 fish and game leases were in force, representing an overall area of 7,000 square miles.

I shall mention a few statistics pertaining to leasing of rights later, but what is more interesting is the management effort of the lessees in general. We have noticed and we still notice that the leased territories are well stocked with fish and game and that the lessee, being directly interested, usually takes great care of his territory and is very interested in management.

Any management scheme is the responsibility of the lessee, who must pay for the restocking of lakes and rivers. However, our biological services on these territories are usually given without charge. There could be a few exceptions, such as when lessees want to have some special studies made which would involve high expenditures.

Hundreds of lakes have been stocked with fish of high economic value and, as far as game management is concerned, the lessees become more and more interested in biological enquiries, food inventories, animal census, and so forth.

How long will this system last? We don't know. However, I am glad to say that up to now, very good results have been obtained as far as wildlife conservation and management are concerned; the fact is that a leased territory constitutes a kind of sanctuary or preserve. Maybe some day the public will ask for a change. A growing and more mobile population is steadily increasing the range of heavy fishing and hunting pressure into hitherto remote areas.

Up to now, the general public has not suffered much from this leasing policy. The total area of the Province is in the vicinity of 600,000 square miles, and up to now, 52,000 square miles have been set aside for parks and preserves. Hunting and fishing can be controlled more effectively in these preserves, and the enforcement system in preserves or in leased areas is practically the same.

Our experience of opening leased territories to the general public has not been very happy up to now. That is why the preserve system for fishing, which has been in favour for quite a long time in Quebec, and for hunting, which is now being experienced, may be the solution to this problem. After all, the areas for which exclusive hunting and fishing rights are granted are administered according to the accepted principles of game and fish management, and the purpose of management is to make the land produce a maximum crop of fish and game, not more, not less.

GRANTING OF HUNTING AND FISHING RIGHTS IN QUEBEC

	1904	1914	1923	1932	1944	1954
Number of lessees	527	670	526	555	742	1399
Fishing & hunting rentals	$49,710.00	$92,165.00	$141,734.00	$209,318.00	$176,304.00	$361,533.00
Number of square miles rented	7,061	8,461	9,959	15,674	13,777	21,318
Number of leased rivers	60	69	180	321	204	292
Number of leased lakes	-	-	2,350	3,938	6,384	10,839
Value of assets & improvements	-	-	$2,236,815.00	$3,991,630.00	$6,293,304.00	$15,374,611.00
Number of guardians	-	-	545	824	824	1,589
Number of guides	-	-	1,420	2,522	1,973	2,254
Number of resident members	-	-	3,256	3,890	5.100	12,795
Number of non-resident members	-	-	2,741	4,483	2,472	3,470
Number of guests	-	-	3,814	8,810	18,103	47,492
Trout caught (lbs)	-	-	144,128	282,787	254,167	541,292
Salmon caught (lbs)	-	-	112,878	109,962	87,639	76,252
Other kind of fish caught (lbs)	-	-	20,335	74,869	47,619	199,680
Moose killed	-	-	221	376	266	418
Bear killed	-	-	-	-	24	146
Deer killed	-	-	549	1,000	374	644
Hare killed	-	-	-	-	2,902	4,914
Patridge killed	-	-	-	-	4,293	21,517
Salaries, rentals & improvements	-	-	-	$1,232,936.00	$1,182,060.00	$3,697,513.00
Expenditures by Canadian lessees	-	-	-	$432,134.00	$342,748.00	$1,657,917.00
Expenditures by Canadian visitors	-	-	-	$159,903.00	$316,286.00	$1,215,851.00
Expenditures by American members and visitors	-	-	-	$679,759.00	$540,644.00	$1,760,337.00

FUR ROYALTIES

by

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Department of Natural Resources, Saskatchewan

Most provinces in Canada charge an impost on pelts of wild fur-animals. Probably the reason for this policy is:

(1) The animals, being wild by nature, are the property of the people of the province.

(2) Resources administrative departments responsible for the management of wild fur-animals have for some years spent considerable sums in research, management, and trapping programs, particularly in the case of beaver and muskrat.

In general, fur royalties have been established at the rate of five per cent of the value of the pelt. In the case of beaver and muskrat, the royalty has for some years been near ten per cent. Periodically, provincial game administrators from Ontario to the west coast have met to discuss, and have usually agreed on uniform royalty rates for each species.

In Saskatchewan we do not charge a royalty on pelts of animals which are considered predators. This includes badger, coyote, skunk, and timber wolf. There is no royalty on bush rabbit, nor has there been a royalty on raccoon since 1951.

When considering royalty rates, we must use the price received through fur auctions as the basis, as there are wide fluctuations in price paid by dealers.

I have distributed material showing the Saskatchewan fur production, value, and royalties by species for the years 1946-47 to 1956-57. However, for the last period, I have quoted average prices only, available as at May 15th.

From 1946-47 to 1954 our royalty on beaver and muskrat was on a ten per cent basis, which, in my opinion, is the fairest way to handle the matter. However, this is possible only when the fur is sold under government supervision. The present royalty of $1.00 on beaver is, in some cases no doubt, over ten per cent of the value of the pelt, and it may be desirable to make some reduction here.

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Muskrat prices, too, are rather depressed. It has been suggested that there could be a cut from ten per cent to five per cent on this royalty. However, it seems to me if we are to follow the past policy on muskrats, it might be advisable to reduce them to seven or eight cents.

It will be noted that royalties on marten are also a little high, but there are a number of other species, such as lynx, otter, and squirrel, whose prices in recent years would indicate some increase is warranted. This is particularly apparent in the case of jack rabbit, where prices in more recent years have been from 56 cents to 75 cents, yet the royalty has continued at only one cent.

Prices received for raccoon pelts would also indicate that a royalty impost might be considered.

For some years now $1.00 on mink has been considerably less than five per cent of their value.

There are always fluctuations in fur prices from year to year. I do not think we can hope to keep royalties on an even basis in relation to prices from year to year. Some will either be under or over the percentage desired. Most trappers take a number of different fur species, and the overall effect should be quite satisfactory.

It is recommended that the representatives from the provinces interested should have a meeting to discuss this matter further before this conference is concluded.

FUR PRODUCTION, AVERAGE PRICES AND ROYALTY, SASKATCHEWAN PELTS, 1946 - 1957

Year	Badger				Beaver				Coyote			
	Production	Valuation	Average Price	Royalty Payable	Production	Valuation	Average Price	Royalty Payable	Production	Valuation	Average Price	Royalty Payable
1946-47	995	$1,243.75	$1.25	-	2,557	$81,312.60	$31.80	10%	12,579	$44,026.50	$3.50	-
48	540	534.60	.99	-	6,070	191,934.40	31.62	10%	8,823	24,704.40	2.80	-
49	559	296.27	.53	-	10,228	191,263.60	18.70	10%	7,934	19,279.62	2.43	-
50	1,023	439.89	.43	-	13,489	300,804.70	22.30	10%	8,860	22,593.00	2.55	-
51	449	399.61	.89	-	14,078	260,020.66	18.47	10%	15,707	71,780.99	4.57	-
52	442	119.34	.27	-	17,618	239,604.80	13.60	10%	6,153	16,366.98	2.66	-
53	132	39.60	.30	-	22,977	290,199.51	12.63	10%	3,016	7,147.92	2.37	-
54	239	31.07	.13	-	34,419	333,520.11	9.69	10%	769	1,531.83	2.07	-
55	205	43.05	.21	-	52,115	681,143.05	13.07	1.00	1,971	6,721.11	3.41	-
56	227	72.64	.32	-	41,666	366,660.80	8.80	1.00	1,907	6,216.82	3.26	-
57			.28*				10.69*				2.71*	

Year	Blue Fox				Red Fox				Cross Fox			
	Production	Valuation	Average Price	Royalty Payable	Production	Valuation	Average Price	Royalty Payable	Production	Valuation	Average Price	Royalty Payable
1946-47	185	$1,850.00	$10.00	.75	2,300	$8,050.00	$3.50	.25	660	$3,960.00	$6.00	.50
48	-	-	-	.75	1,529	3,791.92	2.48	.25	536	1,754.56	3.46	.50
49	166	1,328.00	8.00	.75	1,329	2,498.52	1.88	.25	435	774.30	1.78	.50
50	-	-	-	.75	1,421	1,591.52	1.12	.25	444	763.68	1.72	.50
51	-	-	-	.75	2,409	4,577.10	1.90	.25	754	1,922.70	2.55	.50
52	-	-	-	.50	1,710	1,744.20	1.02	.20	543	923.10	1.70	.30
53	9	33.75	3.75	.50	1,008	1,703.52	1.69	.20	365	762.85	2.09	.30
54	21	89.25	4.25	.20	904	1,166.16	1.29	.05	286	500.50	1.75	.10
55	2	5.00	2.50	.20	298	402.30	1.35	.05	101	179.78	1.78	.10
56	1	7.75	7.75	.20	277	202.21	.73	.05	67	81.07	1.21	.10
57			-				1.33*				1.68*	

FUR PRODUCTION, AVERAGE PRICES AND ROYALTY, SASKATCHEWAN PELTS, 1946-1957

Year	Skunk				Squirrel				Weasel			
	Production	Valuation	Average Price	Royalty Payable	Production	Valuation	Average Price	Royalty Payable	Production	Valuation	Average Price	Royalty Payable
1946-47	12,628	$9,471.00	$.75	-	379,728	$170,877.60	$.45	.02	98,104	$171,682.00	$1.75	.10
48	1,643	952.94	.58	-	330,757	214,992.05	.65	.02	132,965	335,041.80	2.52	.10
49	1,468	572.52	.39	-	698,479	185,096.93½	.26½	.02	127,464	279,146.16	2.19	.10
50	2,404	841.40	.35	-	353,329	127,198.44	.36	.02	112,779	170,326.49	1.51	.10
51	299	257.14	.86	-	370,292	277,719.00	.75	.02	69,973	182,629.53	2.61	.10
52	1,863	540.27	.29	-	439,771	211,090.08	.48	.01	71,552	120,922.88	1.69	.10
53	215	73.10	.34	-	328,698	164,349.00	.50	.01	130,344	179,874.72	1.38	.10
54	28	12.04	.43	-	178,708	110,798.96	.62	.01	55,819	63,633.66	1.14	.10
55	429	300.30	.70	-	510,520	296,101.60	.58	.01	58,383	101,586.42	1.74	.10
56	626	413.16	.66	-	250,200	112,590.00	.45	.01	108,223	173,156.80	1.60	.10
57			.60*				.48*				1.10*	

Year	Wolverine				Fox - White				Timber Wolf			
	Production	Valuation	Average Price	Royalty Payable	Production	Valuation	Average Price	Royalty Payable	Production	Valuation	Average Price	Royalty Payable
1946-47	8	$ 80.00	$10.00	-	-	-		1.00	225	562.50	$2.50	-
48	9	54.00	6.00	-	7	$ 65.24	$ 9.32	1.00	341	556.83	1.63	-
49	4	49.64	12.41	-	4	34.00	8.50	1.00	99	322.74	3.26	-
50	8	120.00	15.00	-	6	24.00	4.00	1.00	71	194.54	2.74	-
51	9	273.96	22.82	-	25	380.75	15.23	1.00	101	799.91	7.91	-
52	5	65.50	13.10	.35	28	156.24	5.58	.50	89	280.35	3.15	-
53	11	168.63	15.33	.35	33	356.73	10.81	.50	44	204.16	4.64	-
54	23	394.45	17.15	.35	6	83.76	13.96	.25	18	54.18	3.01	-
55	12	205.80	17.15	.35	149	1,975.74	13.26	.25	15	105.00	7.00	-
56	31	629.61	20.31	.35	28	358.96	12.82	.25	8	31.04	3.88	-
57			22.16*				$15.00 or $16.00*				-	

* = Average Price as at May 14, 1957.

FUR PRODUCTION, AVERAGE PRICES AND ROYALTY, SASKATCHEWAN PELTS, 1946-1957

Year	Lynx Production	Lynx Valuation	Lynx Average Price	Lynx Royalty Payable	Marten Production	Marten Valuation	Marten Average Price	Marten Royalty Payable	Mink Production	Mink Valuation	Mink Average Price	Mink Royalty Payable
1946-47	24	$ 540.00	$22.50	1.50	506	$15,180.00	$ 30.00	2.50	8,088	$258,816.00	$32.00	1.25
48	361	5,295.87	14.67	1.50	160	4,374.40	27.34	2.50	9,579	296,661.63	30.97	1.25
49	179	1,576.99	8.81	1.50	212	4,466.84	21.07	2.50	10,672	271,068.80	25.40	1.25
50	363	3,045.57	8.39	1.50	374	9,088.20	24.30	2.50	16,195	504,798.15	31.17	1.25
51	1,014	10,140.00	10.00	1.50	215	6,460.25	30.05	2.50	12,596	461,517.44	36.64	1.25
52	1,017	3,213.72	3.16	.75	280	4,494.00	16.05	1.50	12,833	340,202.83	26.51	1.00
53	1,175	7,296.75	6.21	.75	196	2,518.60	12.85	1.50	18,853	445,873.45	23.65	1.00
54	848	4,435.04	5.23	.15	320	3,484.80	10.89	1.50	11,493	259,282.08	22.56	1.00
55	1,111	11,687.72	10.52	.15	500	7,125.00	14.25	1.00	14,613	417,493.41	28.57	1.00
56	574	3,409.56	5.94	.15	510	4,783.80	9.38	1.00	18,514	481,364.00	26.00	1.00
57			8.69*				7.29*				19.65*	

Year	Otter Production	Otter Valuation	Otter Average Price	Otter Royalty Payable	Bush Rabbit Production	Bush Rabbit Valuation	Bush Rabbit Average Price	Bush Rabbit Royalty Payable	Jack Rabbit Production	Jack Rabbit Valuation	Jack Rabbit Average Price	Jack Rabbit Royalty Payable
1946-47	233	$ 6,990.00	$30.00	1.50	41,925	$ 4,192.50	$.10	-	100,651	$70,455.70	$ .70	.02
48	413	12,261.97	29.69	1.50	41.071	2,464.26	.06	-	61,117	41,559.56	.68	.02
49	443	8,541.04	19.28	1.50	7,002	70.02	.01	-	39,795	16,315.95	.41	.02
50	304	6,852.16	22.54	1.50	2,834	28.34	.01	-	51,371	20,034.69	.39	.02
51	366	13,545.66	37.01	1.50	7,667	76.67	.01	-	24,960	14,976.00	.60	.02
52	295	5,790.85	19.63	1.00	2,547	25.47	.01	-	32,838	6,567.60	.20	.01
53	331	9,109.12	27.52	1.00	257	N/V	-	-	44,282	10,627.68	.24	.01
54	222	5,265.84	23.72	1.00	-	-	-	-	38,671	10,441.17	.27	.01
55	283	8,688.10	30.70	1.25	2,300	-	-	-	82,981	46,469.36	.56	.01
56	389	12,331.30	31.70	1.25	1,324	79.44	.06	-	98,989	58,403.51	.59	.01
57			32.49*				-				.75*	

FUR PRODUCTION, AVERAGE PRICES AND ROYALTY, SASKATCHEWAN PELTS, 1946-1957

Year	Muskrat Production	Muskrat Valuation	Muskrat Average Price	Muskrat Royalty Payable	Fisher Production	Fisher Valuation	Fisher Average Price	Fisher Royalty Payable
1946-47	$ 370,638	$ 681,965.92	$1.84	10%	76	$2,090.00	$27.50	1.50
48	510,730	1,368,756.40	2.68	10%	50	1,203.00	24.06	1.50
49	734,859	1,006,756.83	1.37	10%	165	2,501.40	15.16	1.50
50	473,212	818,121.00	1.75	10%	218	4,615.06	21.17	1.50
51	302,177	667,811.17	2.21	10%	304	9,381.44	30.86	1.50
52	542,170	759,038.00	1.40	10%	572	8,551.40	14.95	1.50
53	951,065	1,046,171.50	1.10	10%	574	9,568.58	16.67	1.50
54	678,470	576,699.50	.85	10%	735	11,598.30	15.78	1.00
55	1,951,800	2,127,462.00	1.09	10¢	390	7,179.90	18.41	1.00
56	1,731,978	1,610,739.54	.93	10¢	274	5,411.50	19.75	1.00
57			.74*	10¢			16.05*	

Year	Raccoon Production	Raccoon Valuation	Raccoon Average Price	Raccoon Royalty Payable	Black & Silver Fox Production	Black & Silver Fox Valuation	Black & Silver Fox Average Price	Black & Silver Fox Royalty Payable
1946-47	55	$137.50	$2.50	.25	122	1,098.00	$9.00	.75
48	174	365.40	2.10	.25	68	408.00	6.00	.75
49	2	4.00	2.00	.25	49	294.00	6.00	.75
50	8	10.40	1.30	.25	43	219.30	5.10	.75
51	23	25.30	1.10	.25	80	524.80	6.56	.75
52	18	18.90	1.05	-	80	478.40	5.98	.35
53	9	17.37	1.93	-	46	258.98	5.63	.35
54	17	21.93	1.29	-	61	181.17	2.97	.20
55	27	38.34	1.42	-	21	75.18	3.58	.20
56	54	111.78	2.07	-	9	20.97	2.33	.20
57			2.57*				1.79*	

GERALDTON DISTRICT PLAN FOR A STATISTICALLY SOUND MOOSE SURVEY

by
H. G. Cumming, Department of Lands and Forests, Ontario.

In many field problems it is impossible to count the animals with which we work. In such cases one common solution is to count samples in order to estimate the total population. Two separate problems are involved in a census by means of samples. One is the physical method by which the census is taken. The other is the choice of size, shape, and number of samples. These two problems are completely interdependent.

An illustration of their effects upon each other is provided by our attempts at aerial moose censusing in Ontario. We began by choosing a sample shape which seemed logical. This was the strip count, which was used in all our early censusing efforts. It was found, however, that although this was a logical sample shape, all our efforts at changing widths of strips and distance between strips failed to give us a good count. The problem was in the physical method involved. We could not see very many moose while flying in straight lines. Then came the circling method of censusing, developed in Gogama. This provided a much more efficient method of counting the moose, but meant that the strip count had to be abandoned. A new sampling design had to be developed.

A plan tried out in the Geraldton District during the winter of 1957-58 is referred to as "a stratified random sample with disproportionate allocation of sample plots". The advantages of this method are as follows:

1. It takes advantage of any information about moose distribution which we now have.

2. It ensures that our work will bring the highest possible returns for the time, money, and effort expended.

3. It eliminates personal bias.

4. It allows confidence limits to be set on the final estimate.

In the belief that this is a good design which others may wish to try, the method by which it was planned is set forth below. It is not necessary to be a statistician in order to plan such a census, because statistics, in the last analysis, is just common sense.

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Plan

1. Determine number of days or hours' flying which can be allotted to this project. We decided in Geraldton that we could count on a minimum of 10 days' flying.

2. Determine most appropriate size of sample. In our test work last year, we found that a sample plot of 80 sq. mi. was too large to be completed in one day. It was decided that plots of 50 sq. mi. would be better. Since occasions arise upon which only half a day can be used, it was decided to split these plots in two so that they could be completed in half a day. This gave us a total of 20 plots for the 10 days.

3. Find some method of covering the entire area to be sampled with possible sample plots. The possibility of using FRI base maps for sample plots was considered in Geraldton District several years ago. It was found that by quartering these maps a grid of the entire District could be obtained. We were somewhat hesitant at using straight-line borders, but they seem to have worked out quite nicely.

4. Enumerate all possible sample plots. In our case the grid was numbered and each square was located by the number of its northeast corner.

5. Divide the area to be sampled into sections or strata in each of which the moose population could be expected to be fairly uniform. The Geraldton District was divided into the ecological units shown in the FRI reports, and the centre section was subdivided along the railway lines and Long Lake for a total of five strata.

6. Divide the total number of plots among the strata proportionate to the area of each. Adjust this allocation so that the strata which are the most important, most variable, or most easily censused, receive the lion's share of plots. Plots in the Geraldton District were divided as follows:

	Possible Plots	No. of Plots Chosen
Hudson Bay Lowlands (Distant, low population, least important)	220	3
Northern section (Distant, med. low population, not important)	272	5
Geraldton section (Close, good population, heavily hunted)	151	5
Longlac (Close, good population, heavily hunted)	141	4
Southern (Fairly distant, lower population, hunted, difficult to survey)	175	3
	Total	20

7. Choose the required number of plots from each area by a random method, i.e., pick numbers from a table of random numbers or write the numbers on pieces of paper and pick them from a hat.

For the Geraldton census we used a table of random numbers.

With the completion of these steps the following things have been done:

(a) All bias has been eliminated by the random sampling.

(b) Knowledge of high and low populations has been used in choosing the strata.

(c) The most efficient allocation of plots in the strata has been accomplished.

(d) Sample plots of workable size and workable numbers have been chosen.

Preliminary Results from the Geraldton Census

The calculations from such a census are rather complicated for the layman, but can be done quite easily by any statistician. As long as the census is properly designed, anyone can calculate the results. If it is not properly designed, no one can improve it afterwards.

96351—4½

The total estimate of moose is the sum of the estimates for each stratum. The estimates for the strata are obtained by multiplying the average number of moose per plot by the total number of plots in the stratum. The number of moose estimated for the Geraldton District by this method is 6,900. (Note: this is for the mainland only, and does not include the islands of Lake Superior or Lake Nipigon.)

The confidence interval is estimated by using the differences between the counts on individual plots and the mean number of moose per plot. This is where the stratification helps. Instead of having to subtract the individual count from the mean for the whole District, (from which it may differ widely) it has only to be subtracted from the mean for its own strata (to which it is likely quite close). For example, a count of 18 for the McKay Lake plot differs from the total mean (8.0) by 10.0, but differs from its own strata mean (14.5) by only 3.5. This helps to reduce the range of the confidence limits. Even so, confidence limits for the Geraldton District were ± 1,500, at the 80 per cent level. That is, unless a one-in-five chance occurred in picking the plots (such as, all falling in very good or very poor range), the actual number of moose in the Geraldton District is between 5,400 and 8,400. However, here we must remember our opening paragraph. This does not account for error due to the method of counting on the samples. Since it is very unlikely that we counted all the moose on the sample plots, these figures are probably all too low. As we do not know how much too low, no attempt has been made to correct the censusing error. At any rate, we know that we saw what we saw. Therefore, the minimum confidence limit provides a minimum estimate for the District, about which we can be very sure. When we consider the width of confidence limits from a census such as this, it gives some idea of the kind of accuracy we have been obtaining by censusing 3 or 4 plots and applying that to the District. As mentioned before, these are preliminary figures only. It is hoped that some refinements in calculations can be made and included in the final report of the survey.

Summary

1. The new method of censusing moose from the air requires a new design for the sampling units.

2. One such possible design was used in the Geraldton District in 1957-58. The plan is presented herewith.

3. The preliminary results of the survey have not been as good as was hoped, but final figures may be better.

TRAINING PROGRAMME FOR FISH AND WILDLIFE PERSONNEL IN ONTARIO

by

Dr. W.J.K. Harkness, Chief,
Fish and Wildlife Division, Ontario

This programme, tailored to meet Ontario's needs, has been developed over the last 12 years.

Two essential features of satisfactory fish and wildlife administration are realistic, practical plans and a competent, trained staff to carry them out. The plans should include, in fact, a training programme, the training programme being part of the plans.

I wish today to deal with the Ontario situation which, although by no means satisfactory, does exhibit some progressive features.

Ontario has three levels of personnel responsible for fish and wildlife work, the university graduate, the conservation officer and the honorary deputy game warden.

There are two areas of training, the pre-service training and the in-service training.

There are three sources of biologists within the Province - those graduating from the Ontario Agricultural College with agricultural background, those graduating from the School of Forestry with forestry background, and those graduating in Biology from the Arts Courses with perhaps more training in the philosophy of Biology. We encourage students in all of these courses, including those students from outside of the Province, by employment during their undergraduate period, and after employment we provide certain areas of in-service training.

The conservation officer group, some 200 strong, includes those personnel who receive most attention in the in-service training, as they are, for the most part, untrained on recruitment. The value of their work on the staff is almost in direct ratio to their ability and training.

The conservation officers are divided into five salary and duty categories:

Group 1 - $2880 - $3240, includes 44 officers.

The novices, first field training period - (Ranger School Course).

Group 2 - $3360 to $3900, includes 103 officers.

The standard officer. (Promoted to Group 3 on the basis of demonstrated ability and good work.)

Group 3 - $3600 to $4200, includes 31 officers.

Assistants to senior conservation officers, mostly responsible for management.

Group 4 - $4050 to $4800, includes 8 conservation officers.

This category is not well represented, but will be occupied by the best officers from Group 3 - in training for senior conservation officer post.

Group 5 - $4600 to $5500, includes 15 officers.

Senior conservation officer - one to each of the 22 Forest Districts - in charge of the conservation officer staff and its work.

The duties of the conservation officers are set out in Circular O.P. 17-4/issued January 31, 1957.

Recruitment is limited to applicants in the age range of 24 to 35, ensuring some degree of maturity and at the same time being sufficiently young to look forward to many years of successful service. Recruitment is limited to applicants who have completed grade 10 or its equivalent. They must be at least 5 feet 7 inches in height and weigh between 145 and 200 pounds.

Considerable recruitment is made from within the Service by transfer, especially from the forest ranger group, which they may enter at a lower age group, but still with the grade 10 academic requirement. Such recruits will have had experience and training in other phases of Departmental work.

Recruitment is also made from a careful selection of general applicants. These recruits are enrolled as super-numerary conservation officers.

Supernumerary conservation officers are on Head Office strength. They are assigned to work with field men of known high efficiency and, in fact, some districts set up well-planned supernumerary officer training programmes for any of this group assigned to their district. This group is often used to augment the regular staff in cases of emergency, such as, for example, protection of spawning fish, extra patrols during deer, moose, or pheasant seasons, or at road inspection stations.

In the case of vacancies arising from transfer, promotion, superannuation, or death, a supernumerary officer or a recruit from within the Service is immediately posted to the vacancy.

All conservation officers must attend and complete satisfactorily the course at the Ranger School before promotion to Group 2. The Ranger School course involves 33 weeks of training - three terms of 11 weeks each - in the work of the Department, including forestry, fish, and wildlife.

Formerly, the third term provided special training in fish and wildlife work, and conservation officers were given this special course. This has been discontinued, and special short-term courses, from 3 to 8 or 12 weeks' duration, in fish and wildlife are being introduced to meet special requirements. These special courses will be available to Chief and Deputy Chief fire rangers also, to indoctrinate them in the principles of wildlife management, and to conservation officers who are coming into greater responsibility in Group 3. Refresher courses will be held for conservation officers of the senior groups, and a course is being especially designed for fish-hatchery personnel.

The Forest Ranger School is not restricted to in-service training, but the course is available to anyone meeting the entrance requirements. The number of outside students is increasing, and we shall probably look to this source for desirable recruits, as in fact is already the case.

As needs dictate, special courses to train field staff are laid on by the Districts or by Head Office.

Each year over fifty conservation officers, some biologists, and others, such as forest rangers, take a refresher course in deer aging. Last autumn, five such courses were held to train and test candidates. Only those who pass a stiff proficiency test are permitted to undertake age determinations on the checking stations.

Prior to intensive checks on waterfowl hunters' bags, District officers may call in the men for instruction on species, age, and sex determination.

Courses are given when and where needed to train personnel when new techniques are developed, as for deer browse survey or moose inventory.

In the southwestern Region especially and to a lesser degree in other areas, conservation officers have been required to undertake a wildlife investigation or management project of their own choice. Such projects include creel census of a discrete water area, beaver damage on a watershed, Hungarian partridge population fluctuations, and highway deer-kill.

This provides valuable self-training, because the man learns "by doing", and when he has to collect and analyse his own data and come to some conclusion, he realizes the need for care with all details associated with the collection of information.

In a similar category we have annual meetings in connection with our co-operative fur management work. At these meetings our Group 3 conservation officers are required to report on special phases of their management work. The preparation and presentation of these reports constitute an important field of training.

When important phases of major management projects have been completed, they are formally reported and recorded in our Fish and Wildlife Management Reports. These reports may be prepared by personnel at any level of responsibility and are frequently written by advanced Group 3 conservation officers, sometimes with the assistance of a biologist.

Arrangements are sometimes made for courses, special training, or observation for our men outside the Province. A biologist took a five-week course in fish hatchery operation in New York, two of our hatchery managers have recently returned from a study of American hatcheries, while three conservation officers and two biologists have just completed a six-week course in the Cree language which was given by the Missionary Society of the Anglican Church of Canada at Prince Albert.

Occasionally, outsiders are brought into the Province to give lectures or special training. Mr. McIsaac of the Hudson's Bay Company in Montreal has for the last two years given two courses of one week each at different centres in the Province on fur quality and grading.

This gave our conservation officers an opportunity of handling hundreds of pelts of our most important fur bearers and of actually carrying out grading. While they are in no sense qualified graders, they gain a keener appreciation of fur quality and are in a much better position to assist the trappers in quality improvement (for cash appreciation of his fur).

We have placed considerable emphasis on developing comprehensive libraries on fish and wildlife and management. We encourage the self-training of staff through use of the libraries, from which books and periodicals on any subject are provided on request, and by personal subscription to at least one professional periodical. It is regarded as an officer's duty to keep abreast of the literature. Library accession lists are sent out to the Districts from the Wildlife Library at regular intervals.

Finally, we encourage officers, in the senior groups especially, to attend conferences of a provincial, national, or international nature when such conferences are held near their posting, to take advantage of the information given in lectures, and to meet and discuss the work with men from other areas.

Again I wish to emphasize that a staff training programme should be an integral part of any fish and wildlife administrative plan.

THE PHEASANTS OF ALBERTA

by

E.S. Huestis, Fish and Game Commissioner, Alberta

We have good pheasant hunting in Alberta.

The introduction of Chinese Ringneck Pheasants was started in Alberta by a few Calgary sportsmen, who placed some birds, five hens and five cocks, near that city in 1908. The records show that by 1912 they were able to shoot a few pheasants legally under some arrangement, the details of which are not known.

The first open season occurred many years later in 1939, when for two days, November 11 and 15, the hunters, under a special licence, could take cock pheasants. Seven hundred and seventy-seven (777) licences were sold, and an estimated eight hundred and sixty (860) birds were killed.

Leading up to the open season in 1939 there were many pheasants planted by individuals, sportsmen's groups, and by the government. The principal introductions, according to our records, were as follows:

1913 - 75 pheasants south of Calgary

1914 - a small number northeast of Calgary

1927 - 2,400 birds near Calgary

1927 - 200 birds near Brooks

1928-29-30 - number of birds near Edmonton

1929 - a small number south of Medicine Hat

1930-31 - numbers of birds near Camrose

1934 - The largest release -

300 birds near Edmonton

300 birds near Brooks

150 birds near Calgary

These birds were obtained from South Dakota and it is considered that they made possible the two-day season in 1939.

In 1940 the Fish and Game Branch was transferred from the Department of Agriculture to the Department of Lands and Mines. Prior to 1940, pheasants had been raised in small numbers at the Department of Agriculture poultry farm east of Edmonton. In 1945 it was decided to go into the pheasant raising business in a larger way, and space was obtained in an orchard at the horticultural station at Brooks. This spot was chosen because of the high concentration of pheasants in this irrigation area. Pheasant eggs were obtained by school children from nests around Brooks, allowing the hen to lay a second clutch. We offered the children two cents per egg and had no trouble obtaining our needs of up to 18,000 eggs in about three weeks' time.

The first year we sent out 5,000 eggs to local sportsmen's groups, to be hatched in whatever manner was available. The rest of the eggs, some 3,000, were incubated by a local turkey farmer, and we put day-old chicks in a few brooder houses equipped with electric brooders. The pen space in the orchard was limited, and our losses were heavy. We released 2,060 birds at eight weeks of age to local groups throughout the Province.

The distribution of eggs was not successful, so the next year we sent out 5,000 day-old chicks to local groups. We raised 2,000 birds to ten weeks of age and sent them to interested groups for release. The day-old chicks were as bad a failure as the eggs, and this system was abandoned.

In the following year we tried raising birds to twelve weeks of age and found the survival quite good. Since then all releases, except those for experimental purposes, are at this age. After the first year we purchased a 12,000-egg electric incubator and handled our own eggs.

It was soon found that our original location was too cramped, so in 1952 we moved to a very fine site on the edge of Brooks, where we have been able to raise our capacity, and at the same time assist Saskatchewan and Manitoba with eggs.

During the years 1945 to 1957, some 50,000 pheasants were released from our Brooks farm in 70 different areas of the Province. Some areas have received several plantings.

In the earlier years of our program, we gave the birds to local sportsmen's groups that were interested. They paid the express charges or picked the birds up. Since 1954 we have been very careful in our selection of release sites. They are

96351—5½

examined by our biologists. We do the releasing ourselves, inviting the local sportsmen to be present.

Since 1948, all pheasants have been banded with numbered bands before release. Records have been set up, and a system similar to the duck banding program is in effect. The person sending in the band is advised where and when the bird was released. A study of returns gives us some indication of the movement of birds from release sites. The average movement is 7.6 miles, and the greatest movement recorded was 66 miles. The number of bands returned is under ten per cent, but compares favourably with returns in Washington, Oregon, and Idaho.

The pheasant farm, as it now exists, is composed of a house and garage for the superintendent; a combined incubator and storage building, with a small office; and 39 brooder houses located in banks of 13. Attached to each brooder house is a wired enclosure 24 feet x 100 feet to take care of young birds when they leave the brooder house. The enclosures are in turn attached to three large covered runs each 250 feet x 110 feet, for each bank of brooders. These pens supply a natural setting for the larger birds. The pens are seven feet high to allow men and trucks to pass through when necessary. The pens have enough trees, shrubs, and weeds to supply natural cover for most weather.

In addition to the above we have parent stock enclosures for laying and wintering. After we have obtained our requirement of eggs, the parent stock is released and a new stock established. We have 60 covered laying pens, 12 feet x 18 feet, with two wintering enclosures, 150 feet x 225 feet. Each enclosure carries approximately 350 birds. During the winter electric water heaters are used.

Brood stock consists of 600 hens and 100 cocks. The cocks are obtained each year from birds hatched from 1,000 wild eggs collected by school children and sold to us at four cents each. With this method we are introducing a wild strain each year. This gives us a larger, better bird which is more able to survive when released.

During laying time we use a sex ratio of one cock to ten hens in the pens. This was found, after much experimenting, to be the best ratio.

Laying starts between April 1 and 15, depending on the weather. The number of eggs obtained increases gradually until in four weeks we get a production of between 70 per cent and 80 per cent. Eggs are collected four times daily, cleaned,

stored in humid cool storage, and turned twice daily. Every fourth or fifth day eggs are placed in the incubator, and an average hatch is 1,600 to 2,000 chicks. The total eggs incubated amounts to 12,000. The average hatch is about 70 per cent.

All eggs are candled after 14 days in the incubator to determine fertility and are transferred to hatching compartments. The incubation period is 22 to 24 days. On hatching, the chicks are placed in chick boxes for 24 hours and then placed in the brooder houses, 220 chicks to each house. We are not able to use all brooder space each year as the pen space must be rested from time to time to avoid the possibility of disease.

The brooder house floor is kept to a temperature of 105°F at first, which is gradually dropped to normal temperature in three weeks. After 10 to 14 days in the brooder house, the chicks are allowed out into the smaller pen, with the door left open so they can return in case of a storm. After six weeks they are turned into the large enclosures where their only protection is the trees and weeds in these pens. At 12 weeks of age the birds are released.

In the brooder houses we use peat moss, three inches to four inches deep, rather than shavings or straw. It is not necessary to clean the brooder if moss is used. The moss absorbs all surplus moisture and leaves dry footing for the chicks at all times.

Pheasants are hard to raise. Even temperature is important to avoid crowding and smothering in the brooder houses. Feeding of proper food is essential to avoid crooked legs and feather picking.

Over the years we have been in operation we have been searching for the very best food. To obtain this we have had excellent co-operation from the Department of Animal Science at the University of Alberta. Each year we supply them with a quantity of eggs which are hatched and brooded at their laboratory. As new foods are found or as changes are made in the formula, we feed the new variety to a part of the birds at the Brooks farm to check the results of the experiments at the laboratory. When they are finished with the laboratory experiments they turn the birds over to us for further feeding and release at an age of 12 weeks. A pheasant starter resulted from the first experiments, which took into account all known nutrient requirements and assessed the requirements for certain B vitamins. This food has been successful in raising pheasants to five weeks of age with complete absence of leg deformities

and practically no feather picking.

The University is now making a study of the nutrient requirements of pheasant chicks. First they investigated the proper calorie to protein ratio. They found that, for each per cent of protein, 25 calories were required. This was found to be different to chickens, for which 40 calories are required. Next they tried to find the optimum protein level in the ration. Four different levels of protein were fed at the Brooks farm. With each there was little or no leg trouble or feather picking; however, the best growth was obtained with a 32 per cent protein ration.

Last year they investigated the need for adding supplementary riboflavin. It was not needed, but could be added.

This year they are investigating the effect of supplementary folic acid on feather picking and feather quality. Therefore, we are now using rations with four levels of folic acid supplement. The cost of our feed may be high, but we are seeking for perfection and the end results should pay off.

This year we have set up new game-farm regulations and attached to them the best available information we have on raising pheasants. We think that local sportsmen's groups will now be able to raise pheasants in a proper manner for release in their district. We supply day-old chicks at 15 cents each from our blood-tested stock at the farm. We require that release sites be inspected by our biologists and that a release permit be obtained. Birds must be blood tested before release and brood stock on the game farms tested periodically.

We have good pheasant hunting in Alberta and expect to have better. We have had as many as 11,000 hunters on the opening day of the season near Brooks. Other areas are good. Come and hunt in Alberta.

NEWFOUNDLAND GAME MANAGEMENT AND RESEARCH

by

Stuart S. Peters, Biologist,
Department of Mines and Resources, Newfoundland.

Newfoundland is aesthetically a rugged, picturesque, and interesting place, but with the exception of moose hunting, it is, unfortunately, not the hunters' paradise it is so often depicted as. We do, however, offer such appealing game as caribou, black bear, and ptarmigan. Of local interest, in addition to those mentioned, is the hunting of fresh and salt water ducks, geese, and varying hares. Outside our Division's jurisdiction, of course, but nevertheless of considerable appeal, is this Province's excellent salmon and trout fishing.

Newfoundland, with its relative shortage of game species, both avian and mammalian, coupled with a considerable amount of illegal game activity, is often faced with complex problems in carrying out proposed game management programs. Considerable, and apparently steady progress has been made against nefarious practices, but shortage of law enforcement personnel, and inadequate communication media place limitations on what can be accomplished. Education and extension programs will aid and complement a law enforcement program, but will not solve the problem. There are, here, as elsewhere, people who disregard laws intended to regulate the game harvest. Part of the blame for this situation probably must be born by this Division in not getting the idea of conservation across.

Through a new program on education and extension to be put into effect this autumn,we have an objective - to alert and make the people of Newfoundland aware that to condone illegal hunting is as serious as participation. The effect is the same - over-exploitation reduces everyone's chances of sharing in a product of the land which can be managed on a sustained yield basis. For reasons not fully understood as yet, the indigenous and magnificent caribou appears to be in a precarious situation. Although not faced with extinction, for we still have over 5000 animals, there are certain local populations that are apparently being suppressed by illegal hunting. We have a big job ahead of us before we can be reasonably sure we are controlling the caribou, moose, and ptarmigan harvest in some areas.

It is not generally realized, either here in Newfoundland or on the mainland, just how few terrestrial mammals we have. The thirteen indigenous and five introduced species represent only about one-third of the species of land mammals found on the nearby maritime mainland. The Cabot and Belle Isle Straits apparently have, for a considerable period of time, presented an effective geographical barrier for many potential immigrants to Newfoundland. Both luck and effective legislation against importation of exotics have helped keep control of introductions in the recent past. We maintain a cautious yet solicitous policy toward game transplantations and exotic introductions. The land mammals native to Newfoundland, are as follows: Little brown bat, long-eared bat, black bear, pine marten, short-tailed weasel, otter, red fox, lynx, beaver, meadow mouse, muskrat, Arctic hare, and caribou.

Up until shortly after the turn of the present century, there remained a remnant, but meagre, wolf population; the last one presumably being shot in 1911. They were never recorded as being plentiful and became extinct before a build up of a potential new food source, in the introduction of both varying hare and moose, took place. The varying hare and moose were the only intentional introductions; the maritime varying hare in the 1850's, and two separate introductions of moose, one pair in 1878 and two pair in 1904. Ironically, these two mammals are also, by far, the most economically important game species. The brown rat and house mouse were unintentional introductions, as was the mink, which escaped from early fur farms. Occasionally, polar bears and Arctic foxes reach our shores with drifting Arctic ice flows, but seldom remain long.

The value of Newfoundland's game resources is difficult, if not impossible to resolve. Probably more emphasis is placed on the value and need for fresh meat, in our case from moose, varying hare, and sea birds, than in any other Canadian Province save, of course, the Indian and Eskimo populations in the northland. The aesthetic and sporting values are, as would be expected, therefore of much less importance. To many Newfoundlanders it is not how and where they get their animal, but of more importance - when there is a need for it! To appreciate this situation is to gain insight into some of our game management problems. Big-game regulations and zones are, for example, established to provide not only a favourable kill distribution, but also to provide a source of fresh meat at a time of need and when spoilage, due to unfavourable weather, is minimized.

Moose comprise over 96% of our big game harvest; the caribou are relatively insignificant as a source of needed fresh meat. On the other hand, the caribou have an extremely

high aesthetic value, particularly to mainland sportsmen, many of whom come each autumn to hunt the caribou and by so doing provide a source of revenue to caterers and guides. Since they are mainly in the interior, caribou are generally inaccessible to most Newfoundland sportsmen - the only alternative to a long trek is the use of aircraft. The moose, on the other hand, are generally nearer to settlements and roads and have the added advantage of providing up to twice as much meat per animal.

The game research programs (now numbering six) undertaken by this Division, all have as their objective, the securing of as much detailed life history and ecological information as is necessary to allow the formulation and implementation of a sound management program. These programs and policies must, if possible, assure an adequate harvest of a species - but, in concurrence with the carrying capacity of its range, also regulate and enforce this harvest to meet the demands of present as well as future sportsmen.

The discussions to follow, dealing with our research activities, will be, for the most part, rather brief. Phases of some projects are now completed or nearing completion and are being prepared either for publication or as an advanced degree thesis. I will, however, be glad to discuss with those interested, details of our research and management programs.

We have, at the present time, five experienced wildlife biologists on our staff, with prospects for another before the end of the summer.

Moose

The first game research project was undertaken by this Division in 1950 when D. H. Pimlott commenced the moose study.

The yearly either-sex kill of moose, now slightly over 5000 animals, is steadily increasing, as is our sale of licences.

In the parts of Newfoundland where a dendritic pattern of woods roads are open to hunters, the moose harvest appears to closely approximate the annual increment. This situation, unfortunately, only applies to a relatively small part of the island. In the vast inaccessible areas, the hunter kill is negligible and may not equal natural mortality. Many such areas show signs of severe overbrowsing, the balsam fir and white birch being either killed out or their regeneration completely suppressed. Such areas are far below their former carrying capacity.

These overbrowsed areas should have received sufficient hunting pressure to prevent the build up of an overpopulation of moose, but the remoteness of some of our areas makes this impossible. We are, therefore, not only losing a potential source of fresh meat, but potentially valuable forest trees as well. Island-wide hunting pressure is not heavy enough to adequately manage the moose and its environment. I feel we could safely harvest an additional 1500 to 2000 moose a year.

A few brief statistics based on Doug Pimlott's work might be of interest: 40% of our cow moose breed as yearlings, with an overall pregnancy of 75% for all cows. Twinning occurs in 13% of the pregnancies, and is correlated with the less severely browsed areas. He considers our annual increment as being in access of 30%. With an estimated population of from 40 - 50,000, we are therefore only harvesting from 10% to 12% (5000 animals).

The vast accumulation of data compiled on the Newfoundland moose during D. H. Pimlott's seven-year study, is now being prepared for publication.

Caribou

The caribou investigation commenced in 1956; but last year, under the direction of biologist A. T. Bergerud, it was expanded as a co-operative federal-provincial project, covering all of insular Newfoundland and Labrador.

Details and preliminary findings of last year's field work are, for the most part, too premature for any generalizations. Extensive observations, both from the air (helicopter and conventional aircraft) and in the field, have resulted in securing much new information on population estimates, movements, sex ratios, mortality, and breeding behaviour.

From last year's field work, it was discovered that about 80% of the calf crop died. An apparent bacterial infection, affecting only calves, was considered one of the main contributary factors in this excessive mortality. A special disease investigation, separate to the main program, is now under way in an attempt to isolate the cause.

Snowshoe Hare

Since its beginning in the spring of 1955, the snowshoe hare research program has been under the direction of biologist Donald Dodds.

The widely distributed varying hare, or rabbit as it is locally called, was introduced from the maritime mainland about 100 years ago. It was well established by the 1870's and is one of the most valuable land mammals we have, providing an important winter source of fresh meat to many rural people of the Province. It is also legal to sell them by the brace, and during population high's they, no doubt, become a substantial source of income to some residents. Commercial canning has been prohibited since 1948.

As a game animal, the hare is not very important, for most are taken by snares. In the St. John's area, however, the hunting of hares with hounds is fast becoming an important sport.

In studying short-lived animals, such as hares, a knowledge of the ratio of young animals to adults is very important, since it provides information on breeding success. This information is being secured by the examination of a large collection of humeri (one of the bones in the front legs). When a young hare is still growing, (up to about seven months old) there is a discernable groove separating the cap from the remaining part of the bone. When the bone has reached its full growth, this line, called the epiphysial groove (consisting of cartilage), disappears. Humeri of known age have been secured by rearing animals in captivity.

To secure adequate samples of humeri for examination, we have, over the past three years, worked through the Junior Red Cross organization in a number of schools. The children have assisted the program by making collections of these bones from the family stew pots. In this way, large samples are obtained and funds are earned for the Junior Red Cross organization.

At the end of the season the organization receives five cents for each bone it has collected. This is considered a prime example of the simple but effective ways in which the public can play a role in research programs.

Examination of part of this collection (humeri) has shown marked differences in the juvenile-adult ratio in different areas. In some cases, annual differences have also been noted. Whether these differences are the result of reproductive

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factors or whether they are a result of changes in the effect of natural decimating factors, including disease within a population, is a problem we are now investigating.

Ptarmigan

The ptarmigan research program, which is my personal responsibility, has been under way since 1955.

For the second year now, ptarmigan have been reported as being more numerous than the previous year. There are, however, many localities that formerly produced a good harvest that have not for several years. Our investigations reveal that a deteriorating habitat, due to normal plant succession, is the most plausible explanation for this decline.

Excluding the bogs, Vaccinium angustifolium, the common blueberry, and Kalmia angustifolia, commonly called lamb kill or sheep laurel, are the two most abundant and widely distributed plants found on ptarmigan range. Although they occur together, there are vast areas that appear to favour the growth of Kalmia. Some of these sites indicate that Kalmia has only fairly recently reached this dominant condition of suppressing Vaccinium spp. and other less abundant but desirable ptarmigan food species. We have no definite history on former distribution or abundance of Kalmia, but from interviews with sportsmen and our own field observations, it appears to be on the increase.

No part of Kalmia is utilized for food by willow ptarmigan. In fact, it has been impossible to "trick" our captive birds, when either young or adult, into so much as taking a bite from this plant. It has, however, been used as nesting cover, but because the birds exhibit little if any preference for nest-site cover, this species of plant is not important.

The blueberry plant, on the other hand, is by far the most important food source available to the ptarmigan. From this plant the leaves, blossoms, fruit, buds, and twigs are eaten. This extensive utilization and the fact that it provides a food source throughout the year suggest that, providing there is an adequate interspersion of cover, this plant may singularly determine the carrying capacity of a particular area for ptarmigan. Following this vegetative survey and the preliminary food habits study, it was concluded that if anything could be done to eliminate or even control Kalmia, and at the same time give the blueberry plants an opportunity to increase yield, a major obstacle would be eliminated in an attempt to plan a management program.

In investigating the possible role of fire in ptarmigan management, we worked on locating existing burns by searching through newspaper records, conducting interviews in settlements, and by our own investigations. We were able to evaluate over 1,000 sample plots on burns within ptarmigan habitat, ranging in age from a few months to over thirty years.

Results of this survey show that from two through five years following a fire, the blueberries have a definite advantage over Kalmia in both the number of plants and the area covered by the plants. After six years, however, Kalmia exhibits a trend toward dominance, surpassing blueberries in coverage in about twenty years.

For three years, co-operating sportsmen have provided the ptarmigan study with crops, wings, and tails from their birds. Adult ptarmigan may be separated from young-of-the-year during the autumn hunting season (October) by utilizing the difference between mature and immature birds in the moulting sequence of the primary wing feathers. Wings provide valuable information on the ratio between young and adult ptarmigan. This ratio is related to brood survival and will be of particular importance to the study as it is continued through periods of high and low populations. The role of disease organisms as a possible decimating factor is also being investigated.

Ruffed Grouse

The introduction of ruffed grouse into Newfoundland was first authorized in 1953. However, for three years, efforts to obtain live-trapped wild birds and to obtain grouse eggs for hatching were completely unsuccessful.

Finally, during October and November of 1956, the Department procured 82 live-trapped grouse from Sandhill Game Farm in Wisconsin. The birds were shipped air express from Chicago and arrived in Newfoundland in very good condition. Only four died in transit from Wisconsin to the two release areas, Cormack, in western Newfoundland, and near Badger, in central Newfoundland.

This past year, 60 additional birds were brought in from the same source of supply. Three died in transit, but the remaining 57 arrived in good condition and flew off following release near Clarenville and in the Codroy Valley on Newfoundland's west coast.

There have been scattered sight reports of ruffed grouse from time to time, and there is good evidence, by spring drumming counts, that some are establishing themselves. It will be a year or two yet, however, before we will know if this experiment has any chance for success.

Although fairly expensive, it is considered that the program is a very worth-while one, and if successful, will yield great dividends to Newfoundland's sportsmen, who will have the opportunity of hunting these fine, forest game birds.

Beaver

Although beaver is native to Newfoundland, not much is known about its early history. Apparently, the population was kept low by extensive trapping, spurred on by the high prices the pelts commanded. By 1930, beaver were very scarce and apparently close to extinction.

During 1935, a transplantation program was started - moving live beaver from the Avalon Peninsula (one of their last strongholds) to other sections of the island. From the start of this program until it was terminated in 1947, over 1200 beaver were transplanted. The population built up rapidly, and in 1946 a legal trapping season was declared, with 4999 beaver being harvested. Between 1946 and 1955, five trapping seasons were declared. This year we again opened the season, the third consecutive year, resulting in a harvest of over 7000. It now appears we are able to regulate the harvest on a sustained yield basis, this being one of our objectives following the establishment of the beaver research program in 1956. Biologist Donald Miller, in charge of beaver investigations, has several areas under intensive investigation. Last year, 80 beaver were tagged and measured. Seventeen ear-tagged beaver were taken by trappers, which provided movement and growth information. During the trapping season over 100 carcasses were collected for detailed investivation.

Predation

In Newfoundland, as in most other places, there are conflicting opinions regarding the role of predatory mammals and birds on small game populations, which in our case are ptarmigan and varying hare.

There is some reason to suspect that, because of the virtual absence of the so-called small rodent "buffer species", we may have, under certain conditions, a rather unique and interesting situation.

Although predation studies have been conducted in connection with the varying hare and ptarmigan studies since 1955, this year a separate research program on predation was begun. Under the direction of biologist Jack K. Saunders, the emphasis in this study will be placed on the evaluation of the fox and the lynx. A general life-history study is also being conducted on the lynx. The role of avian predators (hawks and owls) will continue in connection with the ptarmigan research.

A relatively high lynx population has existed throughout much of the Province for the past few years. Foxes are widely distributed and vary among districts from common to scarce, no high densities being reported.

Collections of stomachs and intestinal tracts of over 150 lynx and several foxes have been made by Division personnel over the past couple of years. The specimens are being analysed as part of this program. In order to get additional information, the predator scat collection has been stepped up on a year-round basis.

In connection with the detailed life history on the lynx, we now have a trained hound that is used in tracking and assisting in capturing lynx. Over sixty lynx have been trapped for detailed anatomical study. Several have been ear-tagged and released, and three have been held in captivity throughout the winter as part of the behaviour and breeding aspects of the study.

Work has been started on a paper dealing with the taxonomic evaluation of the Newfoundland lynx in relation to mainland forms and it should be completed during the coming year.

Botanical Studies

For several summers, an intensive botanical survey of Newfoundland has been undertaken by Dr. Ernest Rouleau of the University of Montreal. Although his earlier work was sponsored by outside grants, I am pleased to say this is our third year of sponsorship. His detailed information on the flora has already aided certain aspects of our management and research projects, and we believe that, when completed, the study will

prove to be of interest not only to botanists, but to the related fields of wildlife, forestry, and agriculture.

Doctor Rouleau has personnally assisted many of our programs in the identification of plant and plant fragments in food habits study.

During the summer of 1956, a Finish lichenologist, Teuvo Ahti, was employed to conduct a lichen survey of Newfoundland in connection with the caribou study. The results of his study are in report form, and we have, as well, a reference collection of our lichen flora.

SOME RECENT DEVELOPMENTS IN WILDLIFE ADMINISTRATION AND MANAGEMENT IN BRITISH COLUMBIA

by

Frank R. Butler,
Director, Fish and Game Branch,
Department of Recreation and Conservation

It is pleasing indeed to be called upon, as a representative of British Columbia, to speak to you on a subject that is very close to my heart. I sincerely hope that the information supplied will be of some use to game administrations in Canada, and should there be any items covered in this presentation that any person present wishes further information on, then such information will be gladly supplied.

I suspect that many of our current problems in British Columbia are, in some instances, similar to those which other Canadian wildlife administrations have been faced with over the past few years. It is doubtful, however, if any wildlife administration in Canada is feeling the impact of industrial development, expansion of population, and other trends, to any greater extent, at least, than is the case in British Columbia. Our problems are magnified in large measure by the diversity of our fish and wildlife species. None the less important, too, are the problems which have arisen as a result of the tremendous hydro-electric potential of our Province and the resulting concern we have for the protection of our sport-fishery resource. Moreover, in but a short span of six years, there have been conspicuous changes in our highway system and in the proportion of our population taking advantage of this improved access for the purpose of week-end hunting and fishing.

With these thoughts in mind, I would like to outline for you some of the progress we have made in our administration in the past six years in an effort to keep pace with increasing demands and pressures.

In 1957, the administration of Fish and Wildlife in our Province was removed from the Department of the Attorney-General and placed in a new Department of Recreation and Conservation, which I understand is the only department of government in Canada dealing wholly with recreation and conservation. What was formerly the British Columbia Game Commission is now the Fish and Game Branch of this Department, and the Branch is divided into four Divisions, viz., Administration, Fisheries Management, Game Management, and Predator Control.

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While our overall staff has not increased at a rate proportionate to that observed in some other public services, we have made notable progress in the addition of technical personnel, and in this regard most of the twenty-five biologists and technicians now employed have been added to our staff since 1952.

Wildlife Protection Division

Administrative Division

While additions to the staff have not been as great in the Administrative Division as in the others, an effort has been made to improve the quality of new personnel through a system of written and oral examinations now in effect. Candidates are selected after careful consideration of their suitability for the job they are to fill. Educational standards have been raised, and high school graduation is now a mimimum requirement, even for an applicant for the position of game warden or conservation officer.

In recent years more attention has been given to annual personnel meetings, and efforts have been made to try and standardize procedures and improve the efficiency of the field officers. Procedure manuals have been prepared and issued to all personnel. These include not only instructions in routine office and field procedures but also cover the principles and practices of wildlife management.

Careful consideration is also given to the selection of personnel for promotion to the rank of Divisional Inspector. Written and oral examinations are prepared when vacancies occur at this level, and every game warden is given an opportunity to take the examination.

A "staff bulletin" or "newsletter" is prepared and mailed monthly to all personnel. This serves to keep each worker in touch with the activities of others and acts as a morale builder. This mimeographed bulletin aims at outlining the most recent developments in wildlife problems, introduces new staff members, describes interesting happenings within the administration, makes the more isolated staff members feel that they are part of a team.

In 1954 our publication Wildlife Review, which is issued three times a year, began with a circulation of 2,000 copies. Today this has increased to 26,000 copies, and it is mailed to subscribers in twenty-one foreign countries, including Soviet Russia. (A Russian wildlife magazine has been sent to us in return by one of our subscribers.) Present circulation

has been built up without any attempt at promotion of the magazine, and it is our considered opinion that Wildlife Review serves as a most useful tool in education, public relations, and goodwill.

In the matter of transfers, we have adopted a new policy which it is hoped will prove to be of value in maintaining the highest level of job satisfaction and work interest. I refer to a system in which field workers and others are given the opportunity to state their wishes in respect to the district in which they would like to work. Of course everyone cannot be fully satisfied, and other considerations must be taken into account when making transfers, but is is believed that members of our field staff in particular feel that their wishes are given every possible consideration whenever opportunities for a transfer arise. While this always has been our policy, it is now being accentuated.

Game Management Division

I mentioned previously that high school graduation was a prerequisite for game warden candidates. In the technical divisions we have, of course, made graduation from university a minimum requirement for technical employment. In future, a Master's degree or equivalent will be required before a person may successfully compete for new openings at the game biologist level. Of the eight game biologists now employed, one has a Ph.D. degree, another is completing his thesis for this degree, four have a Master's degree, and two have a B.A. degree plus an additional year of training. It has been our experience that the four-year university program of education and training is hardly adequate, because it is not until a student enters employment in game management in years following graduation that he has an opportunity to specialize in this type of work. We also find that once a person begins this line of work there is much less likelihood of him successfully completing his work for his Master's degree. In the case of the most recent addition to our staff, we kept this position open for a year and a half in order to allow the individual to complete his university studies. In other words, we prefer that a student finish his training before coming to work for us, rather than having him try to complete the requirements for a degree while on the job. Incidentally, when new positions occur, we intend to encourage the best students from the University of British Columbia to stay and work for us. Considering the advantage of working in British Columbia and the salary, which is now competitive, we believe that we will be able to accept Mr. Mair's recent challenge of competition for wildlife graduates. We are, however, very pleased to see so many job opportunities exist-

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ing within the Canadian Wildlife Service.

The major responsibilities and activities of the Game Management Division pertain to Game Regulations, public access, public relations, education, information, research, and wildlife propagation.

In the past few years we have tried to keep our game regulations as understandable as possible. The format of the regulations has been changed from that of a booklet to a folded sheet, the main feature of which is a large map of British Columbia. On this map the Province is broken into twenty-one game management areas for the purpose of hunting regulations. In the past six years, hunting pressure has increased thirty-six per cent and the big-game harvest in the same period has doubled or increased by 100 per cent. This necessitates the need for increasingly detailed regulations to efficiently harvest the game resource. By 1969, it is estimated that hunting pressure will be greatly increased. Improved road access is continually changing the distribution of this hunting pressure. Many areas which were formerly out of reach to week-end hunters from our heavily populated lower mainland regions are now within easy access on week-ends. Hunters tend to pile up in the best adjacent hunting areas in the interior, particularly during the antlerless deer and moose seasons. We have to continually alter our regulations on this account in an effort to spread the pressure out as evenly as possible.

A full-time checking station operates during the hunting season (Sept. 1 to Dec. 15) on our main interior highway at Cache Creek, and through this station last year we interviewed 14,763 hunters and checked out 2,820 moose; 2,344 deer; 19,351 grouse; 8,985 waterfowl; and lesser numbers of the other game species.

The annual,resident game-harvest for the Province last year reached the highest level on record and stands at approximately 59,700 deer; 11,500 moose; 4,000 elk; a fair number of grizzly bear, caribou, and mountain goat; 555,000 grouse; 70,000 pheasants; 433,000 waterfowl; and several hundred of the rarer species, including mountain sheep.

Antlerless seasons have been in effect since 1954 with respect to moose, deer, elk, and, in some areas, mountain caribou.

The annual game-harvest is determined by a mailed questionnaire to a sample of licensees representing approximately 12,000 hunters.

Game Propagation

In 1951, we introduced the chukar partridge to sections of our interior dry belt, and after only five years an open hunting season was allowed. In the Thompson Valley, this bird has increased to the point where it is now the dominant upland game bird, but whether or not we will be able to maintain a shootable population, in the face of several severe winters, remains to be seen.

Two years ago we ceased the purchase and liberation of artificially raised pheasants. After careful analysis of the dubious benefits from this program, we realized that in so far as British Columbia is concerned, it is a costly and unrewarding practice.

The main features of our wildlife propagation program now involve the trapping and transplanting of native California bighorn sheep. In the past four years we have transferred some of these sheep to Oregon, North Dakota, and Washington, in an attempt to help these States re-establish this animal in other suitable sections of the Pacific Northwest. Transplants have also been successfully made in our Province, and this program will continue.

Last year we re-introduced sage grouse to the southern Okanagan Valley, with the hope that this bird may once again join our native fauna, of which it was once a part. Recent reports indicate that some increase in population is assured.

Research

Annual grants for research are provided out of our appropriation to the University of British Columbia, and at the Department of Zoology some basic research into deer nutrition has been carried out over the past several years. Research on blue grouse on Vancouver Island has also been partially financed by our administration.

Research activities on the part of our regional staff is limited to the so-called applied types. These include waterfowl banding, game damage to agricultural land, vegetation studies on a deer range, and some experimental work on pheasant habitat improvement.

Public Access

We now have an active Departmental Committee working on and studying public access problems, with the main objective

being that of endeavouring to arrive at a solution to all of our ever-increasing problems of access. In the past few years we have been successful in reserving certain lands for public access and as public shooting grounds, but still public access to hunting and fishing areas continues to be one of the most important problems in our Province.

Fisheries Management Division

I would now like to deal generally with our fisheries work and some recent progress in this field. The Fisheries Management Division comprises four major activities, each with a divisional fisheries biologist in charge. These are management and protection, hatcheries, research, and engineering. We have, at present, twelve permanent fishery biologists, eleven fishery officers, one engineer, and an assistant to the engineer. Much of what was said previously in regard to training and qualifications of game biologists also applies to personnel of the Fisheries Division.

Fishing pressure in British Columbia is increasing at a rate considerably faster than the growth in our population. In 1945, 3.5 per cent of our residents went fishing; in 1955, 7.5 per cent indulged in this sport; and in 1960, the figure will exceed 8 per cent. In the last fifteen years the number of persons fishing in the non-tidal waters of our Province has increased over 200 per cent. From these figures it may be concluded that our fishery problems are many and varied.

One of the most promising activities to date is our program of lake rehabilitation. British Columbia has spearheaded the use of toxaphene in the West, and much attention has been given to coarse-fish removal and restocking programs. Over eighty lakes have been treated since 1956, some with rotenone, but most with toxaphene.

Steelhead Program

In order to try and improve the steelhead fishery in some of our important rivers, releases of artificially reared and marked steelhead trout were first made in 1954 and since that time have continued in several experimental rivers. The program was initiated in an endeavour to increase the numbers of adult steelhead available to the angler and was to be achieved through the planting of migrant-sized fish of about ten to the pound (6-8 inches in length). The program appeared to have met with considerable success in Washington, and we were hopeful of its success in British Columbia.

The results from this experimental program are still only preliminary, but the program is being continued. On the Vedder River, some 65 miles from Vancouver where the most work has been undertaken in evaluating the program, returns indicate that steelhead planting may be economically feasible, with a cost of about two dollars per pound for fish taken by the angler.

Some curtailment of the program as briefly outlined is necessary until a more satisfactory system of evaluating the result of the work can be developed. The only practical procedure for this is by use of a compulsory punch card for recording the angler's catch, and it is hoped such a practice will be adopted in the near future.

Trout Propagation (Hatcheries)

Considerable improvement has been made in our trout hatcheries in the past two years, and plans are currently under way for a large modern fish hatchery in the southeastern portion of the Province.

Through careful study and close attention to sustained production of our hatcheries, the output from these has doubled in the past two years. Moreover, through use of new, dry trout foods and pellets, the cost of production per pound has been lowered from $5.86 to $3.34, while production increased in 1958 from 14,000 pounds to 28,000 pounds of fish.

Hydro-electric Investigations

The investigations of proposed hydro-electric developments appears to be an endless problem in such a Province as ours where the industrial potential of our rivers is so great. As mentioned previously, we now have on our fisheries staff a full-time engineer, a part of whose activities are involved in work related to various industrial developments as these affect our sport fishery.

Research

Two full-time biologists are engaged in basic fisheries research, and temporary employees vary from two to four in number. Research has centered largely upon spawning behaviour and the life histories of several of our lesser-known species of sport fish, such as kokanee and dolly varden. Work has also centered upon studies of the movement of

young and adult rainbow trout in outlet and inlet spawning streams. Other studies have involved coarse fish spawning behaviour and life histories of several of our native coarse fish species. This work will have a great bearing upon our future program of fish propagation. Here again we are co-operating with the Fisheries Institute at the University of British Columbia, and grants have been made to this Institute annually.

Predator Control Division

With the complete elimination of the bounty system, our predator control activities are now carried out by a permanently employed staff of predator control officers. This staff consists of a supervisor and eleven predatory animal hunters.

Through the use of a poison known as 1080, we appear to be well able to prevent wolves or coyotes from increasing to proportions where they may become a menace to domestic livestock or game. We have not had a serious predatory animal problem in British Columbia since the late forties, and this is no doubt due, in large part, to our control program. It should be emphasized, however, that it is not our policy to try and extirpate any predator. Our control measures are carried out on a regional basis and in accordance with local conditions and needs.

In 1958, the Fish and Game Branch, through its Predator Control Division, commenced a program of rodent control in co-operation with the Provincial Department of Agriculture. This work has been centered in the southeastern portion of the Province. Columbian ground squirrels and pocket gophers are the species for which control measures are being undertaken. Two rodent-control officers are involved in this work.

Some Thoughts on the Future

It is evident, from what I have already mentioned, that our program in British Columbia is moving at a rapid pace. With the present rate of population increase and the even greater proportionate interest in hunting and fishing, it is evident that increasing future demands will be placed upon our wildlife resource and administration.

Apart from the pressing requirements for additional staff, some of the future needs might be briefly listed as follows:

(1) An expanded information and education service.

(2) More frequent publication of "Wildlife Review".

(3) An in-service training program for warden personnel.

(4) Youth training program and assistance in hunter safety work.

(5) Participation in teacher training activities.

(6) Increased facilities in most phases of fisheries and game management.

Time or expediency will not permit me to deal at length with any of the above topics. I am sure many provincial wildlife administrators are confronted with similar problems. In British Columbia we are making an earnest and honest attempt to practise wildlife management according to the latest scientific and modern standards. Our problems are many, but we sincerely hope our work will continue to be fruitful.

WILDLIFE MANAGEMENT IN QUEBEC

by

Jean Duguay, General Superintendent,
Department of Fish and Game, Quebec.

Good wildlife management has been a main concern of all the technicians of the Federal and Provincial Governments.

These last years we have seen an increase in hunting pressure on our game and fish. In fact, the number of hunters and anglers is greater from year to year and, as far as we are concerned, this yearly increase in our Province is about 15 per cent. Within a year or two, if things are going the way they are now, more than 300,000 hunters will invade out forests.

With the modern means of transportation, the wilderness areas practically no longer exist; that is why the task on our shoulders is heavier from year to year.

With the personnel available, however, the activities of Quebec in the field of management have covered big game, small game, and fur-bearing animals.

As far as big game is concerned, studies have been undertaken on deer and deer habitat. Four years ago, this systematic study was started with statistics on deer kill. These statistics have been obtained easily by means of the compulsory registration of carcasses which is now in force in Quebec. Deer kill has been compiled by regions in order to give us an idea of the most productive areas in the Province. Four regions of the Province, classified among the best, have been patrolled in order to determine the productivity of existing deer bands and also the carrying capacity of both the summer and the winter habitats, with special reference to the hunting pressure. That is why the results of these studies have been followed by a modification in the boundaries of hunting zones and also of the length of the hunting season.

In one area especially, our studies have been carried out on a given population of deer in each season of the year, with emphasis on the game bagged by the hunters during the hunting season. Predators' activities were also studied and, in the specific area I mentioned, we have an idea of the productivity of the territory, the hunting pressure, the reproductive rate, and the mortality; the average age has also been determined according to samples taken at different dates.

This spring, deer were captured on Anticosti Island and have been brought near Quebec City in order to study the food requirements of these mammals and to make some pathological studies; these will be long-term studies. Such studies have been undertaken outside our Province, but studies must be done while taking into account the specific habitat of Quebec.

As far as climatic conditions are concerned, we are on the northern edge of the deer habitat, as we do not see very many deer north of the southern slopes of the Laurentian Mountains. Our rough winters are a big handicap, and the winter yards must be well provided with food and cover. Plantations with tree species valuable for food have been made in Mount Orford Park in order to create an ideal habitat.

Naturally, these studies will be conducted over many years, and we hope that, with the data we will collect, we will be able to restore the habitat and give valuable advice to our lessees of exclusive hunting rights on Crown lands.

As far as moose are concerned, enquiry cards are still being sent to moose hunters and forest rangers throughout the Province. Like deer, the registration of moose carcasses is compulsory, and we have good yearly statistics on different moose hunting regions. We also collected statistics about the moose killed by Indians, and the location of winter yards has been determined by aerial surveys in some regions.

The moose situation in the Province may be considered good, but as long as our knowledge is incomplete, we cannot take any chances. That is why the hunting season is short and will stay so as long as well-trained personnel are not available to make extensive studies to give us more complete data on habitat and natural requirements of this animal.

With regard to small game, a step forward has been made, in that the snaring of snowshoe rabbits in the Montreal region is now prohibited. Up to last year, snaring was legal anywhere in the Province, but for the benefit of the hare hunters of Montreal, an area a few miles around the City has been set aside, where studies on the behaviour of this animal will be undertaken as soon as possible.

In order to have kill figures on snowshoe hares, partridges, and migratory birds, data are collected through a

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questionnaire sent out by the federal biologists in Quebec. This study has given us some interesting figures on the different species bagged by our hunters. According to these biologists, adjustments have to be made for more representative results.

With regard to fur-bearing animals, the stocking of the whole of the 325,000 square miles of beaver preserves has now been completed. The Saguenay Preserve on the north shore of the Gulf of St. Lawrence was the last to be stocked, and with its 40,000 square miles, it is our largest fur-bearing-animal preserve. The first section of this Preserve, called the Mingan section, was stocked in 1954 and will start to produce in 1959-60. With the other sections, which will be opened later, this Preserve should be able to produce 10,000 beaver pelts annually, during the first years.

The furs from the Saguenay Preserve are now known as Labrador "E.B.", which means Eskimo Bay. Under this label they have attained international fame. The mink, otter, and marten pelts are known to be among the most beautiful and are in great demand.

According to experience we had with our other preserves, the opening of beaver trapping in this section should increase the production of mink and otter. We are awaiting the results with great interest.

For many years the trapping of marten has been prohibited in beaver preserves. In certain sections, this fur bearer has increased to the point where we will have to permit trapping under quotas next year. Our marten pelts of northern Quebec are of a high standard and, if the quantity captured is significant, it is the intention of our Department to try to promote the demand as we did for beaver pelts.

In the field of fur promotion, there will be a discussion on the matter, and I will leave to Mr. Armand Tremblay the task of giving details on the program he started a few years ago.

Fur promotion is certainly a must these days and, if we emphasized quantity in the past, I think we will have to look to quality in the future.

Finally, I want to mention predator control. Methods of control have been applied north of Montreal and in Lauren-

tide Park. The winter before last, between 600 and 700 timber wolves were killed in the Laurentide region, and poisoning by strychnine, used by some of our game wardens under the supervision of our biologists, is responsible for this result.

Studies are conducted from year to year in order to improve our techniques. The relative abundance of foxes was checked by an epidemic of rabies in the western part of our Province last autumn. The epidemic reached the area adjoining Quebec City and progressed eastward. Although the epidemic, up to last winter, had not crossed the St. Lawrence River, cases of rabies have been reported south of Montreal this spring. It looks as though it will invade the south shore.

Close co-operation has been established between the Health and Agriculture Departments of our Province for the purpose of trying to lessen the damage that may be caused to domestic animals and to avoid accidents involving human beings.

That, gentlemen, is a brief picture of what is being done in Quebec in the field of wildlife management. We will always be very glad to exchange ideas with the authorities of the Federal and Provincial Governments in order to try to solve mutual problems.

THE PHEASANT IN NOVA SCOTIA

by

F.C. van Nostrand, Wildlife Biologist

I will discuss briefly the status of the common pheasant in Nova Scotia and outline the management work we are attempting to inaugurate.

First, I should state that the management work was begun only last November and, therefore, most of the work is just getting under way. Consequently, the talk will be concerned with, first, the present status of the pheasant as a game bird in Nova Scotia; second, a brief review of what has been recorded of its stocking history, establishment, and rise to its present status; and third, the work now being done in the name of management.

I should first like to point out very briefly where the Nova Scotia pheasant stands in relation to the pheasant of the whole continent.

Since its first introduction and establishment in Oregon less than a hundred years ago, the pheasant's popularity among sportsmen has resulted in millions being reared and released wherever there was a ghost of a chance of its survival. Its hardiness and adaptability made possible its establishment to various degrees in a remarkable variety of habitats, from the rice paddys of California to the scrub farmland of the Northeast. Its spread and increase over surprisingly large areas of the continent has made it a major upland game bird for over thirty years.

The Midwestern States, notably South Dakota, probably harbour a greater density of pheasants spread over an area of several states than anywhere else on the continent. The five Midwestern States, including North and South Dakota, Nebraska, Iowa, and Minnesota, had an average annual harvest of well over a million cocks each over the ten-year period 1940 to 1950. Of the Lake States, only Michigan and Ohio have shot more than a million birds in one year. In comparison, all of the Northeastern States combined usually do not harvest more than a million birds.1/

Nova Scotia is on the northeastern fringe of the northeastern pheasant range. Since pheasants have become established, and are found scattered over the farming areas of every region of the Province, it seems unlikely that climate

is a primary factor limiting their densities, even in the northern parts of the Province, except possibly under very extreme weather conditions.

Since pheasants are, for all practical purposes, limited to the cultivated and orchard land of any area, the potentially suitable habitat in Nova Scotia makes up only a little better than three per cent of the land area. The total acreage reported in crops, a little over 400,000 acres, is irregularly dispersed among large areas of woodland, permanent pasture, and other inhospitable terrain which covers much of the Province. While this is typical over most of the Northeastern States as well, this situation is even more prominent in the Province of Nova Scotia.

The total reported pheasant kill in the Province is not high. In the peak years of 1950-56, the total kill for the Province was in the neighbourhood of 4,000 cocks. At the same time, there were around 2,500 hunters, so that there were approximately 1.5 cocks per hunter. In two of the better pheasant states, Michigan and Ohio, hunter success was only 1.29 and 1.34 respectively. Other Lake States averaged less than one bird per hunter. The hunter success in most Northeastern States is even lower due to much higher hunting pressures combined with lower pheasant densities. Even with an apparent 50 per cent decrease in kill, hunter success in Nova Scotia is still about one bird per hunter. The reason for this is probably that the Nova Scotia hunter has approximately 160 acres of pheasant range compared to 20 to 50 acres for other areas. This may mean that future increased hunting pressure in Nova Scotia may lower the hunter success, but increase the total harvest.

By far the best range in Nova Scotia is found in the Annapolis Valley, and it is here that the present study is largely centred. The Valley extends through the three counties of Kings, Annapolis, and Hants, the best range being in Kings County. Previous to the decline, this one County produced over one-half the total kill in the Province. Since this was the chief focal point of the pheasant investigations, a brief look at the land use on an average farm in Kings County may be of interest.

The average farm contains 136 acres. Of this, 85 are in wood and scrub land, 10 are in permanent pasture, 38 are in crop land, and 3 acres are taken up by the farmstead. Of the 38 acres of crop land, 21 are in hay, 7 in orchard, 6 in grain (mostly oats), 1½ in potatoes, 1 acre in small fruits and vegetables and 1½ acres in miscellaneous crops.

The average grazing livestock on each farm includes almost one horse, 6 milk cows, more than 8 beef cows, 2 steers, and 1½ sheep.

The most noticeable difference between the land use of Kings County compared with the rest of the Province is that the former has a greater proportion in fruit trees and small fruits and vegetables, and a lower proportion in hay.

Mr. D. A. Benson, former biologist for Nova Scotia, did some work in compiling the history of the pheasant in Nova Scotia[2] and I rely on his work to give a brief sketch. Pheasants were believed to have been stocked in Nova Scotia over 100 years ago, but they apparently did not become established in the wild until the 1930's, when they became widespread as a result of persistent stocking by individuals and organizations.

The first reference to pheasants I could find in the Annual Reports of the Department of Lands and Forests was in the 1936 edition. Here it was reported that 215 mature pheasants were reared from eggs and released. In concluding his report, the writer seemed still in doubt as to whether pheasants could withstand the winter conditions of the Province. Thus, it might be assumed that the birds were little more than established at that time; i.e. 1936.

In contrast to this rather late establishment, most of the New England States had already held their first season on the birds, and New York and Pennsylvania populations had passed their first peaks of abundance, which were in 1927 and 1931 respectively.[1]

Similar stocking was continued in Nova Scotia each year until by 1939 the Annual Report stated that pheasants were, "...to be found in fairly large numbers in certain districts in Queens, Kings, Annapolis, Digby, and Pictou Counties." Larger numbers of young birds were reported each of the last four years, apparently as a result of a succession of mild winters. Stocking continued and the birds were reported to increase until 1941 when the first losses were reported. The next year they continued to increase. By 1943, it was noted that while pheasants were doing well in Kings County, pheasant stocking in other sections of the Province was not so successful. In 1943, a short open season was held in Kings County to mark the first in the Province.

Pheasant densities fell off for a second time in 1944, but in 1945 a second open season was held in Kings County, and there was every prospect for a continued open season.

In 1946, Annapolis, Digby, and Queens as well as Kings had open seasons, but the season was closed in 1947.

In 1948 Hants County was added.

In 1949 birds were reported plentiful in all the Valley Counties.

In 1950 the bag limit was increased from 3 to 5 cocks, licences were issued for the first time, and reports of kill were requested. This policy has continued to the present, and the figures provided by the reported-kill form the only quantitative basis for gauging the relative numbers of birds in the peak years and through the recent four-year decline.

In the peak years, licence sales fluctuated between approximately 2,300 and 3,000. With the present decline of pheasants, licence sales declined to just over 2,000 last year. The percentage of hunters reporting their kill in the period 1950 through 1958 were approximately as follows:

Year	1950	1951	1952	1953	1954	1955	1956	1957	1958
Per cent	76	64	97	99	99	99	73	75	77

While these variations make it difficult to arrive at good comparisons of the relative pheasant densities from year to year, several things are clear. First, during the period 1950 through 1955, pheasants were at their highest level since introduction and produced a legal harvest ranging from 3,000 to 4,500. Secondly, there has been a steady decline in the kill since 1954, such that last year's kill was only around 50 per cent of the annual kill of the peak years.

From complete kill and stocking records by county for the period 1950 to 1959, the following observations were significant:

First, the three Valley Counties of Kings, Hants, and Annapolis provided nearly 80 per cent of the provincial kill in the peak years and a little over 60 per cent in the past two years. Further, all three counties have shown almost identical rise and fall over the nine-year period.

In contrast, counties outside the Valley had relatively low kills which fluctuated independently of any other county and had no relation to the number of birds stocked.

A third observation is that very few birds were stocked in the Valley from 1950 through 1955, so that the high populations were almost entirely wild-reared stock. In contrast again, the counties outside the Valley normally stocked far more birds than were killed, but the kill was not greatly affected, if at all, in years when there were no birds stocked. This indicated that the kill from other counties, as well as the Valley Counties, was basically produced from established native populations.

The present pheasant study, begun in the Annapolis Valley last November, was designed to study possible factors responsible for the recent decline and to evolve a solution. The study was to be largely concerned with some of the possibly important mortality factors. To be considered were losses due to predatory animals, mowing and other farm machinery, orchard sprays and other pesticides, and illegal kill. Other studies were to include hunter-farmer relations and the possibility of a hen season.

Three other lines of study were added later: correlation of weather with population trends, the possible effect of various land-use trends, and evaluation of pheasant stocking as a means of re-establishing formerly good areas and as a direct means of providing more birds for the gun.

The program was begun by winter live-trapping of wild pheasants in order to band and neck-tag them for future observations, and to obtain immediate information on the population structure.

The sex ratio of the 133 birds trapped was one cock to 2.8 hens. This was practically the same as the observed winter sex ratio. Age ratios based on only part of the total number of birds trapped indicated the cocks were 83 per cent birds-of-the-year and hens 73 per cent. This difference, of course, is due to the hunting of the cocks and will be useful in later analysis.

Some of the birds were neck-tagged with plastic markers similar to those used by Taber, (1949).2/ This made the identification of individual birds possible, and later, observations of these marked birds on the breeding grounds provided some information on the extent of spring dispersal.

During the past two months, 12 20-mile cock-crowing routes were set up and an index of the relative abundance of

crowing cocks throughout the Valley was obtained by using the method developed by Kimball, (1949). The best average index for any route was 4.9 calls per station. Two other routes had an index of 4.8 and 4.4 calls per station. All the other routes averaged less than three calls per station, and four of the lowest routes had less than one call per station.

A farmer survey is partially completed. This involves personal interviews with a random sample of farmers making up three to four per cent of the total number. Information sought includes land use, spray programs, relationships between farmer and pheasant, and farmer and hunter.

A pheasant-stocking evaluation experiment is under way in which we hope to release over 4,000 Nova Scotia-reared birds at various times and ages, such that the subsequent return of their leg bands by hunters should yield information on the best time and age to release the birds.

Intensive hunter checks are planned for the hunting season in order to determine the following information: (1) the total kill per licensed hunter throughout the season, as a check on the reported kill; (2) observed field ratio of banded to unbanded birds, also as a check on the ratio derived from reported kill and bands returned; (3) numbers of birds seen by hunters; (4) wounded birds not recovered; (5) birds found in the field which were shot by another party; (6) proportion of hunters using dogs; (7) size of hunting parties; (8) number of hunting hours; (9) illegal kill observed; (10) age ratio of the kill.

In order to better analyse the above data, a hunter census is planned to compare the relative numbers of hunters using the various parts of the range.

Losses due to predators will be evaluated from analysis of scats and alimentary tracts, and analysis of pheasant leg bands found at predator dens or nests. Mowing losses will be evaluated from farmer interviews. Losses due to orchard sprays will be evaluated by searching heavily-sprayed orchards where pheasants range, and from information provided by the farmer surveys.

A correlation of weather during April and May with pheasant trends, while as yet incomplete, does seem to produce some evidence to support the theory that a cold, wet April and May is not conducive to high pheasant populations. However,

the correlation is not without exception in some years, and other factors may be found to be involved.

I would make no predictions, as yet at least, as to the future trends for the Valley pheasants. However, the recent decline in Nova Scotia has not been so great, percentwise as the continent-wide crash of the 1940's. Since pheasants in most areas were able to recover fully after this drastic decline, there is no reason to doubt that the Valley pheasants will again become abundant when conditions become suitable. In any event, management studies and management measures will no doubt increase the natural supply and eventually help solve some of the unknowns associated with this interesting species.

While I have not studied conditions in the rest of the Province, it would seem that it has far less potential for pheasant production and will never make a comparable contribution to the pheasant hunting of the Province. For these areas, especially those close to the larger centres of population, some sort of shooting preserves may be the answer to the fulfilment of the unceasing demand for this gaudy, cackling target of the uplands.

FOOTNOTES:

1. Allen, Durward L., 1956, Pheasants in North America, The Stackpole Co., Harrisburg, Penn., and Wildlife Management Institute., Wash., D. C.

2. From unpublished work contained in the files of the Dept. of Lands and Forests, Nova Scotia.

3. Taber, R.D., 1949, A New Marker for Game Birds, Journal Wildlife Management, 13:228-231.

A REPORT OF ACTIVITIES OF THE BUREAU OF SPORT FISHERIES AND WILDLIFE, U.S. FISH AND WILDLIFE SERVICE

by

Lansing A. Parker, Assistant Director

I appreciate very much the invitation extended by Mr. Mair to the Bureau of Sport Fisheries and Wildlife to have a representative join in the Twenty-third Federal-Provincial Wildlife Conference. We welcome the opportunity of sitting in on this very enlightening and interesting meeting. Director Janzen was forced to decline your invitation because of prior commitments, but asked me to extend his personal regards to you.

It would be presumptuous for an official of the U.S. Fish and Wildlife Service to come up here to tell you how to manage fish and wildlife. We have too many unsolved problems of our own. However, I think you might be interested in a report on what we are doing.

Last year at the St. John's meeting, I reviewed some of our prospective legislation. I can now report that we had a very successful legislative year. Many important bills relating to conservation were passed by the Congress and became law.

To begin with, we were successful in getting an amendment to the "Duck Stamp Act" which will greatly aid in expanding our program of waterfowl habitat preservation. The amendment raised the price of the Duck Stamp from $2 to $3, starting this July 1. Further, all of the receipts, less the costs of printing and distributing the stamps, were earmarked for land acquisition. Another feature was the change permitting the Secretary of the Interior to open 40 per cent of a refuge to hunting, instead of the former 25 per cent. Also, a program of preserving small wetlands or potholes was authorized without regard to the provisions of the Migratory Bird Conservation Act. We now have the tools to move ahead with a greatly expanded habitat preservation program which I will discuss more fully later.

Another important act passed was an amendment to the so-called Fish and Wildlife Co-ordination Act. Through the years since 1946 we have been making studies of the effects on fish and wildlife of water impoundment structures being planned by the Corps of Engineers and the Bureau of Reclamation, as well as those licensed by the Federal Power Commission. These studies evaluated the losses or gains to fish and wildlife and resulted in recommendations for mitigating these losses. The new amendment permits us to also plan for the enhancement of conditions benefiting these resources over and above just balancing the losses. This means more opportunities for fish and wildlife to share as an equal partner in a multiple-use plan for water impoundments.

By enactment of another law we received specific authorization to engage in research to determine the effects of insecticides, herbicides, fungicides, and other pesticides on fish and wildlife. We had general authorization for many years and a very limited budget. The new Act gives us an authorization of $280,000 a year. We received a proportionate share this year and will receive the full amount next year. I will describe our program a bit later.

As you know, we have no more land space in the United States, so action was taken to subdivide, and we now have a new 49th State. One of the provisions of the Statehood Act withheld the transfer of the responsibility for fish and wildlife until the Alaska Legislature had passed laws relating to the management of these resources in the Nation's interest. Also, the Secretary of the Interior was to certify to the Congress as to adequacy. Following a period of 90 legislative days (now changed to calendar days) after certification, the new State would take over the management of fish and wildlife, starting on the first day of the calendar year. All of these steps have been taken and we are anticipating turning over these responsibilities to the new State on January 1, 1960. After that time our program in Alaska will be similar to that in any of the other States. This includes maintenance of the national wildlife refuges, enforcement of the federal laws relating to fish and wildlife, assistance in the program of predator and rodent control, and the conduct of fish and wildlife research.

The other piece of legislation which I would like to mention was the authorization to participate in the preservation of the Nene goose in Hawaii. This is a terrestrial goose which has become extremely scarce. It occurs in the wild only in Hawaii. About five or six years ago it was believed to be extinct in the wild and only a few birds occurred in captivity. Surveys undertaken about two years ago disclosed about 50 wild birds remaining. We have launched a co-operative program with the Territorial Fish and Game Division to undertake studies of habitat needs, as well as to conduct a moderate program of artificial propagation. By the latter means we propose to attempt re-introduction into the wild through the use of holding pens and gradual release.

Now for some of the projects we have under way that might be of interest to you. As I mentioned earlier, we received authorization to expand our research on the effects of pesticides. The control program creating the most interest and study is that of the imported fire-ant. This insect made its appearance at Mobile, Alabama, about 1917. In the intervening years it has spread to eight other Southeastern States, and now is estimated to cover 9,000,000 acres. The control program began in the autumn of 1957 using two pounds per acre of heptachlor or dieldrin applied aerially. Our investigations indicated losses of 75-80 per cent in quail and rabbits. We have been working very closely with the Department of Agriculture to

lessen these losses. Currently, the application rate has been reduced to 1¼ pounds per acre. Also, research is being undertaken by the entomologists to modify formulations, rate of application, and new control methods.

Some concern has been expressed that this program was responsible for the rather drastic reductions noted in the songbird populations. However, the program has treated only 900,000 acres. The Audubon report for this past winter pointed out the unnaturally cold winter in the South, and the strong adverse winds that the birds encountered over the Caribbean during migration as factors in the reduced populations.

We are much concerned, however, over the multiple effects of all the chemical control programs. If a bird escapes the fire-ant poisoning, it may encounter the gypsy moth, spruce budworm, or Dutch elm disease control programs. Also, we are just beginning to learn of the long-range effects of chemicals used in insect control. We had done considerable research on DDT and had developed, what we thought were, the safe limits. In the last two years there have been considerable losses of robins at the University of Illinois and Michigan State campuses resulting from the use of DDT in the Dutch elm disease control program. These deaths occurred 10 to 16 months after the application of the chemical. Someone thought of testing the amount of DDT in the earthworms found under the trees. Examinations indicated that the worms had absorbed lethal quantities of the chemical in their bodies. Robins feeding on the infected earthworms were indirectly poisoned.

We recognize that pesticides are essential to agriculture and human welfare. We also anticipate that the use and variety of these chemicals will increase in the future. When you realize that the wholesale value of these chemicals was $40 million in 1940 and jumped to $290 million in 1956, it is obvious that it is necessary to find methods of alleviating the effects on fish and wildlife.

I should like to mention that we have been much concerned over the apparent losses of the immature whooping cranes as they return to their summer ranges. Observations at the Aransas National Wildlife Refuge in the autumn, following the return of the birds, indicate that the flock is chiefly composed of breeding pairs and their young-of-the-year. This spring we have a man and airplane assigned to the job of locating and observing the yearling portion of the flock.

Although the two captive whooping cranes in the New Orleans Zoo laid seven eggs during the 1959 mating season, no living birds were hatched.

As I reported to you last year, the Bureau has been co-operating with the Flyway Councils in the development of flyway management plans. All of these are completed now and have been accepted by the

Bureau and most of the Councils. One of the high priority jobs in all plans is the selection of waterfowl habitat which must be preserved, as well as the establishment of priorities of acquisition, and by which agency.

These lists will serve as the basis for our expanded land acquisition program. Of interest to you, I believe, is the fact that both the Mississippi and Central Flyways' lists contain the small wetlands or potholes as No. 1 priority. We have just started a combination acquisition and lease program designed to preserve the most important potholes in the Dakotas and Minnesota. This program calls for the purchase of the important permanent potholes and some land around them. Then we are attempting to lease or secure easements from the landowners of the less permanent potholes around the areas acquired. We are contemplating the purchase of approximately one such unit per township as funds become available. We recognize that it is not feasible to acquire by purchase any number of the waterfowl production areas. However, we believe this combination of lease-purchase will assure reasonable preservation of these important waterfowl areas.

I can also report that we had an opportunity to discuss waterfowl management with two of the Mexican officials after their visit to the North American Wildlife Conference. Following the recent presidential election, Sr. Beltran was appointed Assistant Secretary for Forestry and Game in the new Mexican cabinet. Sr. Beltran has a high reputation as an ecologist and conservationist. He has elevated the game unit to a higher status in the Government. Luis Macias has been retained as head of this organization. Exploratory talks lead me to conclude that the present administration is desirous of co-operating with our two countries in the management of the migratory bird resources. Commissioner Suomela is in Mexico City now and hopes to discuss the current critical duck situation with the Mexican officials.

Now for a few trouble spots. Our spring waterfowl surveys show exactly the conditions described to you by Dave Munro. The situation is not good, and we are studying means of curtailing the duck kill next autumn. Shorter seasons, reduced bag limits, closing concentration areas, and shorter daily shooting time are all being considered. The waterfowl population was not in a very good condition last autumn and the conditions described to you earlier with regard to production this year all point to the necessity of greater restrictions this autumn.

In order to set the record straight, I should like to describe a loss we sustained at the Patuxent Laboratory. Last Saturday afternoon there was an electrical storm at the refuge, and lightning is believed to have struck an air conditioner, bounced off to a water pipe, knocking off a valve and setting fire to one of the machine rooms. A newspaper account indicated that 40 years of banding records were lost. Although nearly all of the IBM equipment was a total loss, very few of the records were destroyed which cannot be replaced. The machines were working on the hunter-kill survey data for the Pacific Flyway at the time. Some cards were charred or water soaked, but the information was not lost since the data are still

available in other forms. We will lose several man-months of work which will be required to develop new cards to replace those that were damaged.

We have realized for some time that additional space is required at the Laboratory and we hope to be able to build another building in a few years.

I should like to conclude my remarks by telling you of some of the recent changes in the Bureau. Some of you will be dealing with these men and should know of the shifts. We have inaugurated a policy of promotion and transfer to give our personnel a variety of experience. The most recent moves are those transferring Rod Gascoyne, Regional Director in the Boston region, to the Commissioner's Office in Washington. John Gottschalk, who has been Chief of the Sport Fisheries Division in Washington has taken Gascoyne's place as Regional Director. Allan Studholme, who has been Chief of the Division of Wildlife in Boston, transferred to our Minneapolis office in the same capacity, taking Sam Jorgensen's place. Jorgensen is coming into the Washington Office as Chief of the Federal Aid Branch. Dr. Ray Johnson, who has been the Federal Aid Branch Chief, moved up into the position vacated by John Gottschalk. Dr. John Buckley has replaced Arnold Nelson as Director of the Patuxent Research Laboratory. Mr. Nelson had asked to be relieved of the directorship because of poor health and a desire to concentrate on research programming.

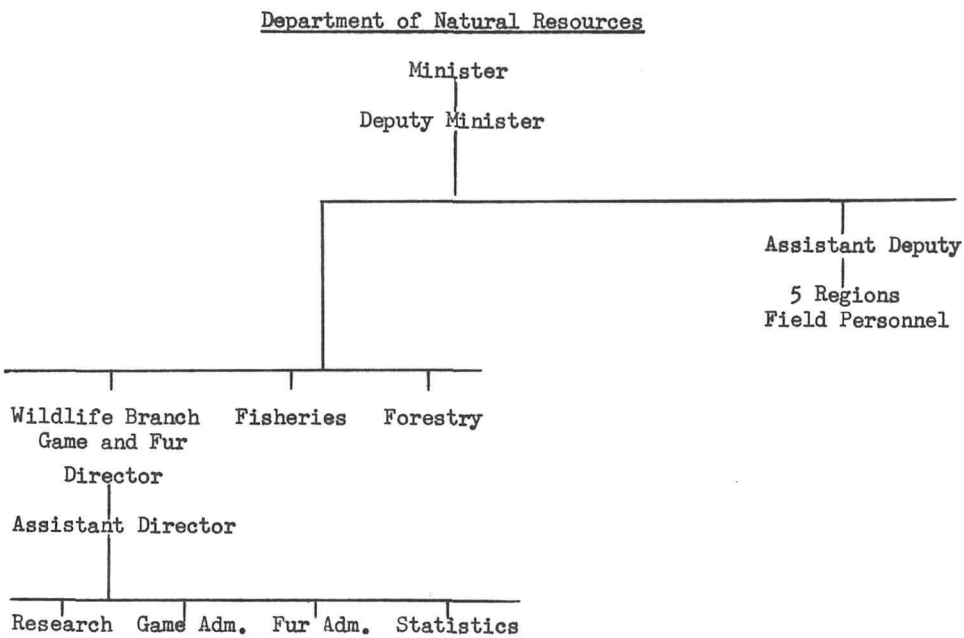
With these announcements I have completed my report to you. If there are any questions, I will be happy to answer them.

Thank you for the opportunity of appearing before your group.

WILDLIFE TRENDS AND MANAGEMENT IN SASKATCHEWAN

by

E.L. Paynter, Saskatchewan



As indicated by the simple organization chart above, you will note that in Saskatchewan the Wildlife Branch is attached to the Department of Natural Resources. It is our responsibility to establish policies and programs as may be required for the preservation, utilization, and control of the game and fur resources so that long-term maximum benefits will accrue to the people of our Province, chiefly from the recreational standpoint.

Our chief problem in game management is to maintain satisfactory numbers of various game species to provide good hunting and recreational opportunities in our expanding economy that is producing an increase in the number of hunters and a decrease in wildlife habitat. Industrialization and greater urbanization give our residents more time for recreation.

In 1948 we sold 45,484 hunting licences;

In 1958 this increased to 119,141 licences, an increase of 162 per cent.

Even more spectacular is the increase in non-resident hunters, chiefly American, which in the same period went from 300 to 3,740, an increase of 1146 per cent.

Natural habitat, particularly for game birds, has decreased due to the trends in farm practice. Gradually, the economic farm unit has required larger fields and larger machinery, doing away with fence rows, tree cover, and wetlands.

Water use becomes more complex with the increased demand for domestic and industrial uses as an increased population becomes more centralized. To date, in Saskatchewan law there is no provision for water use for wildlife or recreational purposes. Indications are that this will soon be rectified.

It appears that before long our forests will be in more demand, veering toward a pulp economy and bringing in more people and resulting in many more access roads into the forest area.

It is apparent that as hunting pressure increases, the farmer-hunter relations problem will also increase. In Saskatchewan 84 per cent of the accessible lands available to the sport hunter are privately owned or controlled. This includes thousands of acres of Crown land under grazing or hay leases. In the more isolated areas of northern Saskatchewan, our policy is that the wildlife resources are first for the people who live there. We outsiders will only be allowed to hunt when there is a surplus they do not require or take.

Our Game Administration Division is charged with several programs directed toward public relations and education to overcome some of these difficulties:

1. Working with farmers and sportsmen toward better relations;

2. Education of and better control over guides and outfitters' activities.

3. Junior firearms, safety, and conservation training programs.

The research staff of our Wildlife Branch includes six professionally trained ecologists on permanent staff, plus four to six student ecologists during the summer months. Considering the vast area of the Province (250,000 square miles) and the variety of wildlife species and habitats, their activities are necessarily limited. Generally, much of their work is of an annual inventory nature, the information from which being required for management.

Recently, however, some basic resource studies have been initiated. Such studies are still a very minor part of the research staff activities. It is hoped that future programming will permit additional activities of this type.

The research staff supplies many answers to our hunting problems. We are presently planning a range survey of the sandhill grasslands areas in western Saskatchewan with a view to having those areas which are more suitable to the production of wildlife than domestic stock established and managed as hunting preserves.

Ducks Unlimited has for several years been carrying on a survey to obtain basic information on the more important water areas of the Province. Our personnel are enlarging this study to obtain an increased volume of information and the initiation of a water-area classification, with a view to establishing a multi-purpose marsh-management program. Marshland development in Saskatchewan can only take place in relation to the solving of the duck depredation problem. It is beginning to look as though nature is going to look after the latter to a great extent this year, unfortunately at the expense of our wetlands. Our wildlife depredation insurance has worked fairly smoothly. Payments to farmers have been $194,695 in the last six years, of which $70,000 was paid last year alone. Unfortunately, all of those who receive damage are not insured. There is considerable feeling that while extensive depredations continue no action should be taken to maintain or create marshes that might increase the hazard. We have hopes that the Depredations Survey which was started last autumn with the U.S. Federal and State wildlife agencies, Canadian Wildlife Service, and Ducks Unlimited will bring forth more definite answers this year.

Over the years, our Forestry Branch has carried on a tree planting program. The Department of Agriculture has also sponsored many shelter belts and miles of hedge to prevent soil drifting. Though these plantings are of considerable value, they are not the most desirable for upland game bird habitat. This year we have begun a planned habitat improvement program, particularly for pheasants, consisting of plots of trees and shrubs, herbaceous cover, and feed plots. The total acreage desired is about twenty-five, strategically placed over a section of land. It is our hope that we can produce effective winter shelter, nesting cover, and winter feed in this manner.

Of late we have been faced with another problem in the extensive use of insecticides. This year the Provincial Department of Agriculture procured $1,000,000 worth of Dieldrin to be used in the control of grasshoppers. While the recommended rate of application is only one ounce per acre, it has proven to be twenty times as toxic to some insectivorous and game birds as is DDT. Personnel of our Research Division are studying the effect of the spraying operations on wildlife this summer.

Some of our best antelope and mule deer ranges coincide in the southwest. Range studies are being carried on there. We are endeavouring to manage the mule deer herd through special limited seasons. The antelope

management program provides for tapping and tagging to determine their movements. For six years we had compulsory checking stations where all antelope hunters had to report whether they were successful or not. A wealth of data have been collected, such as location of kill, sex, weight, number of antelope wounded, and hunting pressure. Many jaws were collected to determine the age of the animals taken. We are following up this study with a few voluntary checking stations manned by research staff.

The sharp-tailed grouse (prairie chicken) is our most important upland game bird. We have been carrying on a comprehensive study of their private life on a typical parkland agricultural area in central Saskatchewan. Habitat, population densities, movements, etc. are being studied. Banding has been successfully carried out, using a cannon net trap. Each spring our conservation officers carry out population surveys by recording the number of birds on a large number of known dancing grounds. With sharp-tails, as well as Hungarian partridge, each autumn our field staff carry on bag checks to determine hunter success, at which time wings and tail feathers are taken to compile our age and sex data.

At the Government Game Farm near Saskatoon, which is ably operated by the Saskatchewan Fish and Game League under government subsidy, pheasants as well as a small number of chukar partridges are raised for stocking purposes. Successful breeding work has been carried on to produce a hardy species in which the hen pheasants are very light grey to white, making them less conspicuous to predators under our winter habitat conditions. Our field staff carries out spring pheasant-population surveys by using the "crowing count" method. Age ratios are taken by autumn bag checks.

We are just getting under way with range and habitat studies for moose and white-tailed deer with a view to establishing carrying capacity. We realize that this will only be a beginning in management, as so many factors affect the harvest. If habitat conditions are right, it seems that the more game you harvest, the more you will have.

In late winter and spring, aerial population surveys, using the transect method with some variations, are carried on to check populations of moose, elk, woodland caribou, and deer. We are not satisfied with the results with deer, and ground studies are under way to improve methods. Antelope transects are flown in late May and again in July to ascertain the spring population and fawn crops.

I think you are all aware of the Co-operative Barren-ground Caribou Studies in which our Branch personnel took an active part.

The Co-operative Waterfowl Survey is a story in itself. We play a small part in it along with the Canadian Wildlife Service and Ducks Unlimited. The small army of research personnel from the United States Federal Wildlife Service and various states that carry out the bulk of the aerial survey and banding operations, under the direction of field general Dr. Fred Glover, do a terrific job, not only of research, but of public relations. During the

last couple of autumns, in co-operation with the Canadian Wildlife Service, periodic flights have been made over the main route of waterfowl migration in order to time and place the southward movement of waterfowl.

Fur

Fur management in northern areas is carried on much the same as in Quebec, Manitoba, and Ontario - under a financial agreement with, and the full co-operation of the Indian Affairs Branch. It is based on trapper security and full participation, and was built around the re-establishment of the beaver.

Since the program began in 1946, trapper income has increased materially in spite of declining prices. We have not had as much difficulty keeping trappers on their lines as some provinces have though. The field organization used its influence to encourage them to get out and take the available fur crop at the best time.

The actual trapping operation is almost a minor part of the northern fur program. Through participation in the various activities relating to fur and game management at the local level, a gap is being bridged that will hasten the day when this ethnic group will take its rightful place in our Canadian economy.

Since 1946, there has been a very comprehensive plan of muskrat management throughout southern Saskatchewan, which was largely responsible for the production of 2,000,000 pelts in 1954. Certainly, ideal habitat conditions after the high precipitation which began in 1952 were the main contributing factor, but without the organization that existed this could not have been accomplished.

Changes in farm practices and the population shift toward urban centers is creating a problem in the fur harvest in southern Saskatchewan. Most of the trapping is a supplementary activity of the farmer and his sons, yet it is a substantial contribution to the provincial production. We will be giving this phase of fur management more attention with a view to procuring a more adequate harvest.

I do not agree with those who think trapping is soon to be a thing of the past. While industry has produced some wonderful synthetics, one can still spot an imitation fur garment a mile away. I'm sure Milady will continue to demand the genuine article, and in order to keep her conscience clear, we are encouraging our trappers to use humane traps and methods.

Following are a few figures on fur production, showing the trends since 1934:

Year	Total Pelts Produced	Value	Beaver Pelts Only
1934-35	996,980	$1,049,817.00	763
1944-45	890,957	1,543,663.00	473
1954-55	2,678,234	3,715,011.00	52,115
1957-58	1,204,000	2,136,144.00	50,838

While production and harvest are usually the main concern in wildlife management, control also becomes a problem when the harvest is not adequate. When the value of coyote pelts declined in the early forties, the coyote population increased by leaps and bounds in spite of bounty payments ($100,000.00) in the first six months of our 1948 fiscal year. We patterned a control program based on that of the United States Fish and Wildlife Service in the Northern States, using paid hunters with marked success. Complaints of domestic stock losses soon disappeared. Wildlife increased rapidly, particularly deer, antelope, and mink. Foxes have also increased to some extent with lack of competition from the coyote. Generally, our timber wolf policy is that control should take place wherever the prey species is required by humans. This, again, is handled by staff personnel. No predator animal bounties have been paid since 1949 by this Department.

At long last, the Saskatchewan River Power and Irrigation Dam is under construction. This will certainly bring vast changes in wildlife habitat and opportunities for recreational development. The reservoir capacity will be 8,000,000 acre feet. The surface area will be 109,600 acres, 140 miles long with a shoreline of 475 miles. Quite a pond! While there will be some fluctuation caused by draw-down at certain periods, this reservoir should be one of the finest boating and fishing lakes in our settled areas. The development of the irrigation project will, no doubt, provide an opportunity to develop some ideal wildlife habitat, particularly for pheasants.

Many of the problems which we face in wildlife management now, and will to a greater extent in the future, are dependent upon a knowledge of wildlife needs and a thorough understanding of effects on wildlife populations as environmental and utilizational changes occur. Basic research can provide much of the information required, but few provincial agencies will be permitted adequate staff and funds to meet their needs. Although the suggestion is not a new one, it is again proposed that a co-operative wildlife program be established throughout Canada. This would require the establishment of a formal organization to co-ordinate wildlife research and should include as co-operators the Canadian Wildlife Service, provincial wildlife agencies, and various universities and colleges. Such an organization would permit more effective use of personnel, as well as a more efficient expenditure of funds available for such research. Unnecessary duplication of certain studies would be eliminated, and information would be readily available to all co-operating agencies.

In closing, may I thank you for your intestinal fortitude and tolerance in reading this paper. I'm sure there will not be time to cover it all in my talk. I have tried to give you a picture of some of our activities and problems in game and fur management in Saskatchewan. If there is any phase on which you would like further information, we shall be glad to oblige.

WILDLIFE RESEARCH AND THE ROLE OF THE CANADIAN WILDLIFE SERVICE

by

Dr. V.E.F. Solman,
Assistant Chief, Canadian Wildlife Service

History

Wildlife management dates back at least as far as the Old Testament. In Deuteronomy 22:6 Moses decreed that the young of birds might be taken, but not the mother. Developments from that time to the recent past have generally followed a sequence which included restriction of hunting, predator control, establishment of areas reserved from hunting, artificial stocking of desired species, and environmental control. In the light of modern information, current emphasis is directed toward environmental control and habitat development, although the other methods of management are still in wide use.

As the development of the country proceeds, and the population increases, heavy pressures are placed upon the wild fauna, even in remote areas. Improvements in agricultural and forestry practices, and in abatement of pollution are reducing some of the detrimental effects on wildlife in settled areas. Increasing public interest in wildlife, brought about through more leisure time, coupled with a higher standard of living, has increased the recreational use of the resource. Public ownership of wildlife, combined with private ownership of the richest habitat creates many problems. The implementation of a wildlife policy of sustained yield requires high level technical work in the fields of habitat maintenance, habitat manipulation, inventory, and regulation.

In Canada we are now emerging from an era of exploitive use of the wildlife resource, which was an essential part of the opening up of the country. Most persons now do not rely directly on wildlife for even part of their food, but the people who still do cannot be overlooked. There will always be some reliance on wildlife for food in remote areas. Nevertheless, the major wildlife use will be recreation and that use will increase in importance and in its contribution to the economy of the country. An even greater contribution than the economic one is made through promotion of health and general well-being of the people who participate in outdoor recreation associated with wildlife. The

increasing demand for wildlife for recreational use can be met only by wildlife management closely co-ordinated with other land uses and steadily improved in quality and increased in quantity.

Research

In order that wildlife management may be carried on effectively it must be preceded by well-planned, well-conducted wildlife research to furnish the factual data. Wildlife research can be examined under a number of headings, some of which are biological, and others form related disciplines. Wildlife research characteristically may include:

Wildlife Biology	Limnology and Fish Culture
	Mammalogy
	Ornithology
	*Genetics
	Parasitology - Pathology
	*Animal Ecology
	Animal Behaviour
	Animal Nutrition
	Population Dynamics
Allied Sciences	*Botany, including plant taxonomy
	*Forestry
	Range Management
	*Plant Ecology
	*Soil Science
	Statistics

The Canadian Wildlife Service is presently undertaking active work under many of the above headings. Close liaison is maintained with universities and other government and private agencies who deal particularly in the other specialties(*indicated).

Research in the wildlife field may be of several types. The two major divisions frequently used are fundamental and applied. Because Canada has a large area and has been relatively unexplored from the wildlife point of view, we are forced to consider a third category, which might be called exploratory or observational research. It is impossible to draw a clear line of division between the three types, because the exploratory research grades into fundamental or applied research as the area becomes better known and greater intensity of effort is concentrated upon it.

Fundamental research may be considered a search for new information and is directed to the derivation of facts that may not have immediate direct application to management, but rather constitute a contribution to knowledge. Applied research is the experimental application of known data to the solution of problems faced by wildlife management. In the Canadian Wildlife Service, as in most other game agencies in Canada, much of the research is applied, and relatively little can properly be grouped under the headings exploratory or fundamental. As we progress, there is an increasing necessity for more fundamental research so that we will have a continuing, expanding fund of new knowledge from which we may conduct applied research to solve our management problems.

Many wildlife species have relatively short life histories and so some research on the changes in their populations and on the factors which relate to those changes can be conducted in a relatively short time. When we consider the problem of long-term fluctuations in numbers, including the known phenomena of "cyclic" changes which affect small birds and mammals and may indeed influence large animals as well, we need to consider fundamental research extending over periods of ten to twenty years. In some cases, that type of research may be required to continue for a much longer period. Only when continuous data of high quality are available for long periods of time will it be possible to study population fluctuations in a truly productive manner.

Wildlife species are vulnerable to many outside influences. Among those we must consider the increasingly widespread use of chemical agents for the control of insects and of unwanted plants and other groups. Here again, data must be accumulated over many years before the total impact of such agents on the wildlife species and their ecological environments may be accurately assessed. Unfortunately, the lure of easy control by chemical means is not yet associated with factual knowledge of the ultimate result. That result may easily be quite different from that expected or observed after a short term.

Organization of Research

Wildlife research is carried out in Canada by the Federal Government through the agencies of several departments, through similar arrangements in the provinces and territories, through university departments across Canada, and through the work of private organizations and industrial companies. As the needs increase for work in the field, support for research by industry and by other agencies will probably increase. The present policy of the Government of Canada in regard to

wildlife research, as expressed through the Canadian Wildlife Service, is essentially as follows:

(I) To provide information, through research and experimentation, for the proper administration and management of migratory birds throughout Canada, and to carry out regulatory and management functions as required by the Migratory Birds Convention Act.

(II) To conduct research and experimental management in all fields of ornithology, including ecology, as required to maintain optimum populations of birds for management, recreational, and other purposes in the National Parks, in the Northwest Territories and the Yukon Territory, and to provide management plans and advice based thereon as required.

(III) To conduct research and experimental management in all fields of mammalogy including ecology as required to maintain optimum populations for management, recreation, and preservation in the National Parks, the Northwest Territories, and the Yukon Territory, and to provide management plans and advice based thereon to administering agencies as required.

(IV) To conduct research and experimental management in limnology and fish culture in the National Parks and to provide management plans and advice based thereon as required.

(V) To co-operate with other organizations directly and indirectly interested in wildlife research and experimental management, at federal, provincial, and private levels, to ensure best economy of funds and manpower both in the Service and Canada-wide.

(VI) To keep under review the total wildlife research and management effort in Canada so as to advise the Department concerning the wildlife resources of Canada and, on request, to assist other wildlife agencies in providing data for wildlife conservation.

(VII) To carry out or sponsor research required in the fields of mammalogy and ornithology where such data are required for the maintenance of species and where such researches are not clearly within the purview of other existing wildlife research agencies.

(VIII) To increase the proportion of its effort devoted to long-term fundamental and applied researches in the nation-wide interest as other research organizations develop sufficiently to undertake necessary ad hoc research.

(IX) To make the results of its work available to all wildlife agencies and to the public, through its own publications and through reports in scientific, professional, and other journals.

(X) To act as the co-ordinating centre for the dissemination of all wildlife research and management information throughout Canada.

The Service is now organized on a national basis and at June 19, 1959, has an establishment of forty full-time professional wildlife biologists, with supporting administrative and clerical staff. New appointees in the scientific field have at least university graduation in biology or a closely related field and post-graduate experience, usually to the Master's level. In order to permit professional staff to increase their technical competence, a program of educational leave is in effect under which several officers have secured their Ph.D. and M.A. degrees from recognized universities in Canada, the United States, or other countries. Promotion may be solely on research merit or on expanding supervisory and administrative responsibilities or on a combination of those factors. An attempt is made throughout to provide adequate working conditions and modern research equipment. Technical assistance is provided during the summer months for field programs and that type of assistance will be expanded in quantity and in availability throughout the season in the future.

Organization of Canadian Wildlife Service

The Service is divided into three sections for convenience of operation. Since the passing of the Migratory Birds Convention Act in 1917, there has been a responsibility of research on, and management of migratory birds. Because of the terms of the British North America Act, the management of migratory birds has been conducted in co-operation with the Provin-

cial Governments in whose areas the birds spend part of their lives. Provincial assistance in the research program varies and is increasing.

The mammalogical section deals with mammal problems in the National Parks and in the Northwest and Yukon Territories. In the latter areas it works in close co-operation with the appropriate governments. Research in mammalogy includes detailed studies of pathology and of range and nutrition requirements. For that purpose the mammalogy section includes in its staff, along with appropriately qualified mammalogists, specialists in the fields of animal pathology, range management, and nutrition.

The limnological section works closely with the National Parks organization in developing fisheries management activities based on its research findings. In addition to responsibility for maintaining high quality angling in National Park waters, the section may be called upon for advice in sport fishing matters in the Northwest Territories. In the National Parks, in addition to fish, the limnologists deal with other aquatic problems including control of blood-sucking insects, algae and other aquatic vegetation, and swimmer's itch.

Co-operative Work

The field of co-operative research is expanding and the need for careful co-ordination of effort toward the solution of wildlife problems which extend beyond provincial boundaries is well recognized. The Wildlife Service is assuming an increasing role in co-operative programs with Provincial Government agencies and is prepared to make its specialized services available for the solution of provincial problems of national importance.

The Future

The Service hopes to continue expansion at about the same rate as has occurred in past years for at least another five to ten years. Responsibilities now in sight would seem to dictate such growth. However, there is now a real problem in recruitment, which must be solved if the growing pressures for additional work are to be met. I believe the recruiting problem applies to provincial agencies as well. It is a major challenge at present - a problem we must solve in the next few years.

We are now studying, in the Department, plans and programs directed to clarify wildlife policy and research priorities over the next several years. We are well aware of the changing times and the requirement for solutions to emergent problems and we propose to deal with those. We are planning now the ways and means of marshalling our forces to meet the challenge of the growth that has been forecast for Canada for the next 25 years by the Royal Commission on Canada's Economic Prospects.

IMPORTATION OF NUTRIA INTO CANADA

by

John S. Tener, Biologist,
Canadian Wildlife Service.

In February of this year, the Canadian Wildlife Service received enquiries from the Customs and Excise Division of the Department of National Revenue concerning the existence of regulations controlling the importation of nutria (Myocaster coypus), a South American rodent. Concern was expressed over the possible damage the species might do should it become established in the wild in Canada.

The ten provincial game agencies were asked what specific import restrictions against nutria were in effect in their provinces and what regulations, if any, applied to the confinement of the animal. Replies were received from all provinces and a summary of their answers follows.

British Columbia

The British Columbia Game Act requires that the importation of nutria or any other live fur bearer must be done under permit. Such permits are issued only to a duly licensed fur farmer, on the understanding that the nutria being imported are kept in close confinement.

Alberta

There is no specific regulation concerning the management of nutria in Alberta. The general regulations for the control of fur farming apply to nutria raising. It was the belief of the Alberta Game Branch that the species would be unable to survive in the wild.

Saskatchewan

That Province has no regulation forbidding the importing of nutria. The ranch raising of nutria is permitted under the Province's fur regulations. The belief was expressed also that the species would not survive in the wild.

Manitoba

Manitoba has no restriction on the importation of nutria and no regulation governing them in the Province. The Game Branch thought it unlikely free-living nutria could exist during winter.

Ontario

The Department of Lands and Forests has no control over nutria as its legal status under their Game and Fisheries Act is the same as such exotic creatures as guinea pigs. If it were proven that wild nutria were established in Ontario, they would then automatically come under legislation, and nutria ranchers would have to be licensed.

Nutria may have become established in the Detroit River area, the only place in the Province where aquatic vegetation and open water are found within reach of each other throughout the year. The nutria there are not numerous enough to damage anything, and there is no sign that they are extending their range. Dr. Harkness pointed out in his reply that nutria build a house like beaver, but on dry land with no underwater entrance. When the water surface of a pond becomes frozen, the nutria are unable to go back and forth to feed.

The Ontario Division of Fish and Wildlife believes it quite unlikely that nutria will become a problem in Canada.

Quebec

There is no restriction on the importing of nutria into Quebec. There are a few nutria fur farms in the Province. It was thought that the nutria was unlikely to become established.

New Brunswick

There is no specific restriction with respect to nutria.

Nova Scotia

There is no specific restriction or regulation for

nutria. However, nutria would be governed by restrictions that apply to the breeding of any fur-bearing animal in captivity, that is, a permit is required.

Prince Edward Island

Under the Game Act, a permit is required for the importation of non-native game birds or animals.

Newfoundland

There are no specific restrictions against nutria, but the regulations provide that permission of the Minister must be obtained prior to the importation of any live animal into Newfoundland.

Provision is made also for the licensing of fur farms and the prevention of escapes from such farms. The release of wild animals into natural cover is prohibited, except with written permission.

The consensus appears to be that, except for a few areas where open water conditions exist all year, the nutria is not likely to become the pest species it is in some regions of the United States.

PLANS FOR WILDLIFE MANAGEMENT IN NEW BRUNSWICK

by

Brian Carter, Department of Lands and Mines

Before discussing the future plans for wildlife management in New Brunswick, it might be well to give a short summary of the past history of the Fish and Wildlife Branch.

In 1877, the New Brunswick Legislature passed what might be considered the first Game Act in an attempt to protect certain birds and mammals. Such measures as a closed season for moose, caribou, and deer, with penalties for violators; closed season for mink, grouse, and snipe; and outlawing the use of punt-guns and nets for killing waterfowl were outlined in this early legislation.

Prior to that date, game legislation was limited to a closed season for moose from February 1st to May 1st of each year, and the bag limit was restricted to two moose of either sex.

Since the first Game Act was passed, many amendments have been added, mostly of a restrictive nature.

The present Act gives the Minister of Lands and Mines the authority to manage, preserve, and utilize the wildlife of the Province. In addition to the establishment of seasons and bag limits, the Act governs the methods by which game may be harvested and provides the means for introducing management measures.

A Game Division within the Department of Lands and Mines was first established in 1893 under a Game Commission and continued as such until 1896 when the Province was divided into four districts, each with a chief fire, fish, and game warden. In 1913, a chief game and fire warden in charge of the entire Province was appointed. The appointment of a chief game warden was first made in 1918. To date, four persons have held the position. At present, the permanent professional staff consists of a chief game warden, an assistant chief, an inspector of fish and wildlife, and two wildlife biologists. The first biological position was created in the spring of 1959 and the second a year later.

The employment of two wildlife biologists represents the first step by the Province toward a management program for its wildlife resources.

Wildlife management is still in the experimental and planning stage and probably will not be fully developed for several years.

Several immediate wildlife problems are recognized in the Province today. Of these, deer, moose, and bounties are probably most urgent.

Deer are the most popular game species hunted in the Province today. In 1958, over 49,000 licences were sold, and over 20,000 deer of both sexes were shot. The average number of deer reported killed per licence over the past 22 years is 0.49 and has varied from a high in 1937 of 0.66 to a low in 1956 of 0.37. It would seem, therefore, that the deer herd is at least holding up under a steady increase in the number of hunters. The bag limit for deer is two of any sex and has been in force for many years. At present, we have no idea how long the herd can bear the increasing hunting pressure. It is, therefore, necessary to develop a program which would provide information on the population dynamics which are needed for the management of the herd.

Hunters' returns are a good indication of the total seasonal kill. Without advertising, the return is about 28 per cent of the total licences; advertising through the press and radio adds about 15 per cent to this amount. These reports give the sex of the deer shot, the county where it was shot, and the county of residence of the hunter. The kill figures can, therefore, be broken down into sex, number of hunters, and success ratio for each county. These statistics give us the general trend of increase or decrease of the deer population and the hunting pressure. But more than this is needed. A program is being started this year which, it is hoped, will provide us with more information.

Deer transects are being set up in each ranger district (there are 45 of them), so that a population index throughout the whole year may be obtained. The observations from these transects will also indicate the sex ratio from season to season and the twinning rate. The transects will be established in different types of habitat (along back roads) and will be from ten to twenty miles long. Observations will be made along the transect once a month, on approximately the same date and time of day.

Data on all roadside kills of deer and deer found dead are also being collected, and the ovaries from does are taken for examination.

Check stations will be established during the hunting season, and all hunters passing through them will be required to stop so that their deer may be examined for age, weight, condition, etc.

A survey to locate and examine deer yards in the Province will be started this winter. Aerial population counts will be carried out during the winter, probably using the Ontario method of intensive search.

Work on moose will be conducted in conjunction with the deer work, with the exception of the deer work done during the hunting season. There has been a closed season on moose in New Brunswick since 1937. In the past few years there has been considerable agitation for the opening of a moose season. Present knowledge of the moose population is scanty, but it appears from sketchy field reports that the population in the southeastern part of the Province is increasing fairly rapidly, and that a limited season in that area would be desirable. How a season would be administered is a problem, since it would be unwise to open a portion of the Province to an unlimited number of hunters to hunt a limited number of moose. A lot more information on the moose herd is required before the number and sex to be harvested can be determined.

Ruffed grouse are probably the most popular game bird to be found in the Province, and an average of approximately 75,000 are shot every year. Beyond compiling the annual kill, no work has ever been done on these birds. This autumn an effort will be made to collect a substantial number of wings and tails, so that a production index can be determined. Since some 2,500,000 acres are being sprayed with DDT this year, the study will also be used to determine the difference, if any, in the productivity between sprayed and unsprayed areas. To gather the wings and tails, we plan on using the Branches of the Fish and Game Protective Association. These Branches have been asking for ways to help the Department and so far have accepted the suggestion with enthusiasm.

Another bird study which will be started in the near future is one which will investigate the status and distribution of game birds. The main question to be resolved is whether the stocking of pheasants and Hungarian and chukar partridge is practical and economically possible in New Brunswick. Some consideration is being given to the possibility of allowing pheasants to be raised by individuals and the establishment of private game farms for commercial hunting.

Bounties have long been a controversial subject, and this is so at the present time in New Brunswick. A considerable

amount of educational work on the bounty question has been done over the past year by the Fish and Wildlife Branch, and public opinion appears to be shifting toward the abolition of bounties.

There are only two species for which a bounty is now paid - the bear and the bobcat; a porcupine bounty was paid up until 1952. In spite of a bounty being paid for both bear and bobcat, the numbers of bears bountied over the past 18 years have increased, and the annual kill of bobcats has remained fairly constant over the last 35 years.

Our proposed wildlife management plan will recommend the removal of the bounty system within the next few years. Both bears and bobcats are excellent game animals, and when the bounty is removed, both these animals would be reclassified as game and instead of representing an annual expenditure, would become a source of revenue.

Predators in the future would be controlled by predator crews, which will probably consist of two or three experienced hunters and trappers. Crews would be dispatched to areas of severe predation to deal with a local situation.

There are 13 game refuges in the Province, representing a total of 733,000 acres. The game refuges are not carrying out the function for which they were intended - the production of stock for the surrounding hunted areas. In fact, some of them are not game areas at all, but were proclaimed refuges for other purposes. Under the present proposed management recommendations, some of the refuges would be cancelled, and at least three, one in the north, one in the centre of the Province, and one in the south would be converted into wildlife management areas. The management areas would be used for experimental purposes, which would include the manipulation of habitat, experimental trapping seasons and methods, experimental hunting seasons and hunting methods, restocking, and many others. Parts of the areas could be set aside as demonstration units, so that wildlife management practices and their effectiveness could be shown to the public.

Up to the present time, no work of any kind has been done on the fur bearers of the Province. It is hoped that in the future, several studies can be initiated to determine their abundance and economic importance. Fisher and marten appear to be increasing steadily in the northern areas, while otter and beaver are increasing over the whole of the Province. A considerable amount of experimental and educational work is required on the muskrat to determine the best trapping season.

The staff of the Fish and Wildlife Branch now includes two biologists, and it is hoped that a fishery biologist will be added within a short time. The Branch has no field staff and

relies on personnel from the Forest Service. This is unsatisfactory, since men are not always available when needed and are liable to recall without notice.

For the future, a small staff of field technicians is required, based at headquarters. Game rangers based at Forest District and Ranger District headquarters will also be needed as wildlife management plans develop.

These plans, of course, are subject to revision as more knowledge is gained and as circumstances dictate.

THE ECONOMIC IMPORTANCE OF WILDLIFE IN THE NORTHWEST TERRITORIES

by

A.G. Loughrey, Northern Administration Branch,
Department of Northern Affairs and National Resources

I have been asked to speak to you today on "The Economic Importance of Wildlife in the Northwest Territories". However, before dealing with the current situation, I think that it is important to review the historic value of wildlife to the aboriginal inhabitants, and the role of wildlife in the exploration and development of the area. In fact, the history of the N.W.T. has been closely related to, and often dependent upon its fur, game, and fish.

History

Before the era of the white man, the Indians and Eskimos led a nomadic existence based on a hunting and fishing economy. The northern Indians consisted of several tribes, chiefly of the Athabaskan linguistic stock. The Chipewyans in the east, from Hudson Bay to Lake Athabasca, occupied the northern spruce forest; the Yellowknives, the east end of Great Slave Lake; the Dogribs, the western and northern region of Great Slave Lake; and the Hare Indians, the region around Great Bear Lake. The Slaves and Loucheaux occupied the Mackenzie River Valley. These various tribes consisted of bands of varying size under the leadership of one strong man or chief. These bands roamed their traditional hunting grounds seeking caribou, moose, and other game, often camping for several weeks or even months at a favourable fishing area or caribou crossing. The Athabaskan tribes made frequent trips to the barrens during the summer and autumn, to hunt caribou and muskoxen. They ranged inland to Yathkyed Lake in Central Keewatin, the upper Thelon River, and the Arctic coast in the vicinity of Coronation Gulf. Their neighbours to the south were the Cree and Beaver Indians, and to the north the Eskimos.

The Eskimos, with the exception of an inland group in the interior of Keewatin, had developed a primarily coastal culture. They too were nomadic and were divided into various geographic "tribes". These tribes were composed of small family groups and they moved with the game resources of their country. The Eskimos hunted seals in the winter; seals, walrus, and polar bears in the spring; and made summer hunts inland for caribou and muskoxen. They made occasional trips to the vicinity of the tree-line to cut wood for sledge runners and various

tools and implements. Some of the Thule-culture Eskimos hunted the larger whales (such as the Greenland whale) and they often settled more or less permanently in favourable whaling areas.

Although their hunting areas were adjacent, the Indians and Eskimos remained discrete. They were, in fact, antagonistic and they seldom met except in strife (an example of this warfare was graphically recorded by Samual Hearne on the Coppermine). There appears to have been little or no cultural exchange and no intermarriage between the races.

(1) Explorations

The names of the early navigators of England in search of a Northwest Passage to the Orient are well known to most of us. Names like Frobisher, Davis, Hudson, Baffin, Ross, and McClure serve to remind us of that era. These early explorers were among the first Europeans to contact the Eskimos, but these contacts resulted in little change in the Eskimo way of life.

Turning to the northern mainland, overland expeditions date back to 1770, when Samuel Hearne, employed by the Hudson's Bay Company, trekked from what is now Fort Churchill to the lower Coppermine River. Hearne's explorations proved that a vast land area stretched west of Canada and the American colonies. In the next ten years the fur traders of the North West Company in Montreal began to enter the Mackenzie District from the south to trade directly with the Indians and cut off the fur trade with the Hudson's Bay Company. In 1788 the North West Company built an important trading post, Fort Chipewyan, and it was from this post, which was to become the distribution centre for the North West fur trade, that Alexander Mackenzie left in 1789 and followed the river which bears his name, to the Arctic coast. During the next 30 years, a number of trading posts were to become established on the great water route opened up by Mackenzie. Meanwhile, the Hudson's Bay Company started to meet competition by establishing its own posts in the area. In 1819-22 and 1825-27, the famous Sir John Franklin, accompanied by Richardson and Back, undertook considerable exploration on behalf of the British Admiralty. Operating from Fort Enterprise on the Snare River, Fort Resolution and Fort Franklin, Sir John's parties explored many inland waters and surveyed Coronation Gulf in the central Arctic and west from the Mackenzie Delta. Back later built Fort Reliance in 1833 and followed the river now named after him to the Arctic coast and on to the Adelaide Peninsula. By 1837 Thomas Simpson and Peter Dease of the Hudson's Bay Company completed the gaps in the survey of the northern coast.

In 1821 the Hudson's Bay Company and the North West Company were amalgamated. By 1852 there were eight trading posts scattered along the main waterway and located at good hunting or fishing grounds frequented by the Indians where food for both Indians and traders was available. Between 1850 and 1900, missions were established at most of the posts. Exploration consisted more of scientific expeditions, such as the geological explorations of the Tyrrells.

(2) Whalers

During the latter half of the 18th century and, until the early 20th century, the whalers around Herschel Island, the Mackenzie Delta, and southern Baffin Island and northern Hudson Bay had frequent contacts with the Eskimos. The whalers traded with the Eskimos for fresh meat and furs and they occasionally employed the Eskimos as guides and helpers. It was from the whalers that the Eskimos obtained firearms and ammunition. On the whole, the contact with the whalers produced only a superficial change in the Eskimo way of life. The whalers in the Mackenzie Delta, Herschel Island area were indirectly responsible for the decimation in the coastal areas of large herds of caribou, which were killed by the Eskimos to feed the whalers.

(3) Fur Trade

It remained, however, for the fur trade to introduce a more significant and enduring change in the culture of the Eskimos and Indians.

By 1900 there were 13 settlements in the Mackenzie Valley connected by river transportation. Lawlessness of the whalers at Herschel Island and growth in activity generally, led the R.C.M. Police to establish detachments at key points, and by 1920 there were seven detachments patrolling the Mackenzie area. During the same period, numerous independent traders operated in the Mackenzie Valley, and trapping became the most important activity to the natives. With the influx of white trappers and unrestricted trapping, there was great danger that fur and game resources would disappear.

(a) Eskimos

The introduction of firearms and the fostering of the fur trade had a significant effect on the Eskimo way of life. In order to trap white fox the Eskimos had to travel greater distances during the winter, frequently inland, and away from their sealing grounds. They needed large dog-teams, and the rifle enabled them to obtain sufficient meat to feed their teams.

The increase in the use and size of dog-teams in the fur-trapping pursuit and the use of firearms was probably the most significant change in the Eskimo culture. The effect of this change upon wildlife was marked and often drastic. A people who had little concept of conservation were supplied suddenly with the means of killing large numbers of game. Caribou, muskoxen, and marine mammals were slaughtered in great numbers. Caribou were virtually exterminated on Southampton Island, and walruses were practically extirpated along the west coast of Hudson Bay. Former techniques and methods for securing and preserving food fell into disuse, and wasteful methods became common (such as shooting marine mammals before harpooning them, and failing to make proper caches and dry caribou meat). Those practices contributed greatly to a depletion of the game resources in many areas.

(b)

Indians

During the initiation of the fur-trade era when the Indians began to trap furs in the Mackenzie District, firearms enabled them to obtain game, such as moose and caribou, more readily. They were able to travel more freely, and the use of dog-teams for extended winter travel became widespread. The Indians spent less time on the barrens except for a late-summer hunt for caribou and occasional autumn hunts for muskoxen. During the period from 1862 to 1916, the Hudson's Bay Company is reported to have accepted 15,100 muskoxen skins for trade.

The close of the 19th century saw an increasing decimation of the mainland caribou herds. In 1913 the first white trapper commenced trapping on the central barrens. The number of white trappers increased over the next three decades, with the peak occurring in the 30's when about 100 white and half-breed trappers were trapping white fox on the central barrens. Many of these men made indiscriminate use of poison baits, and the resulting kill and waste of fur species and other wildlife was extreme. As the price for white fox dropped off in the late 40's, the number of white trappers on the barrens diminished.

The Present Status of Wildlife in the Economy of the Northwest Territories

(1) Social Value

The 1956 census of the Northwest Territories gives a total population figure of 19,313, consisting of 6,000 whites, 4,023 Indians and approximately 9,000 Eskimos. Practically all of the Indians, and perhaps 95 per cent of the Eskimos in the Northwest Territories are dependent to a greater or lesser extent upon wildlife for their livelihood. A small number of whites, including traders, trappers, fishermen, and employees of the government fishery and wildlife agencies obtain their livelihood from this field. In the aggregate they represent 65 per cent, or nearly two-thirds of the total population of the Northwest Territories:

(2) Commercial Value

(a) The Fur Trade

In 1958 a total of 2,647 general hunting licences were issued in the Northwest Territories, of which 327 were to white trappers, 1,211 to Indians and 1,109 to Eskimos. The fur trade industry is of considerable importance to the economy of the Northwest Territories. In the post-war period, the total catch has ranged from a high of 922,000 pelts in 1948-49 to a low of 236,000 pelts in 1958-59. The value of production has varied from $2,000,000 in 1950-51 to $757,000 in 1953-54 (the lowest in 30 years); in 1958-59 it was $808,000. Table I in the supplement shows fur production and value for the Northwest Territories in 1958-59.

The principal furs are: white fox, muskrat, mink, beaver, and marten,(in order of dollar value for 1958-59). Muskrats are the staple catch in the Mackenzie River Delta and in most other districts along the river, while white fox are caught chiefly by the Eskimos in the Arctic. Although the muskrat take is only a small part of the total Canadian catch (in 1955-56 it accounted for six per cent of the total number of pelts and five per cent of the total value), the white fox catch of the Northwest Territories constitutes the bulk of Canada's production (about 87 per cent in 1955-56). Production of both species is subject to cycles, white fox having a well-marked cycle of about four years. Since the war, prices of muskrats to trappers have declined from an average of $2.75 in 1945-46 to a low of 60 cents per pelt in

1958-59. At the same time, the catch has been decreasing and, as a result, income from muskrat trapping has declined drastically. Of all furs, the long-haired furs have been most adversely affected by the vagaries of fashion during the past two decades. White fox brought an average price of $36 in 1944-45; by 1949-50 the return to the trapper had fallen to $6.50. In the past few years there has been some revival, largely as the result of the demand in the United States and Europe. During the current season, prices to trappers have averaged about $20. There has been a temporary revival of the market for white fox, mink, beaver, lynx, otter, and coloured foxes; however, income from trapping continues at a very low level.

(b) Game (subsistence value)

The game harvested by the holders of general hunting licences in 1957-58 is shown in Table II. In the Northwest Territories there are only two terrestrial big-game species of importance to the native economy, the caribou and moose. Table number III gives the yearly and total number of these species killed in the Mackenzie District from 1932 to 1958. There has been a marked reduction in the number of caribou killed during that period. This is due in part to a decrease in the size of the herds, a change in their migratory habits, the removal of some of the Indians and Eskimos from their former hunting grounds, and partly, we hope, as a result of increased conservation measures.

The number of moose taken in the Mackenzie District has increased during the last three decades. The increase has been due partly to conservation measures; an increase in their preferred habitat, as a result of forest fires; and partly due to predator control activities in certain areas of their range.

Game species and fish supply the bulk of the protein requirement for most of the Indians and Eskimos of the Northwest Territories. In fact, the very existence and welfare of the more remote groups is directly dependent upon the availability of these species. In Table IV, I have attempted to show the dollar value of these resources to the Indians and Eskimos of the Northwest Territories. This total subsistence value is calculated on the basis of an arbitrarily assigned value-per-pound figure and the estimated annual consumption of the various species.

(c) Commercial Fishing

Commercial fishing for export outside the Territories is carried out in the Great Slave Lake region; Lake Claire in Wood Buffalo Park; Hudson Bay, Frobisher Bay, and Ungava Bay in the eastern Arctic. Fishing in other northern waters, such as Great Bear Lake, the Mackenzie River, Beaufort Sea, and the waters of the Arctic Archipelago is carried on solely for local consumption.

(i) Great Slave Lake Fishery

The following are production figures for the Great Slave Lake commercial fishery in 1957-58:

White fish, 4,207,154 lbs.; lake trout, 1,933,624 lbs.; inconnu, 200,494 lbs.; jackfish, 106,217 lbs.; and pickerel, 2,630 lbs.

This fishery produced a total of 6,450,000 lbs. with an approximate market value of $1,500,000. Most of this production is marketed in the United States. The past year's operation involved six companies in summer and winter operations. Approximately 100 resident fishermen, 150 non-resident fishermen and forty Treaty Indians were employed. Commercial fishing was also carried out west of Hay River in Kakisa and Tathlina Lakes during the winter of 1958, and 25,000 lbs. were produced.

(ii) Goldeye Fishery

Canadian Fish Producers Limited of Winnipeg has been licensed to fish Lake Claire for Goldeye and they have a quota of 215,000 lbs. The Company employs local residents, chiefly Indians. During the summer of 1957 they took 117,000 lbs. of Goldeye. The fishermen were paid 10 cents per lb. dressed weight for their fish. In 1957 they had a landed value of $11,900, or an average of $377.00 for each of the local fishermen.

(iii) Beluga Fishery

The Beluga, or white whale fishery in the Churchill area of Hudson Bay during the summer of 1959 accounted for 268 Beluga, a decrease of 102 animals from the 1958 catch. The annual quota is 800. Adanac Whale and Fish Products Limited of Churchill bought and processed the

entire catch, and twenty-one licensed fishermen took part in the operation. Of the 268 Beluga caught, 172 were males, 96 were females. The total length was 2,733 feet; the average length 10.2 feet. Hunters are paid at the rate of $1.00 per foot landed, or a total of $2,733 and an average of $137.00 per licensed fishermen.

(iv) Char Fishery

In 1959 two summer fisheries for Arctic char were operated in the eastern Arctic. One at Frobisher Bay yielded 15,000 lbs. of char, and the other at George River 19,000 lbs. The Eskimo fishermen received 15 to 17 cents per pound, and the total raw value amounted to $5,350. This summer a third char fishery will operate at Port Burwell. The entire production of char is distributed as a specialty product in southern markets.

(d) Marine Mammals

With the exception of the white whales taken at Churchill, the marine mammals including the walrus; narwhal; ringed, bearded, and harbour seals are harvested by the Eskimos. The chief value of these animals is as a source of meat and hides for use by the Eskimos themselves. The only commercial products are walrus ivory and the skins from ringed seals. The average annual kill of walruses in the eastern Arctic is 1,200, and the annual value to the Eskimos from the sale of carved walrus ivory is about $10,000. The average annual income to the Eskimos from the sale of ringed seal skins, taken mostly around Baffin Island and Hudson Strait, is estimated to be $30,000.

(e) Reindeer Industry

On the Reindeer Grazing Preserve east of Aklavik, there is a government herd of 4,200 animals and a native herd of some 2,000. The annual round-up and slaughter is held in the late autumn. In 1958, 453 reindeer were slaughtered and the meat sold locally to the missions, Hudson's Bay Company, government schools, and private individuals. The meat sells for 35 to 37 cents a pound, wholesale, and the total revenue from the sale of meat and by-products was $18,700. This enterprise presently provides employment for eleven full-time and seven part-time employees, and three Eskimo families.

(f) Buffalo

There are approximately 14,000 buffalo in Wood Buffalo National Park. As a part of the disease reduction program (for tuberculosis and brucellosis), about five hundred animals are slaughtered annually at the modern abattoir at Sweetgrass. The meat from these animals is an important by-product. Since the program was initiated in 1951, 2,944 buffalo have been slaughtered, and they produced 1,370,000 pounds of edible meat.

During the past year 436 animals were killed producing 228,000 pounds of meat. The distribution of the meat was as follows:

> Inuvik, 42,000 lbs.; Indian Affairs Branch, 85,000 lbs.; Hudson's Bay Company, 25,000 lbs.; and other retail outlets in the Northwest Territories, 40,000 lbs. At a wholesale price of 25 cents per pound, a revenue of $57,000 resulted.

The meat from the condemned animals is used for predator control baits and dog-food.

(T.B. incidence: 13.5% (1,118); Brucellosis: 38.1% (155))

(3) Scientific Value

Because of their unique ecology, the Arctic and sub-Arctic regions have always been of interest to biologists in general, and wildlife biologists in particular. Preliminary and intensive studies have been carried out on the life history, distribution, numbers, behaviour, physiology, and taxonomy of many Arctic mammals, game birds, and fish. The following agencies have a responsibility for, and an interest in the biology of fish and wildlife in the Northwest Territories:

> The Canadian Wildlife Service; the Department of Fisheries, through the Fisheries Research Board; the Arctic Institute; the National Research Council; the Bureau of Animal Populations; and many of our Canadian and American universities, museums, and private institutions.

On the basis of estimates provided by some of these agencies, the total expenditure for research on fish and wildlife in the Northwest Territories for 1960 has been placed at $390,000. This figure is only a rough indication of the scientific value of wildlife in the Northwest Territories. Since

practically all of these funds are spent in the Territories, this figure can be considered as a net gain.

(4) Aesthetic Value

The aesthetic value of wildlife is largely a matter of personal tasteto the individual. There can be no true monetary assessment of this value to the visitors and residents of the Northwest Territories. However, the aesthetic value of wildlife is certainly an important factor to most people living in, and visiting what is basically a wilderness area.

Speaking for myself and, I believe, for other people with a similar interest in wildlife, I think of the following occurrences as "wildlife highlights": the opportunity to see large herds of buffalo, caribou, walruses, and whales in their native habitat; and to see some of the rarer North American species, such as whooping cranes, muskox, and barren-ground grizzly; and seeing and hearing the spring and autumn flights of waterfowl, shore birds, and sandhill cranes.

In this age of increasing urbanization, job specialization, and administrative detail, surely the aesthetic value of our wilderness areas and wilderness species is increasing proportionately.

(5) Recreational Value

The scenic values of the Northwest Territories, boat-tripping, and sport fishing have always been enjoyed by many residents of the Territories. However, relatively few outsiders have come to the Territories for fishing and fewer still for boat-tripping and camping. We are now entering an area when the Northwest Territories appears to be on the threshold of a major tourist development. This development is due to a combination of factors: increasing population, higher standard of living, more leisure time, and the increasing ease of accessibility to remote areas by road, air, and rail. The "overexposure", if I may borrow a television expression, of wilderness areas to the south will undoubtedly cause more hardy individuals to push further afield to visit such areas as the Northwest Territories, the Yukon, Ungava, and Alaska.

I would like to confine my remarks to some recent developments in non-resident tourism in the Northwest Territories. In January of this year the Northwest Territories Tourist Association was formed, and an organizational meeting was held in Yellowknife. Because of the potential for tourist development in the Territories, my Department has recently

engaged a Tourist Development Officer, who will function as a Tourist Bureau for the Northwest Territories, to handle enquiries and promote tourist development.

I do not think that we need to stress the role that wildlife and sport fishing will play in the attraction of tourists. For example, it has been estimated by Buckley that about one-quarter of the attraction for tourists in Alaska is the wildlife of the State. I think that we can ascribe a similar or perhaps even greater importance to wildlife and sport fishing in the initial stages of tourist development in the Northwest Territories.

The following are some examples of tourist developments in the Territories during the past year: Two tourist camps were opened on Baffin Island in the eastern Arctic. One camp, Char Arctic Lodge, is located at Frobisher Bay for sport fishing of char. The other camp is operated by an Eskimo co-operative near Cape Dorset. Last summer a party of eight American tourists spent ten days at the camp and they took part in an experimental program of sport hunting for ringed seal. These hunters took only the skins and left the meat for the Eskimos. They also left nearly $2,000 in the settlement from expenditures for guides, souvenirs, and Eskimo-type clothing.

In 1959 the first sport-hunting season for buffalo in the Northwest Territories was held in the area north of Fort Smith and outside of Wood Buffalo National Park. One outfitter and 29 hunters were licensed, and a successful hunt resulted, with hunters coming from many parts of Canada and the United States. You might be interested to hear that the average expenditure by American and Canadian hunters was $1,462.00 and $917.00, respectively.

Last year approximately 800 sport-fishing licences were issued in the Northwest Territories. On Great Slave Lake one organized sport fishermen's camp was in operation, and a number of other individuals provided various outfitting services to sport fishermen in the Great Slave Lake vicinity. The principal sport fishing in this area is for lake trout and grayling.

Each year there is a small, but increasing number of tourists who undertake boat trips in the Mackenzie River system, and there has been an increasing number of tourists who visit the Great Slave Lake area, travelling by car over the Mackenzie Highway to Hay River.

Those of us who are interested in promoting sport fishing and sport hunting must recognize that in terms of variety of species and their productivity, the Northwest Territories

cannot compete with Alaska, the Yukon, and the Western Provinces. We do, however, have certain unique species such as Arctic char and buffalo. It is possible that in future years, sport hunting for marine mammals, such as the walrus and certain seals, as well as polar bear, muskox, and caribou (if and when they make a comeback) may be feasible.

Conclusion

In Table V, I have attempted to provide a comparison of the value of wildlife and the other natural resources of the Northwest Territories. Raw values are used in order to compare resources at their source and to eliminate the value added from transportation and processing.

At present it is impossible to assign a figure for the value of wildlife to the tourist industry, since records of tourist travel and expenditures are not available.

In terms of actual monetary value, it is obvious that mining is, and probably will continue to remain, the most important natural resource of the Northwest Territories. However, the importance of wildlife in terms of the percentage of the population that is partly or entirely dependent upon it for a livelihood must be recognized. The potential value of wildlife to the tourist industry is obvious, and in time that value may even exceed the sum of its commercial values.

The current prospect for the forest industries is uncertain. It is largely a problem of local demand rather than supply. With the likelihood of increasing economic activity, this resource will undoubtedly come into its own. We should, however, not loose sight of the important secondary roll the forests play in providing wildlife habitat and water resource conservation.

During the next two decades, there undoubtedly will be an increased development and exploitation of the mineral and oil resources of the Northwest Territories, with a resulting increase in population, transportation facilities, and economic activity. Without engaging in too much "crystal-balling", I think it is reasonable to expect that twenty years from now a much smaller percentage of the population will be directly or indirectly dependent upon wildlife as a menas of livelihood. However, we may expect that fish and wildlife will continue to provide a source of revenue to many residents. This will probably result from a shift in emphasis from the hunting, trapping, and fishing economy to an increased tourist development.

TABLE I

FUR PRODUCTION AND VALUE

1958-59

Species	No. of Pelts	Average Value in Dollars	Total Value
Bear, white	382	$70.00	$ 26,740
Bear, not specified	15	2.60	39
Beaver	6,973	9.95	69,381
Fisher	7	17.20	120
Fox, blue	146	8.00	1,168
Fox, cross	127	1.98	252
Fox, red	353	1.98	700
Fox, silver	8	3.00	24
Fox, white	23,026	19.63	452,000
Lynx	544	9.01	4,901
Marten	6,787	6.51	44,183
Mink	4,947	18.94	93,696
Muskrat	157,790	0.60	94,674
Otter	139	20.36	2,830
Squirrel	27,221	0.32	8,711
Weasel	7,329	0.60	4,397
Wolf	198	10.00	1,980
Wolverine	131	18.00	2,358
Total No. of Pelts	236,123		$ 808,154

TABLE II

GAME HARVESTED BY THE HOLDERS OF GENERAL HUNTING LICENCES IN 1957-58

Species	Number
Bear, black	300
Bear, brown	3
Caribou	6,379
Deer	9
Moose	2,190
Mountain Goat	14
Mountain Sheep	77
Bison	84
Duck	19,026
Grouse	10,335
Ptarmigan	15,551
Geese	2,277

TABLE III

STATEMENT SHOWING THE NUMBER OF MOOSE AND CARIBOU
TAKEN IN THE MACKENZIE DISTRICT
DURING THE PERIOD 1932-33 TO 1957-58 INCLUSIVE
BASED ON LICENCE RETURNS

	Year	Number of Moose	Number of Caribou
	1932-33	1438	2,619
	1933-34	1927	14,387
	1934-35	1153	10,826
	1935-36	1751	9,753
	1936-37	1257	12,881
	1937-38	1174	18,071
	1938-39	1014	22,982
	1939-40	1067	22,241
	1940-41	1188	18,189
	1941-42	979	19,232
	1942-43	895	22,605
	1943-44	682	22,763
	1944-45	781	28,704
	1945-46	593	28,854
℄	1946-47	423	12,006
℄	1947-48	306	15,987
℄	1948-49	259	17,126
℄	1949-50	369	37,828
℄	1950-51	467	11,688
℄	1951-52	424	18,126
℄	1952-53	484	20,945
Ø	1953-54	670	23,323
*	1954-55	773	19,092
	1955-56	742	17,514
	1956-57	1021	12,377
	1957-58	2190	6,379
	TOTAL:	24,027	466,498

℄ Restricted to 1 male moose per licence holder.
Ø Restricted to 2 male moose per licence holder.
* May be hunted at any time for food purposes.

TABLE IV

CONSUMPTION OF AND VALUE OF FISH AND GAME
TAKEN BY THE HOLDERS OF GENERAL HUNTING LICENCES
IN THE N.W.T. 1958

Item	Consumption (in lbs.)	Value per Pound	Total Value
Fish	650,000	$ .15	$ 97,500
Caribou	800,000	.25	200,000
Moose	880,000	.25	220,000
Buffalo	42,000	.25	10,500
Bears	40,000	.25	10,000
Walrus	1,200,000	.25	300,000
Whales	80,000	.25	20,000
Seals	500,000	.25	125,000
Other game animals	5,000	.25	1,250
Game birds	15,000	.25	3,750
Waterfowl	40,000	.25	10,000
Birds' eggs (Doz.)	4,000	.25	1,000
	4,256,000		$999,000

TABLE V

COMPARISON OF THE VALUE OF WILDLIFE AND OTHER NATURAL RESOURCES IN THE N.W.T. FISCAL YEAR 1959.

Resource	Raw Value (dollars)
WILDLIFE	
Commercial fish	706,000
Subsistence	999,000
Wild Fur	808,200
Beluga Fishery	2,700
Char Fishery	5,350
Walrus Ivory	10,000
Seal Skins *	30,000
Buffalo Meat	57,000
Reindeer Meat	18,000
Sport Hunting and Fishing	
Buffalo	32,000
Seals	2,000
Sport Fishing *	300,000
Scientific Value	387,000
Tourism and Aesthetic Value	?
Gross Wildlife Value	3,357,250
MINING	24,266,817
FORESTRY (1958)	191,769

* Provisional estimate

WATERFOWL DEPREDATION ON THE PRAIRIES

by

W. J. D. Stephen, Canadian Wildlife Service

Depredation is a term familiar to all game administrators. In case your awareness of present problems has dimmed your memory, I would like to review some highlights of waterfowl depredation on the prairies before I venture some suggestions about waterfowl management in agricultural habitat.

Apparently, waterfowl adapted quickly to man-made changes in the prairie environment. Earlier authors (Bossenmaier and Marshall, 1958; Gollop, 1955; and Mair, 1953) suggest that depredations have taken place since the first crops were grown on the prairies, beginning in the nineteenth century.

Efforts to control depredation have followed a pattern which is familiar in game management: legislation, management, research, and finally public relations. Depredation control was provided for in the Migratory Birds Treaty of 1916. The stringency of those first regulations suggests that depredation was not much of a problem to the game administrators at that time. However, relaxation of the regulations was taking place by 1928, which is about the time that wind-row combining was introduced to the prairies as a method of harvesting grain. The "Dirty Thirties" which followed eased the depredation for awhile. During the Second World War, farm prices were high, hunters were scarce, and so were game wardens, so that the farmer who did have a little depredation managed to take care of himself if he chose to do so.

At the end of the War, recreational demands upon the waterfowl resource increased. Wildlife administrators and scientists began talking and working toward an increase in the waterfowl population. A few years followed which were fortuitous for ducks, but disastrous for farmers, in terms of their ability to harvest and market grain at parity prices. By 1953, it was plain that legislation had done all it could do toward alleviation of crop damage by ducks. In many ways, the problem was now compounded by deterioration in farmer-hunter relationships as a result of misbehaviour of hunters "helping" the farmer.

Largely as a result of the vigorous protests of the farmers, provincial agencies, the Federal Government, universities and independent wildlife agencies studied the problem of waterfowl depredation on a localized scale. These studies were usually located where the complaints had been loudest in

the past, or were loudest at the moment. From that field work some knowledge was gained of the nature of damage complaints. It was found that some farmers were suffering heavy losses to waterfowl depredation, while others were equally, or more vociferous about light damage. It was also found that some farmers would industriously erect scarecrows, and with some shooting of shotguns protect their fields from heavy losses to ducks. Others felt, with some justification, that damage costs, or expenses of protection should be borne by the persons or agencies responsible for, or interested in the welfare of waterfowl.

It was at about that stage that an operational program of depredation management was needed. In 1954 in Saskatchewan, it took the form of wildlife insurance. In 1957 in Manitoba, it took the form of lure feeding of waterfowl in the "hottest" depredation area.

Insurance looked like an ideal scheme. Hunters were contributing to the program, and heavily. The overall risk to the taxpayer was slight. Farmers who took advantage of the insurance were happy to receive the payments. Some duck-damage claims as high as $2,800.00 have been paid under this insurance coverage. However, in a bad year such as last year, depredation complaints again reached a fever pitch, in spite of the availability of that insurance. For reasons known best to themselves, many farmers do not seem willing to risk even the 2 per cent premium and complain loudly that the premiums should be free, or at least their risk reduced even more.

In Manitoba, farmers protected by lure feeding are understandably happy. They are getting a high degree of protection from waterfowl depredation at no cost to themselves. It has cost in the neighbourhood of $30,000 per year to protect farmers in three municipalities from ducks. Needless to say, the Government of Manitoba looks long and hard at that money.

While those programs of depredation management are operational, there are still basic problems related to waterfowl depredation to be solved. How much damage is really occurring and where? After many years of sniping south of the border by prairie game administrators and scientists, in 1958 a co-operative depredation investigation was initiated. It was hoped that such a program would provide information for senior administrators which would help them decide whether the depredation problem should be met each year on a "first aid" basis or whether some amelioration or solution could result from a co-ordinated effort.

In 1958 the objectives of the co-operative depredation program were as follows:

(1) to obtain quantitative information on the extent of loss of harvestable grain on sample areas;

(2) to determine current farmer attitudes with respect to waterfowl and their management;

(3) to evaluate current depredation management techniques which were as follows: (a) lure feeding, (b) early hunting season on cultivated land, (c) wildlife insurance and (d) pre-season crop protection permits.

In 1959 that co-operative program swung to two phases: (1) testing scaring devices which had been reported successful in controlling depredation in the United States, and (2) obtaining a prairie-wide estimate of damage. Of the six devices tested to prevent yield reduction by ducks, acetylene exploders of the type with megaphone amplifiers and flint and wheel ignition systems showed promise as a practical means of preventing duck damage. On the second objective, an attempt was made originally to obtain a prairie-wide estimate of damage by contracting with an independent research company. However, the extremely unfavourable harvest weather forced cancellation of those plans. An an alternative, surveys have been conducted in each province through co-operation of the departments of agriculture and the Canadian Wildlife Service. The validity of values of yield reductions estimated in those surveys is open to question. However, they do provide an estimate of the number of farmers on the prairies with real or imagined duck damage, and some idea of the distribution of those farms.

In 1960 it is hoped that field tests of acetylene exploders will continue under the auspices of the Co-operative Depredation Program. We hope to deduce whether those exploders which were so successful in 1959 can be used on a practical basis by every farmer in a depredation area, so that he might protect himself from duck damage during the entire period that his crop is susceptible.

What is the ultimate solution to the depredation problem? To me it seems that the farmer must have available some simple, practical, and acceptable means of preventing duck damage, whether that means is an acetylene exploder, an electronic device, or a repellent. Then the ducks must be provided with adequate feeding areas. It was interesting to me to learn that ducks on the Bear River Refuges in Utah do not field feed, despite the fact that grain fields are nearby. Adequate feeding may then mean improvement of natural areas or acquisition and management of artificial feeding areas.

Knowing the difficulties involved with improvement of natural areas I would suggest that it might be easier to acquire land or use land presently controlled as managed waterfowl areas. In those, lure crops might be grown on a share-crop basis, so that they are self-sustaining.

Priorities must then be placed on the resolution of the problem in depredation areas. Consistent hot spots must be dealt with first. Water areas must be classified and probabilities placed upon the magnitude of the depredation problem in any one area, so that an administrator or lawmaker will have plenty of working information when it comes to settling with the farmer who is shouting in his face that "Prairie agriculture has only progressed at the expense of the buffalo and the coyote. Why should we let ducks stand in out way?"

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EXPERIMENTS TO DETERMINE FEASIBILITY OF COUNTING DEER BY AIR-PHOTO INTERPRETATION

by

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Problems in big-game censusing were discussed early in April 1959 by W.J.D. Stephen (at that time biologist with the Manitoba Game Branch) and Capt. M.W. Robinson, MBE, of the Joint Air-Photo Interpretation School (JAPIS) of the Canadian Joint Air Training Centre (CJATC). As a result of these conversations it was decided to approach the Department of National Defence through the Canadian Wildlife Service to obtain an official sanction for CJATC, and in particular JAPIS, to cooperate with the Manitoba Game Branch to test the feasibility of air-photo interpretation as a method of aerial big-game inventory.

For several years the Game Branch had been carrying out visual air counts to establish trends in big-game numbers in various areas of the Province of Manitoba. It had been appreciated by the Game Branch that the reliability of the visual air-observation method was open to some question, for such reasons as different observers, pilots, aircraft from survey to survey, variations in animal behaviour, and snow conditions affecting the result. It was therefore decided to test the photo-interpretation method, with a view to eliminating or reducing some of the variable factors.

After official approval for the project was received from Ottawa, Mr. G.W. Malaher, the Manitoba Director of Game, and Mr. Bossenmaier established a personal liaison between the Game Branch and Major Taggart and Capt. Robinson of JAPIS. The resulting discussions developed an outline plan for the project.

It was an established fact that aerial photography had been employed on numerous occasions in the wildlife management field. However, in most instances, the photography was of such a nature that no air-photo interpretation techniques were necessary to determine the results (e.g. counting the seals on snow-covered ice or the ducks on a body of water). In our tests, however, the background and scale were such that it was necessary to apply interpretation skills and the factors of interpretation to obtain the result.

Interpretation is the art of obtaining quantitative, qualitative, or metrical information from a photographic image. In most cases when air photography is involved, the image in question is a micro or near micro image, and the basic factors of photo-interpretation (size, shape, tone, shadow, and associated features of a spacial image) must be employed to arrive at an identification. In addition, for this particular test there was the added factor that the interpreters involved were not familiar with the vertical image of a deer at the photo scales of 1:2400 - 1:4800, (1 inch equals 200 to 400 feet) and therefore did not know exactly what they were looking for. This is of some importance since what the mind does not comprehend the eye does not see.

Selection and Description of Study Area

A four and one-half-square-mile tract of representative southwestern Manitoba deer range was selected for the experiments. It is located directly south of Rivers, Manitoba, in the southeastern corner of Township 12, Range 21, W.P.M. The C.P.R. siding, Pendennis, is two miles southeast of the site; hence the name, Pendennis Deer Area, was derived. Visual air surveys in prior years showed that the study area could be depended upon to have deer present during the period scheduled for the experiments.

The study area is the tip of a glacial moraine that extends southwesterly into an outwash plain. Wooded morainic hills that rise a maximum of 75 feet above the adjacent level prairie characterize the site's appearance.

Different vegetative types on the study area provide various degrees of difficulty in spotting deer from a low-flying aircraft and in the interpretation of an aerial photograph. Most of the area is covered by typical parkland trees and shrubs, mainly aspen, bur oak, hazel, chokecherry, saskatoon, and willow, of various heights, densities, and ages. There are bluffs of dense trees, 30 to 40 feet high, tracts of heavy brush, and willow-choked rims of small sloughs. Small hay meadows are scattered over the area, and cultivated fields enter around the periphery. Coniferous trees are not present.

Procedures and Results

Test 1

The first test of the project was carried out on February 16, 1960, under clear sky conditions, using three different counting methods on the selected area. One count was by light aircraft visual observation, using the normal Game

Branch procedure for this type of count. Another was by CJATC helicopter visual observation, to establish an accurate control count.

It was imperative, in order to determine the accuracy of the air-photo interpretation method, that the location be known of each deer on the study area at the time the pictures were taken. This was accomplished by two trained observers and a pilot in a Cessna 172. Flight lines one-quarter mile apart were drawn in easterly and westerly directions on a large-scale cover map. These were flown, between 1400 and 1430 hours, at an altitude of about 250 feet above ground level and at a speed of 70 miles per hour. The exact location of each deer was spotted on the map and a notation made of its activity. In order to ascertain whether or not all deer on the study area were seen by this method, a helicopter and pilot with one observer resurveyed the area between 1500 and 1530 hours.

The final count was by air photography with a vertical fitted F52 Williamson air camera with a 12" lens, installed in a Dakota (P) aircraft. Eastman Super XX Aeropanchromatic film was used with a 1/300 second exposure at F stop 11. Overlapping stereo coverage was flown at 2400, 3600, and 4800 feet to obtain three comparable scales, and to determine the optimum scale for the interpretation of deer in this selected habitat. All counts were scheduled to take place as nearly as possible at the same time, but due to service factors, etc., there were time lapses between the different counts of something more than one-half hour. Photography was not completed until 1500 hours, and the bright sun this late in the day gave long hard shadows on the bright snow.

The results of the first test were:

a. Visual count by the light aircraft at 1400-1430 hours revealed four groups of white-tailed deer, one each of 5, 4, 3, and 1, or a total of 13 deer, distributed over the central portion of the study area. In addition, a group of 6 horses was observed in the south-central portion. All the deer were lying down, bedded in dense, heavily shadowed, woody cover; the horses were standing along the edge of a lightly wooded area that bordered on a snow-covered hay meadow.

b. Helicopter visual count at 1500-1530 hours showed the same groups as in the light-aircraft count, and no movement of the animals was noted.

c. The three air-photo coverages at 1430-1500 hours, after development, printing, and stereoscopic interpretation, gave information as follows:

(i) The 1:4800 scale photos showed three unidentified animals plus a possible three more near the SW corner of the test quarter section. Two were standing in the open, and four appeared to be bedded down in a clump. Two other animals were also seen in the area north of the test quarter section on the last photograph taken, but lack of stereo examination would not permit positive identification other than "possible deer".

(ii) The 1:3600 scale showed six animals in the same location described above.

(iii) The 1:2400 scale revealed the six animals as before, but these were now identified as horses and not deer. There were no deer identified elsewhere, including the locations where the deer were seen in both of the visual counts.

In general, the photography for this test, due to the bright sun and long hard shadows, was unsuitable for deer identification, because of the high contrast between dark shadow areas and bright snow. There were many places where there could have been deer. Fresh tracks and many beds were seen in the snow even at the smallest scales, but no definite identifications were possible. Post-test re-examination of the area where deer were known to be, revealed nothing that could be positively identifiable on the photos.

Test 2

The second test, after several postponements waiting for the right conditions, was finally conducted on March 8, 1960. It followed the three different count-procedures as outlined for the first test, but profited from the experience gained in that test. Photography was undertaken only under conditions of an overcast sky with the sun at its highest (1200 hours) to avoid the long hard shadows and high contrast which made the first test photography unsuited for interpretation. Planned timings were rigidly adhered to, and the visual light-aircraft counts followed the photography within a half hour. The helicopter visual count followed these after a twenty-minute lapse.

The second test produced these results:

a. The visual light-aircraft count showed one loose group of ten deer along the extreme northeastern edge of the

study area near the C.N.R. main line. They were frequenting an area where dense stands of middle-aged aspen were interspersed with more open, brushy tracts.

b. The helicopter visual count revealed that there was some movement of the animals in the twenty minutes that elapsed between the small-aircraft and the helicopter flights. This suggested that it would be quite possible that the photographs, which were taken thirty minutes before the count from the light aircraft, and which barely took in the site, would show fewer deer than had been seen by the visual observers. No other deer were present on the study area.

c. The photo results were:

(i) At 1:4800 scale, three animals, possibly deer, were identified near the C.N.R. main line at the north end of the test area. Other images, possibly of deer, were noted, but the scale did not permit positive identification.

(ii) At 1:3600 scale, five deer, apparently bedded down, were seen in the same area as above, but due to a tear accidentally incurred when processing the film a full count was not possible on the photograph at this scale.

(iii) At 1:2400 scale, seven deer, three standing in a group, two others in the open scrub, and two in a clump, were positively identified in the same area as previously mentioned. No other deer were seen in or about the test area, but a well-worn track lead across the C.N.R. lines out of the area, suggesting constant movement into and out of the area.

Deer images on this type of photo, with soft contrasts and little shadow, were quite detectable to anyone familiar with air-photo interpretation techniques, and it was felt that if there had been deer elsewhere in the area they could have been identified with certainty. Photography under these conditions and at this scale was entirely satisfactory for the interpretation of deer in the selected habitat.

Discussion and Conclusions

The test project brought out several interesting and important points in regard to taking an inventory of big game by photo interpretation means. The first test demonstrated that good quality photos taken under bright conditions, but too

late in the day to avoid long hard shadows, were unsuitable for the interpretation of deer. The second test proved that with an overcast sky and short shadows, deer can be identified even in an unsuspected spot. It also showed that a photo scale of 1:2400 is best suited for a count in the type of habitat represented by the test area. It appears that only marginal results could be expected of 1:3600 photos in a wooded area such as the Pendennis type.

The test project proved that it is feasible to count deer or similar animals by means of the interpretation of air photographs in the "parkland" deer zone of Manitoba represented by the Pendennis study area. Weather and snow conditions must be considered, since they affect the count even at the larger scales. Patchy snow conditions would prevent an accurate count, and hard shadows must be avoided for good results.

If certain personnel were trained in simple interpretation techniques, including the use of the stereoscope, for perhaps a total of one day, and then were to become familiar with a test area (i.e. from count to count during a season), it is felt that an area could be watched and accurately counted by this method.

It is not the intention of the Manitoba Game Branch to use this technique extensively at the present time, largely because of certain factors which favour the retention of the visual method for the time being. One of these factors is that useful information on snow depths, general physical condition of the animals, and the status of game birds and coyotes is furnished by the visual method and not by the photo-interpretation method. Another consideration is that the visual method gives the conservation officer-observer a valuable familiarity with his district that is not otherwise obtainable. It is felt, however, that an existing government aircraft equipped with an air camera of the type employed by forestry and survey organizations could make this method of taking a big-game inventory fully operational if it were desired to do so.