DOMINION OF CANADA

REPORT OF THE DEPARTMENT

OF

MINES AND RESOURCES

INCLUDING

REPORT OF SOLDIER SETTLEMENT OF CANADA

FOR THE

FISCAL YEAR ENDED MARCH 31, 1943

OTTAWA
EDMOND CLOUTIER
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1943

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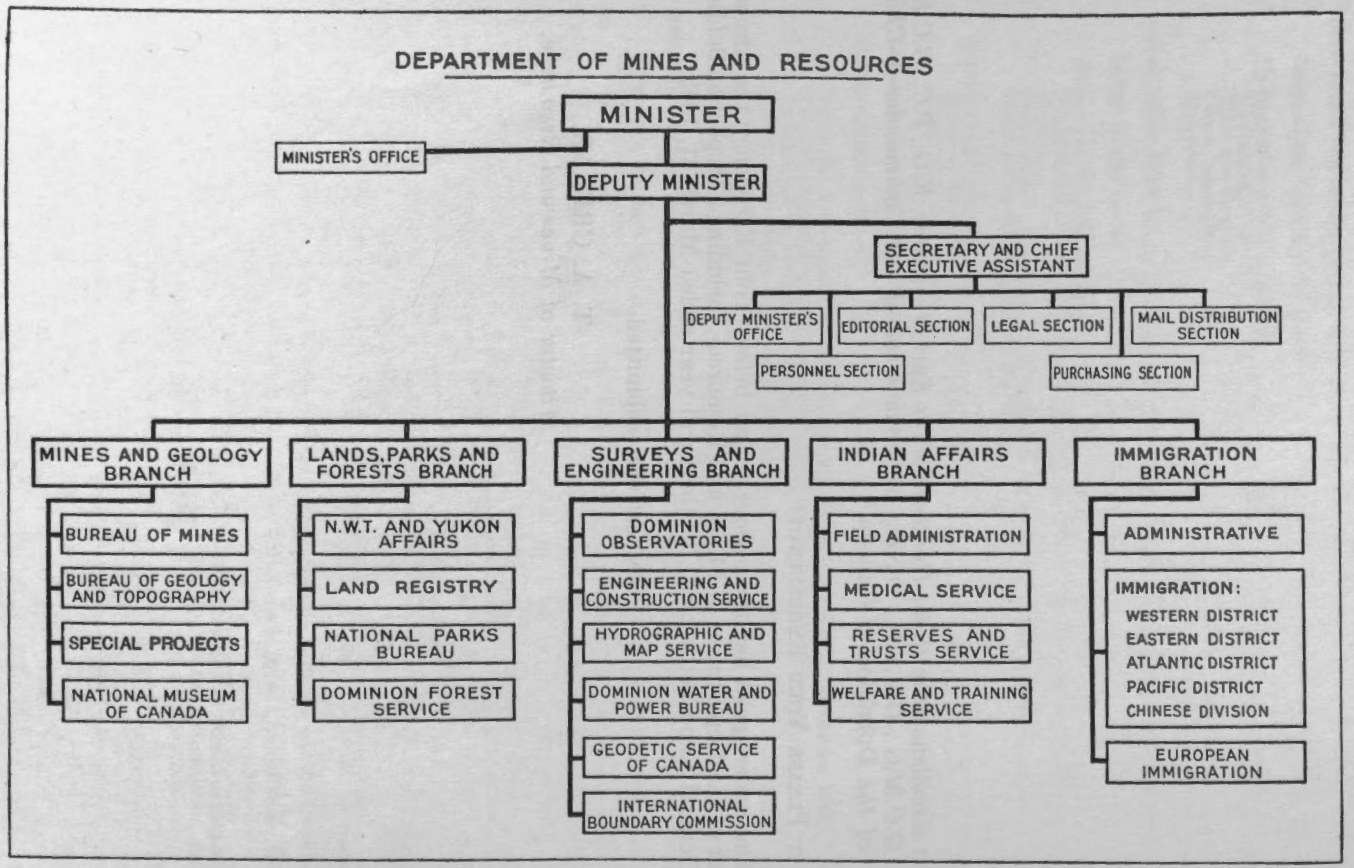
To His Excellency the Right Honourable the Earl of Athlone, K.G., P.C., G.C.B., G.C.M.G., G.C.V.O., D.S.O., Governor General and Commander-in-Chief of the Dominion of Canada.

MAY IT PLEASE YOUR EXCELLENCY:

The undersigned has the honour to lay before Your Excellency the Annual Report of the Department of Mines and Resources, including a Report on Soldier and General Land Settlement, for the fiscal year ended March 31, 1943.

Respectfully submitted,

T. A. CRERAR,
Minister of Mines and Resources.



Organization Chart, Department of Mines and Resources.

REPORT

of the

DEPARTMENT OF MINES AND RESOURCES

Including

REPORT OF SOLDIER SETTLEMENT OF CANADA

FOR THE FISCAL YEAR ENDED MARCH 31, 1943

The Honourable T. A. CRERAR,
Minister of Mines and Resources,
Ottawa.

SIR,—I have the honour to submit the Seventh Annual Report of the Department of Mines and Resources.

As the financial summary which follows indicates, revenue collected during the year was greater by $119,492 than the previous year. However, the total included $247,849 for the sale of the electric light plant at Banff, which is a special item that will not recur.

Expenditures out of the regular votes of the Department remained at about the 1941-42 level, but expenditures out of War Appropriation funds increased by over $5,250,000. The annual expenditures of the Department reached a peak of $23,338,207 in 1939-40 and a low of $11,963,775 in 1941-42. (In reading the latter figure one should bear in mind that the appropriation for coal subventions had been taken out of Mines and Resources estimates. This form of assistance to the Canadian coal industry amounted to $4,434,470 in 1940-41.) As indicated hereunder, total expenditures are again approaching the previous top level. The figure of $6,445,365 shown under the heading "Special—Including War" does not by any means represent the total war effort of the Department but simply that portion of it that could not be taken care of out of the regular votes. Services such as the Bureau of Mines, Bureau of Geology and Topography, Forest Products Laboratories, Engineering and Construction Service, and Hydrographic and Map Service are concentrating almost wholly on war work, and other Services to lesser degrees.

The number of permanent employees as of March 31, 1943, was 159 less (net) than on the same date in 1939 although fluctuating forces had increased somewhat. These were very largely in war units. The work of the Personnel Division has become complicated by reason of Selective Service Regulations and the drying up of manpower pools. It is becoming increasingly difficult to secure the services of qualified personnel—probably nowhere more noticeably than in the Indian Affairs Medical and School Services.

The difficulties encountered in reclassifying permanent positions that have existed during the war is working a hardship on many employees in the Department, and particularly those in the technical services. At the same time,

failure to adjust the remuneration more nearly in line with that paid for similar services outside the Civil Service is making it more difficult to retain our junior technical officers and, as well, to fill vacancies occurring from time to time. Although appreciating the problem involved it is hoped some action will be taken soon to improve the situation that now exists, otherwise it is feared the efficiency of the technical services will be steadily lowered and it will take many years after the war to restore the present standard of work.

Limited by the attention that has to be given to the more urgent war activities of the Department, planning for post-war work of the kind that will assist in rehabilitation or establishment in civil life has received serious study. The Department is in a position to suggest and supervise worthwhile projects that will afford employment of types that will provide the link between army and civil life and of a more continuing character. However, in regard to the latter particularly, there is need of clarification and agreement between the Dominion and the provinces as to relative responsibility for the carrying out of surveys, investigations, and administration affecting natural resources and their development. In places the cleavage is clear, in others the dividing line is anything but sharp and varies with different provinces.

The reports of the Directors, which follow, deal in some detail with the work carried out by the Department during the year.

Summary of Revenue and Expenditure for the Fiscal Year 1942-43

	Revenue	Expenditure Ordinary	Expenditure Special including War	Total Expenditure
General Administrative Branch—	$	$ 155,567 13	$	$ 155,567 13
Mines and Geology Branch— [1]				
Branch Administration	11,985 74	28,353 34		
Bureau of Mines	9,323 31	433,727 12		
Bureau of Geology and Topography	2,268 74	632,148 34		
National Museum of Canada		45,875 30		
War—Miscellaneous			685,463 94	
	$ 23,577 79	$ 1,140,104 10	$ 685,463 94	
				[2]$ 1,825,568 04
Lands, Parks and Forests Branch—				
Branch Administration		17,761 02		
Land Registry	47,058 85	93,593 59		
National Parks and Historic Sites [3]	523,086 88	1,005,584 90	230,399 27	
Forestry	58,701 08	277,828 03	573,833 88	
Northwest Territories [4]	175,369 53	296,225 48	5,243 92	
Yukon Territory	91,509 51	105,544 75		
War—Miscellaneous	1,346 30			
	$ 897,072 15	$ 1,796,537 77	$ 809,477 07	
				[5]$ 2,606,014 84
Surveys and Engineering Branch—				
Branch Administration	5 00	21,516 47		
Dominion Observatories	470 50	121,031 25		
Dominion Water and Power Bureau	132,698 46	224,465 77		
Geodetic Service	112 16	125,967 62	4,276 09	
International Boundary Commission	7 50	34,058 80		
Engineering and Construction Service	840 32	86,096 71	4,692,683 04	
Hydrographic Service	16,711 00	335,157 82		
Legal Surveys and Map Service	23,375 61	180,854 42		
	$ 174,220 55	$ 1,129,148 86	$4,696,959 13	
				$ 5,826,107 99

	Revenue	Expenditure Ordinary	Expenditure Special including War	Total Expenditure
Indian Affairs—				
Branch Administration		51,722 06		
Indian Agencies—Administration	6,095 16	650,705 43	18,690 75	
Reserves and Trusts—Administration		28,604 56	75,123 71	
Indian Education	1,852 48	1,850,450 43		
Medical Services	1,839 03	1,458,115 08		
Welfare of Indians	7,096 23	678,531 22		
Miscellaneous Statutory Items (Annuities and Pensions)	195 99	262,431 55		
Miscellaneous Revenue—not including revenue accruing to Indian Band funds	1,688 47			
	$ 18,767 36	$ 4,980,560 33	$ 93,814 46	
				$ 5,074,374 79
Immigration Branch—				
Administration of the Immigration Act and the Chinese Immigration Act		157,566 63		
Field and Inspectional Service—				
Canada		1,038,208 74		
Abroad		71,925 37		
Miscellaneous Statutory Items		600 00		
War—Miscellaneous	57,787 29		159,651 24	
Miscellaneous Revenue	29,647 10			
	$ 87,434 39	1,268,300 74	$ 159,651 24	
				$ 1,427,951 98
Totals for Department	$1,201,072 24	$10,470,218 93	$6,445,365 84	$16,915,584 77

[1] Includes repayment of loans from War Appropriation.

[2] In addition to this amount there was expenditure by the Branch in 1942-43 from funds made available from the War Appropriation by other Departments, a sum of $513,080.38. Similar expenditures for previous years not heretofore included in this record were: 1940-41, $17,348.30; 1941-42, $115,642.69.

[3] Includes $247,849.57 for the sale of the electric light plant at Banff.

[4] The amounts received from profits on sale of liquor and for liquor fines in the Northwest Territories are not included but are deposited to the Trust Account, Liquor Profits, N.W.T. The credit balance in that account at the close of the fiscal year was $156,373.90.

[5] In addition to this amount there was expenditure by the Branch in 1942-43 from funds made available from the War Appropriation by another Department, a sum of $15,227.18.

Your obedient servant,

CHARLES CAMSELL,
Deputy Minister.

MINES AND GEOLOGY BRANCH

W. B. TIMM, DIRECTOR

The facilities of the Branch were used to the full in furthering Canada's war effort. Brief mention of the wide range of its activities will indicate something of the nature, extent, purpose, and importance of the wartime work. They comprise in the main, and apart from the auxiliary services, the geological examination of areas likely to contain deposits of urgently needed minerals; the mapping of oil structures; physical metallurgical investigations in connection with the production of munitions of war; tests and investigations in the ore dressing laboratories, with particular attention to strategic metals and minerals; tests and investigations on fuels; administration of funds provided from the War Appropriation direct to the Branch, and of funds recoverable from other departments for strategic mineral and petroliferous projects; administration of the Explosives Act; supplying technical information on mining, metallurgical, and allied chemical industries to the war departments; commercial production of a major component of secret equipment for the Naval Services; and consultative services to the war departments.

Administration of the strategic mineral and petroliferous projects formed a particularly important addition to the wartime activities of the Branch and involved considerable field work. Though the results by the end of the fiscal year were not in all cases encouraging, the projects were providing valuable information with reference to the domestic supply of the metals and minerals concerned. They were carried out on the recommendation of the Metals Controller and the Oil Controller and are dealt with in the Special Mineral Projects section.

Allotments from the War Appropriation were also provided for the construction of a new physical metallurgy laboratory; for services to war departments; for geological investigations; and for additional work in connection with the administration of the Explosives Act.

As noted elsewhere, arrangements to celebrate the hundredth anniversary of the Geological Survey and the National Museum were cancelled, owing chiefly to the difficulties of travel and the pressure of work. The two organizations were established in 1842.

Geological field parties gave their full attention to strategic minerals and petroleum and in the case of the former, several of the geologists were engaged during parts of the season in the supervision of exploratory programs on different properties. Deposits of tungsten and chromite and structures believed to be favourable for the occurrence of oil were revealed during the course of the field work.

The Branch lost the distinguished services of George A. Young, its Chief Geologist, who retired on superannuation March 5, 1943. Mr. Young joined the permanent staff of the Geological Survey May 5, 1904, and was appointed Chief Geologist November 1, 1924.

Of special interest and importance in the work of the Bureau of Mines are the tests and investigations carried out in the physical metallurgy laboratories, a list of which is given under the Metallic Minerals section. The facilities have been made available to the Inspection Board of the United Kingdom and Canada, the Department of Munitions and Supply, the Army, Navy, and Air Force, and the British Air and Admiralty Commissions, and they are the recognized physical metallurgy laboratories for these organizations. The work undertaken ranges from the examination of fitments for vessels and the substitution of non-strategic alloys for steel, to the development of specifications and of inspectional methods. The new physical metallurgy laboratories, being erected because of overcrowding in the present location and of the greatly increased volume of work, will be ready for occupancy within a few months.

A process developed in the Branch for the chemical treatment of blower-coals to produce a suitable clinkering ash residue was patented and negotiations were under way with a view to licensing dealers to prepare the treated coal for the 1943-44 heating season. Considerable experimental work was conducted on methods of dehydrating troublesome crude oil-water emulsions from the Vermilion field in Alberta; and the investigation of Canadian and imported crude oils for the production of toluene for use in explosives was continued.

Work on industrial minerals was devoted almost entirely toward promoting the development of those minerals required in the production of munitions and to supply deficiencies caused by restrictions on imports. A process developed in the laboratories for the recovery of magnesia and lime from brucitic limestones was put into commercial operation at a plant near Wakefield, Quebec. The production of steatite porcelain electric insulators for high frequency service will commence in Canada shortly, largely as a result of laboratory work and of technical assistance given to the company concerned by the Branch.

The handbook "Prospectors Guide for Strategic Minerals in Canada" was again revised, as conditions had changed in respect to war minerals in short supply. Near the end of the fiscal year, the Branch and the office of the Metals Controller completed arrangements whereby prospectors would receive special consideration under the wartime employment and food rationing regulations as required to enable them to organize and maintain prospecting parties in the field in 1943. Under these arrangements, Employment and Selective Service offices and local ration boards will accord this special consideration to *bona fide* prospectors, certified as such by the possession of prospector's identification cards issued through the Branch, mainly by the provincial mining recorders.

The Branch was asked to quadruple production of the aforementioned component of secret equipment and to take over certain operations in connection therewith formerly handled by the Naval Services. A suitable building was expropriated for the Branch by the Department of Munitions and Supply and most of the staff concerned was moved to the new quarters in November 1942. By the end of the fiscal year the staff had been increased from forty to about one hundred and fifty and the desired production rate had been reached. The value of output approximates $100,000 a month.

SPECIAL MINERAL PROJECTS DIVISION

Through a special division set up for the purpose, the Branch administered funds provided out of the War Appropriation for special exploration and development work in connection with the supply of strategic minerals; for investigations of petroliferous deposits and potential petroliferous areas; for assist-

ance to Provincial Governments in providing transportation facilities into strategic mineral properties; and for assistance to Provincial Governments in winter maintenance of roads into strategic mineral properties. Various sums recoverable from other Departments were also administered by the Branch.

STRATEGIC MINERALS

Of the $500,000 supplied to the Branch, approximately $325,000 was expended in the form of loans to mine operators, contracts for exploratory work under Dominion or Provincial Government supervision, purchase of mining equipment, etc. The projects were carried out on the recommendation of the Metals Controller and covered a wide range of mineral explorations and development, as follows:

Chromite. Assistance in the form of a loan repayable on the basis of royalties on production was made to Chromite, Limited, operating the Sterrett mine in Cleveland township, Quebec. The Sterrett has operated continuously from May 1942, and the monthly output at the end of the fiscal year was approximately 1,000 tons of concentrates of a grade averaging 48 per cent chromic oxide, with a chrome-iron ratio slightly under 3 to 1. Extensive changes were made to the surface plant, resulting in an increase in daily milling rate from approximately 75 tons to 125 tons, and in a substantial increase in mill extraction. Plans were being made for a shaft-sinking program to maintain production.

A similar loan was made to Orford Mining Company, Limited, whose property in Orford and Brompton townships, Quebec, was brought into production in September 1942, and produced 345 tons of lump ore over a period of 3 months before closing down for the winter.

Fluorspar. Four operators in the Madoc area were given assistance by loans, as follows: R. T. Gilman (Noyes mine), Reliance Fluorspar Mining Syndicate, Limited (Perry mine), H. C. Miller (Keene mine), and Trent Mining Syndicate, Limited (Ben Lee mine). More than 2,000 tons of fluorspar had been shipped from the Madoc area as a result of these loans by March 31, 1943, and considerable further production is expected.

Manganese. In Nova Scotia an extensive program of diamond drilling was carried out under an agreement with the Provincial Government on the Riddle and Cain properties in Lunenburg county. Though no positive ore was outlined, examination of sludge samples indicated the possible existence of 36,000 tons of manganese ore in the Cain mine.

In New Brunswick, some 600 feet of drilling was done on the property of Nabco Manganese Mining Company, Limited, at Gowland Mountain, without encountering additional ore.

Molybdenite. A total of 4,618 feet of diamond drilling was done on the property of Quyon Molybdenite Company, Limited, in Onslow Township, Quebec, as a result of which a considerable addition to the low-grade ore reserves of the No. 1 area was outlined. In the No. 2 area, approximately 56,000 tons of probable and possible ore averaging 0·40 per cent molybdenum sulphide (MoS_2) was indicated to a depth of 300 feet.

On Timothy (Boss) Mountain, Quesnel mining division, British Columbia, twelve holes, aggregating 1,363 feet, were drilled in a body of molybdenite-bearing diorite breccia. This work was carried out under provincial supervision, the Dominion reimbursing the actual cost of drilling. Nearly 40,000 tons of 1 per cent ore was outlined, with a possibility of a further 24,000 tons, but the owners,

Consolidated Mining and Smelting Company, considered the grade too low for this tonnage to justify development of the property as it is difficult of access and because of the great expense that would be involved before any production could be achieved.

Tin. A cassiterite-bearing aplite dyke on the "Odd" claim of Northern Tin Mines, Limited, near Rush Lake (south of Oiseau Lake), Manitoba, was explored by diamond drilling. No ore of mineable grade was encountered.

At Albert Canyon, near Revelstoke, British Columbia, a program of exploratory drilling and channel sampling was carried out in the Regal silver (Woolsey) mine to locate the downward extension of a tin-bearing shoot in the adjacent Snowflake mine. No ore-shoot was intersected, but samples taken on the Snowflake level indicated an ore-shoot 185·5 feet long, averaging 1·79 feet in width, and assaying 5·50 ounces of silver a ton, 0·64 per cent lead, 2·15 per cent zinc, and 0·71 per cent tin. This confirmed previous reports concerning tin on the property.

Tungsten. Under an agreement with the Province of Nova Scotia, whereby the Dominion reimbursed actual costs of the projects, dewatering and mining operations were carried out on tungsten properties in Lower Sackville and Moose River districts. From the Moose River mine, 7,036 pounds of high-grade, and 84,880 pounds of low-grade, scheelite ore was recovered. No tungsten ore was located at Lower Sackville.

Direct Dominion assistance was provided to Tungsten Mines, Limited, operators of the Indian Path mine in Lunenburg county, Nova Scotia, by payment of costs of certain underground exploration and development work, including shaft sinking, crosscutting, drifting, and diamond drilling. A new level was opened up, but no new ore was found.

A small loan of funds required for development of placer scheelite claims on Dublin Gulch, near Mayo, Yukon Territory, was granted to Hugo A. Seaholm, of Mayo. This loan is repayable on the basis of royalty on production and was made to provide for purchase and installation of necessary machinery and for working capital with which to bring the Seaholm property into production of much-needed tungsten ore.

A Dominion contribution of $7,000 was made to the Quebec Department of Mines, representing approximately 50 per cent of the cost of erecting and equipping a provincial scheelite concentrator at Val d'Or, Quebec.

Zinc. Exploration of a zinc showing at Hawk Creek, Kootenay National Park, British Columbia, was carried out by Base Metals Mining Corporation, costs being defrayed by the Dominion Government. A total of 7,800 tons of 25 per cent zinc ore was outlined, but this tonnage was not considered sufficient to warrant further development.

Mining Equipment. To meet any sudden demand for equipment with which to explore or develop strategic mineral deposits, and having in mind a probable future scarcity of such equipment, the Branch acquired four compressors and six drilling machines as a "pool" to be used for Government work or for loan or rental to private parties. Two sinking pumps of 500 gallons per minute capacity were also acquired for emergency use in the Madoc area, where fluorspar properties operating under Government loans may encounter unusual water conditions.

Research. To assist in the expense of investigations connected with increasing the supply of strategic minerals a grant of $5,000 was made to the British Columbia War Metals Research Board. The Board carried out many tests in its laboratories at the University of British Columbia, assayed numerous samples submitted by Geological Survey parties, and provided complete reports of its activities to the Mines and Geology Branch and the Metals Controller.

OIL EXPLORATIONS

Only a small part of the $200,000 provided for the investigation of petroliferous deposits and potential petroliferous areas in Canada, other than the bituminous sands of Alberta, was expended during the fiscal year. Projects carried out under this allotment of funds were recommended by the Oil Controller.

The most important of these projects was the exploration of the oil-shales of Albert and Westmorland counties, New Brunswick. An agreement was entered into between the Dominion Government and the Province of New Brunswick providing for an expenditure up to $50,000 on the project, the Dominion contributing 75 per cent and the Province 25 per cent of the costs. Drilling commenced May 28, 1942. In the Rosevale and Taylor Village areas forty-three holes were drilled, but results were disappointing. Thirty-six holes drilled in the Albert Mines area indicated 100,000,000 tons of oil-shale, but the oil content, estimated at 10·6 gallons to the ton, is considered too low for these shales to be of economic importance. A complete report on these investigations will be available in a short time.

In British Columbia, nearly 13,000 feet of 7-inch and 8-inch casing pipe was acquired by the Branch and stored at Dawson Creek for use in connection with possible future oil drilling in Western Canada.

Bituminous Sands Investigation. For investigation of the bituminous sands of Alberta a special allotment of $200,000 was provided on recommendation of the Oil Controller, and the work was carried out by Consolidated Mining and Smelting Company of Canada, Limited, on a non-profit basis. This included test drilling of the Wheeler Island and Steepbank River areas north of McMurray; a study of the plant of Abasand Oils, Limited, with regard to mining and processing the sands, costs, efficiency of operation, etc.; and research to ascertain what products might be obtained from the bitumen extracted from the sand.

At Wheeler Island, an area of 1,400 acres was explored and an estimated 100,000,000 tons of sand containing about 12 per cent bitumen was indicated. However, because of the high content of -200 mesh material and the heavy overburden, it is doubtful if the bitumen can be recovered economically by tried methods of stripping, mining, and separation. The Steepbank area shows greater economic possibilities. Over 100,000,000 tons of sand with 12 per cent bitumen and 18 per cent -200 mesh material is estimated to be available under overburden averaging about one-half ton for one ton of bituminous sand. This deposit is adjacent to a suitable plant site; it is reasonably close to the railhead and is near a good waste-disposal site. Further exploration of this area was recommended and plans were being made to carry this out.

Steps were being taken towards the expansion of the Abasand plant and its operation as a Government-financed project. A full report on the evaluation of the bitumen is not yet available.

ROADS TO STRATEGIC MINERAL PROPERTIES

Dominion financial assistance was granted to Provincial Governments on eight road projects representing improvement or construction of transportation facilities into strategic mineral properties. A small amount of financial assistance was also granted toward maintaining certain roads affecting operations at strategic mineral properties.

Alberta. Improvement of a road 2 miles long from Hangingstone River to the plant of Abasand Oils, Limited, near McMurray. Owing to shortage of labour and severe weather the work was not quite finished before winter set in.

British Columbia. Improvement of a road 5 miles long from the Nelson-Nelway highway to the Emerald tungsten mine south of Salmo. Severe weather conditions prevented completion of this road in 1942.

Improvement of a 10½-mile road from Skeena Crossing to the Red Rose tungsten mine.

Snow-ploughing of a road 174 miles long from a point near Pinchi Lake to mercury properties at Silver Creek, Omineca district (Manson Creek road).

Ontario. Improvement of a road 2·5 miles long from highway No. 17 near Mattawa to the Purdy muscovite mica mine.

Improvement of a road 6¾ miles long from Timmins to Waterhen River; construction of a new road 12¼ miles long from Waterhen River to the Kam-Kotia copper property.

Quebec. Improvement of a road 3·7 miles long from Bryson bridge to the Calumet lead-zinc mine on Calumet Island, Ottawa River.

Improvement of a road from St. Cyr station to the Sterrett chromite mine in Cleveland township.

Improvement of 4 miles of colonization road and construction of 2 miles of new road from the village of Preissac to the St. Maurice (Dome Exploration) molybdenite mine in Preissac township.

Winter maintenance of the following mine roads: Lacorne molybdenite mine to Val d'Or (21 miles); St. Maurice molybdenite mine to Cadillac (9 miles); St. Maurice molybdenite mine to Amos (27½ miles); Quyon molybdenite mine to Quyon Station (3 miles); Sterrett chromite mine to St. Cyr Station (4 miles); Calumet lead-zinc mine to highway (4 miles).

EXPENDITURES RECOVERABLE FROM OTHER DEPARTMENTS

The Division administered a number of allotments from War Appropriation provided through other Departments in cases where the projects involved work that came within its scope, as follows:

Advance Payments on Yukon Tungsten Ores. In connection with the production of tungsten-bearing concentrates from placer operations in Yukon it was found advisable, on account of the great length of time from date of shipment to date of sale of the ores, to assist the operators by means of advance payments. An amount of $10,000 was, therefore, provided by the Department of Munitions and Supply as a revolving fund out of which advance payments were made to the shippers at the rate of 75 cents a pound of tungstic oxide (WO_3) contained in the concentrates. Subsequently, accumulated concentrates were marketed and settlements completed with the shippers.

Advance Payments on Fluorspar. An amount of $10,000 was provided by the Department of Munitions and Supply as a revolving fund for advance payments to shippers of fluorspar in Madoc area, Ontario. Advance payments were made on the basis of 80 per cent of the estimated value of the ore, amounts paid being deducted from final settlements after sale of the ore.

BUREAU OF GEOLOGY AND TOPOGRAPHY

All field parties made investigations or surveys designed to relieve shortages in oil and strategic minerals, and the associated services of the Bureau were fully linked with these endeavours. Forty-six field parties were organized, of

which twenty-eight were parties of the Geological Survey and eighteen were parties of the Topographical Survey. The Geological Survey had nine parties in British Columbia, one in Alberta, two in Manitoba, five in Ontario, five in Quebec, one in New Brunswick, two in Nova Scotia, one in Yukon, and two in the Northwest Territories. The Topographical Survey had eleven parties in British Columbia, two in Alberta, two in Nova Scotia, and three on special work at the request of the R.C.A.F.

The Draughting and Reproducing Division reports the printing of sixty-three maps, of which twenty-five were geological maps and thirty-eight topographical maps. Among the geological maps was one of southern Quebec in three sheets, on a scale of 1 inch to 12 miles.

Fifteen preliminary geological papers and one memoir were published.
A total of 77,882 reports, maps, and other publications were distributed.

GEOLOGICAL SURVEY

The past year marked the completion of 100 years of continuous service to Canada by the Geological Survey. The decision to organize a Geological Survey was taken by the first united Parliament of Canada on September 10, 1841, and in the spring of the following year William Edmund Logan was appointed to undertake the task.

Despite wartime conditions it was felt that some recognition should be shown on the occasion of this one hundredth anniversary. An invitation, accordingly, was extended by the Minister of Mines and Resources to the Geological Society of America to hold its annual meeting of 1942 in Ottawa and to assist at a modest Geological Survey celebration. The Society accepted the invitation, but later found it necessary to cancel its annual meeting owing to the difficulties of travel and the pressure of war work in which so many of its members were engaged. For like reasons, the proposed Geological Survey centenary celebration was not held.

A pleasant event, which partly compensated for this, took place when Dr. Joseph Burr Tyrrell, a former member of the staff of the Geological Survey, presented to the Survey a case containing the medals and badges that Sir William Logan had received while Director. These medals had been purchased by Dr. Tyrrell from Logan's heirs in Wales years after Sir William's death there in 1875. It is very fitting that they should come into the possession of the Geological Survey on the one hundredth anniversary of the year Logan began his great work. Some of the more important contents of this case include the Gold Medal won at the 1851 Exhibition in London, the Grand Gold Medal of Honour won at the Paris Exposition of 1855, the Wollaston and Royal Medals presented by the Geological Society of London, and the badges of Chevalier and of Officer of the Legion of Honour of France.

During the year, the work of the Geological Survey was devoted entirely to the examination of, and search for, potential sources of oil and strategic minerals, and to other projects closely associated with the war effort.

At the request of the Oil Controller, and with funds made available by the Department of Munitions and Supply, oil exploration activities were undertaken in the Peace River district. This included geological surveys, details of which are given under "Field Work", and aerial photography, details of which are given under "Topographical Survey".

Field Work

NORTHWEST TERRITORIES

A. W. Jolliffe examined scheelite-bearing quartz veins at Tumpline Lake, 60 miles east-northeast of Yellowknife, and at Gordon Lake, 50 miles north-northeast of Yellowknife. He discovered one hundred veins at Tumpline Lake and two hundred at Gordon Lake, and evaluated these and other veins already known with an ultra-violet lamp.

E. D. Kindle examined scheelite-bearing quartz veins at Tibbitt Lake, 33 miles northeast of Yellowknife. He discovered one hundred and fifteen veins and evaluated these and others already known with an ultra-violet lamp.

YUKON

H. S. Bostock estimated the tungsten content of the scheelite-bearing gold placers of Dublin Gulch. He traversed unmapped country nearby in search of granite bodies that might be sources of tungsten and tin, and during this work discovered two scheelite-bearing deposits of the contact metamorphic type. He also examined the silver-lead areas at Galena Hill and Keno Hill; antimony deposits on Yukon River below Dawson; the dumps of several mines in the Whitehorse copper belt; and a reported occurrence of cinnabar near Mayo.

BRITISH COLUMBIA

C. S. Lord examined a body of ultrabasic rock in search of deposits of chromite in the Mitchell Mountains area about 15 miles east of Takla Lake. A thorough examination disclosed only small disseminations of chromite. Late in the year he supervised diamond drilling for the Mines and Geology Branch, Ottawa, at the Regal silver mine. The drilling was designed to explore the downward extension of tin-bearing veins in the adjoining Snowflake mine.

J. E. Armstrong examined ultrabasic rocks in search of deposits of chromite in the Middle River Mountains about 15 miles southeast of Takla Lake. He discovered small lenses of chromite. He also examined the Pinchi Lake, Takla, and Andesite mercury properties, which lie in the Pinchi Lake mercury belt.

A. F. Buckham examined ultrabasic rocks in search of deposits of chromite in Shulaps Mountains, Bridge River district. The work disclosed several small lenses of chromite and larger bodies of disseminated chromite of no present commercial value.

H. M. A. Rice in the early part of the field season supervised diamond drilling at Hawk Creek in Kootenay National Park. The work was done for the Mines and Geology Branch, Ottawa, and served to outline rather completely the boundaries of a body of zinc ore. During the remainder of the field season he examined ultrabasic rocks in Ashcroft district in search for chromite. He also studied and mapped a chromite deposit of milling grade at Scottie Creek and another at Ferguson Creek in the Ashcroft district.

W. E. Cockfield examined ultrabasic rocks in search of deposits of chromite near Grand Forks and near Rock Creek. He also examined tungsten deposits at the Emerald mine, Salmo; tungsten deposits on Stewart Creek near Ymir; manganese deposits at Olalla; and made other examinations of deposits of various strategic minerals in southern British Columbia. Late in the year he made a brief examination of an area at Port Coquitlam with reference to oil and gas.

J. S. Stewart had general supervision of the various parties on oil geology in British Columbia. His own work was mainly at Commotion Creek, but he also investigated a reported occurrence of natural gas at Fort Nelson.

H. H. Beach and J. Spivak studied the stratigraphy and structure of the rocks on both sides of Peace River west of Hudson Hope in search of favourable oil structures. They discovered six anticlines. Beach also investigated reported oil seepages in British Columbia and Yukon near Watson Lake.

R. T. D. Wickenden and G. Shaw studied the stratigraphy and structure of the rocks near Commotion Creek in search of favourable oil structures. They discovered three anticlines.

F. H. McLearn and J. F. Henderson studied the stratigraphy and structure of the rocks in the Monkman Pass district in search of favourable oil structures. They mapped three anticlines, one of which was marked by a gas seepage and was also shown to have satisfactory closure.

ALBERTA

C. O. Hage completed the geological mapping of Dyson Creek (longitude 114° 30′ to 114° 45′, latitude 50° 30′ to 50° 45′) and Cowley (longitude 114° to 114° 15′, latitude 49° 30′ to 49° 45′) map-areas. A gas seepage is known in the Cowley area and both areas have anticlinal structures.

MANITOBA

J. D. Bateman examined deposits of lithia, beryl, tungsten, molybdenite, tin, chromite, and copper-nickel in southeastern Manitoba and molybdenite in the adjacent part of Ontario. He discovered chromite deposits of large size, but poor quality. He also superintended the diamond drilling of a tin deposit at Rush Lake in southeastern Manitoba.

T. L. Tanton in company with W. C. Ringsleben of the Metals Controller's office late in the season examined various tungsten deposits in the northern part of the province.

V. J. Okulitch studied the succession of Palæozoic rocks in the province to establish a standard section that could be used there and also in the more westerly provinces.

ONTARIO

J. F. Caley continued the study of the geology relating to gas and oil in southwestern Ontario. The area covered in 1942 was one in which recent drilling had been done.

A. H. Lang studied and mapped mica deposits in the Eau Claire district near Mattawa. M. E. Wilson, George Shaw, and E. D. Kindle were also engaged for a short time on this work. The deposits contain muscovite of excellent quality.

A. F. Buckham spent six weeks late in the season studying and mapping deposits of vanadium-bearing titaniferous magnetite near Mattawa. M. E. Wilson, T. L. Tanton, George Shaw, and E. D. Kindle were also engaged for a short time on this work. The operation disclosed lenses of magnetite not previously known.

A. W. Jolliffe, in company with V. L. Eardley-Wilmot of the Bureau of Mines, Ottawa, late in the season examined and evaluated deposits of tungsten and molybdenite between Long Lac and Fort Frances.

M. E. Wilson examined fluorite deposits in the Madoc district.

T. L. Tanton, in company with W. C. Lacy of Harvard University, examined deposits of vanadium-bearing titaniferous magnetite at Parry Sound. Tanton examined other deposits of similar nature and deposits of other strategic metals between Parry Sound and Mattawa, and he also examined fluorite deposits near Madoc.

H. C. Cooke and R. E. Folinsbee continued the evaluation of the tungsten content of gold ores in Ontario and western Quebec. Cooke examined about twenty-five gold mines or prospects containing tungsten, most of which were in Ontario. Folinsbee remained at the Hollinger mine for practically the whole year, but also examined about fifteen other gold mines or prospects containing tungsten.

QUEBEC

C. H. Stockwell searched for chromite deposits in the Thetford-Black Lake district, Eastern Townships. This work disclosed several small lenses of chromite ore in each of five localities.

J. W. Ambrose and Y. O. Fortier studied and mapped ultrabasic rocks in the vicinity of Orford Mountain, Eastern Townships, and searched for chromite deposits at Webster and Brompton Lakes and at the property of Chromite, Limited. They discovered many small occurrences of chromite. Ambrose also examined the Ives mine near Eastman, and late in the season he was in charge of operations at the Orford Mining Company.

M. E. Wilson completed the study and mapping begun in 1942 of a small area near Rouyn. He also examined deposits of base metals and fluorspar in Montbeillard township, of molybdenite in LaPause township, and at Quyon, and of china clay at St. Remi.

G. W. H. Norman continued geological study and mapping in Bourlamaque township, and examined zinc, copper, and tungsten deposits in the vicinity. He also examined molybdenite and tantalite deposits in the vicinity of Kewagama Lake.

H. W. Fairbairn investigated reported structures and oil seepages in Anticosti Island.

NEW BRUNSWICK

F. J. Alcock began geological study and mapping in the Sussex district. He examined the manganese deposits on Gowland Mountain, Shepody Mountain, and Turtle Creek, supervised diamond drilling on the Nabco property on Gowland Mountain, and in company with W. J. Wright examined the Dorchester copper deposits. He supervised diamond drilling of oil-shales at Albert Mines and Taylor Village and examined oil-shales near New Glasgow, N.S.

NOVA SCOTIA

L. J. Weeks began the study and mapping of iron deposits at Londonderry. He also examined specular iron deposits in Colchester county and manganese deposits at Canaan. For most of the season he superintended diamond drilling of the manganese deposits at New Ross.

W. A. Bell examined barite-fluorite veins near Lake Ainslie and also near Cheticamp. He examined manganese deposits in the vicinity of Loch Lomond, located sites for drilling for rock salt near Amherst, and examined lead deposits at Arichat. In company with B. R. MacKay he examined a supposed oil structure at Southwest Mabou.

H. C. Cooke examined tungsten deposits in the Moose River district and elsewhere in the province, and also at Burnt Hill, New Brunswick.

T. L. Tanton examined iron deposits at Upper Glencoe.

Office Work

Many reports were prepared, based on examination of deposits of strategic minerals containing tungsten, chromite, mercury, manganese, vanadium, molybdenite, tantalum, mica, beryl, fluorite, and barite; also on deposits of the various base metals; and on possible oil structures and petroliferous formations. Limited preliminary editions of some of these reports and related maps were prepared to satisfy public requests for information. Three memoirs, three papers (preliminary reports), and nineteen preliminary and four final editions of maps were prepared for publication.

Palæontological Section

A large number of fossil collections were submitted by field officers for age determinations and their study formed a large part of the office work.

A donation of fossils collected in the Commotion Creek area was received from the Department of Mines, British Columbia.

W. A. Bell reported on fossil plant collections from Peace River and Cache Creek areas, British Columbia, and from Dyson Creek area, Alberta. He also studied fossil plant material from various Cretaceous formations of Western Canada.

F. H. McLearn reported on collections of invertebrate fossils from the foothills of Peace River area, British Columbia, and from the Nanaimo series, Vancouver Island. He also studied fossils from other Mesozoic formations of Western Canada.

Miss A. E. Wilson reported on fossil collections from Peace River area, British Columbia, and Dyson Creek area, Alberta. She reported on bore-hole cores from Alberta submitted by Standard Oil Company of British Columbia, and supervised changes made in the exhibitions of the Vertebrate Hall of the National Museum.

A. Larocque prepared fossil collections for study and catalogued other collections. He began an investigation of bore-hole cores from Manitoba to assist in compiling data bearing on the oil possibilities of that province.

Mineralogical Section

The Section devoted much time to the examination of specimens received in response to the demand for strategic minerals. The volume of work was especially large in connection with determinations for vanadium, tungsten, and chromium. In addition to the many chemical and optical tests, over 1,400 spectrographic exposures were made and over 20 complete or partial quantitative chemical analyses were run. The work directed attention to several deposits carrying appreciable amounts of vanadium and included a special investigation on chromium for the Department of Munitions and Supply.

Approximately 8,000 specimens from all parts of Canada were submitted for examination and 1,000 written reports were issued, a 20 per cent increase over the previous year. Many requests were also submitted personally for examination of specimens and for advice.

A total of 1,033 collections of minerals and rocks, comprising 27,940 specimens, were distributed throughout Canada. More than two-thirds of these went to prospectors or individuals interested in mining. The rest were for purely educational use. In addition to standard collections, a set of 19 minerals essential in the manufacture of munitions and armaments was made available to prospectors in order to stimulate search for strategic minerals. There were 332 requests for these minerals and 3,808 specimens were distributed.

New material added to the mineral collections of the Geological Survey includes: specimens of radium and silver-bearing ores from Great Bear Lake, presented by the Minister of Mines and Resources; uraninite from lot 10, con. 3, Mattawan tp., Sudbury district, Ontario, presented by M. A. Thomson, President, Inspiration Mining and Development Company, Limited, Montreal; shattuckite from Ajo, Arizona, Phelps-Dodge open pit mine, presented by C. A. Claflin, Boston.

Water Supply and Borings Section

Providing information on underground water supplies, particularly in areas where war projects were being conducted, continued to be an important part of the work. Acknowledgments are made to F. H. Edmunds, University of Saskatchewan, for records of 219 water wells drilled in Saskatchewan and for geological logs of 1,115 shot drill holes, and to the Civil Aviation Division, Department of Transport, for numerous drillers' logs.

A total of 74,805 samples of rock cuttings was received from 370 wells drilled for oil and gas, a substantial increase over previous years. The total comprises: 136 samples from the Commotion Creek well, Peace River Block, British Columbia; 519 samples from 4 wells drilled by Imperial Oil Company at Fort Norman; 41,032 samples and a number of well logs from 121 wells drilled in Alberta; 1,550 samples from 4 wells drilled in Saskatchewan; 28,402 samples from 201 wells drilled in Ontario; and samples from 38 old Gaspe wells, Quebec. Among the Gaspe samples were rock cuttings from the 5,995-foot Haldimand well, a log of which was made in co-operation with the Quebec Department of Mines. A diamond drill core 1,020 feet long was obtained from Manitoba.

Progress was made in building up the well-boring files. Acknowledgment is made for gifts of maps, well records, and well cuttings from Imperial Oil and Union Gas Companies.

There was a marked increase in the number of inquiries for maps, logs, and other geological information, and for personal interviews by representatives of national organizations and foreign oil companies contemplating exploratory surveys in Canada.

British Columbia Office

A total of 2,140 visitors registered at the office and many inquiries were handled by mail and telephone. A total of 1,776 reports and 1,026 separate maps was issued in response to requests from the public. Determinations were made of a number of rock and mineral specimens.

TOPOGRAPHICAL SURVEY

The Topographical Survey carries out original surveys for ground and air mapping and prepares maps therefrom; and compiles and prepares base maps for use in the development of the mineral and other natural resources.

In response to the request of the Oil Controller for investigation of the oil possibilities of a portion of the Peace River district, aerial photography and ground control surveys were conducted, the former under contract with Canadian Pacific Air Lines, Limited.

Field Work

Officer in Charge	Sheet Name	Sheet Number	Latitude and Longitude	Scale of Publication
J. W. Spence	Commotion Creek	93 P/12, W. ½	55° 30′– 55° 45′ 121° 45′–122° 00′	1 in. to 1 mi.
M. E. Nidd	Mount Hulcross	93 0/9, E. ½	55° 30′– 55° 45′ 122° 00′–122° 15′	1 in. to 1 mi.
J. V. Butterworth	Bullhead Mountain	93 0/6, E. ½	55° 45′– 56° 00′ 122° 00′–122° 15′	1 in. to 1 mi.
W. B. Dingle	Chinaman Lake	94 B/1, E. ½	56° 00′– 56° 15′ 122° 00′–122° 15′	1 in. to 1 mi.
R. J. Parlee	Dunlevy Creek	94 B/1, W. ½	56° 00′– 56° 15′ 122° 15′–122° 30′	1 in. to 1 mi.
J. A. Macdonald	Blairmore	82 G/9, W. ½	49° 30′– 49° 45′ 114° 15′–114° 30′	1 in. to 1 mi.
	Gap	82 G/16, W. ½	49° 45′– 50° 00′ 114° 15′–114° 30′	1 in. to 1 mi.
	Livingstone River	82 J/1, W. ½	50° 00′– 50° 15′ 114° 15′–114° 30′	1 in. to 1 mi.
A. C. Tuttle	Mount Head	82 J/7, E. ½	50° 15′– 50° 30′ 114° 30′–114° 45′	1 in. to 1 mi.
A. M. Floyd	Malagash	11 E/14, W. ½	45° 45′– 46° 00′ 63° 15′– 63° 30′	1 in. to 1 mi.
	Wentworth Oxford	11 E/12	45° 30′– 45° 45′ 63° 30′– 64° 00′	1 in. to 1 mi.
	Pugwash Shinemicas	11 E/13	45° 45′– 46° 00′ 63° 30′– 64° 00′	1 in. to 1 mi.
	Tatamagouche	11 E/11, W. ½	45° 30′– 45° 45′ 63° 15′– 63° 30′	1 in. to 1 mi.
S. Hunt	Chignecto Port Greville	21 H/7	45° 15′– 45° 30′ 64° 30′– 65° 00′	1 in to 1 mi.
	Parrsboro Five Islands	21 H/8	45° 15′– 45° 30′ 64° 00′– 64° 30′	1 in. to 1 mi.

FIELD WORK—*Concluded*

Officer in Charge	Sheet Name	Sheet Number	Latitude and Longitude	Scale of Publication
W. H. Miller.... R. Bartlett..... R. C. McDonald. A. O. Gammon... R. F. Dore.....	Control for an area of about 3,900 square miles in British Columbia southeast from Pine River to the British Columbia-Alberta boundary.			1 in. to 2 mi.
H. N. Spence.....	Triangulation control in Peace River district of British Columbia.			
J. Carrol..... E. S. Fry..... C. M. Duncan... R. W. Clark.....	Astronomic observations for latitude and longitude at the request of the R.C.A.F.			

The field work in Nova Scotia was carried out in co-operation with the province, which shared the cost.

OFFICE WORK

Twenty-five manuscripts were plotted from ground or air surveys and cleared to the Map Compilation Section. Three of these maps were of areas in British Columbia, five of areas in Alberta, thirteen of areas in Quebec, and four of areas in Nova Scotia.

Thirteen map projects were actively in hand at the end of the year. An additional thirteen projects were temporarily laid aside for more urgent work and planimetric work was completed over twelve other map projects awaiting contouring in the field.

A special map of the Monkman Road area, British Columbia, on a scale of 1 inch to 1 mile, was prepared for the Oil Controller.

The necessary computation and plotting was carried out in connection with work undertaken for the Royal Canadian Air Force.

The Map Compilation Section forwarded twenty-four topographical and geological base maps to the Draughting and Reproducing Division, as follows: Northwest Territories, five; British Columbia, one; Alberta, three; Saskatchewan, one; Ontario, five; Quebec, seven; Nova Scotia, two.

Seventeen preliminary geological maps and eight preliminary topographical maps were forwarded for blue-printing.

At the end of the year, forty map manuscripts were in the Map Compilation Section. Of these, eight geological base maps were ready for transmission when the geological manuscripts are received. Three preliminary geological maps were also in hand.

Base maps for the field and office use of the Geological Survey and a number of index maps and special drawings were prepared. Seventy-eight map projections were made.

PHYSICAL GEOGRAPHY

The manuscript of the Glacial Map of North America was completed.

Verbal and written information was supplied in answer to many inquiries regarding the physical geography of Canada.

A special relief map of Canada, Alaska, and the adjacent Asiatic Coast was prepared for the Department of National Defence.

DEVELOPMENT DIVISION

The Development Division carries on the general executive and administrative work of the Bureau, administers the general services required by the Bureau and the National Museum, and maintains the National Air Photographic Library.

National Air Photographic Library

This library has on file for reference approximately 837,600 prints of aerial negatives, covering an area of about 870,000 square miles. During the past year, 9,032 new photographs were added to the Library collection, 1,152 of which were supplied by the United States Government and cover areas in New Brunswick, Quebec, Yukon, and the Northwest Territories; 4,732 were obtained from Canadian Pacific Air Lines, and cover areas in Quebec and British Columbia; and the remainder were obtained by the Royal Canadian Air Force and cover areas in British Columbia, Nova Scotia, Labrador, and Newfoundland.

Aerial photographs are especially useful in the study and development of Canada's natural resources. The National Air Photographic Library is organized to give all needed assistance in the use of aerial photographs either to applicants personally or by correspondence. Index maps of areas photographed and other related information are prepared and supplied to applicants on request. Facilities for stereoscopic study of the photographs are provided and expert assistance in their interpretation is given. During the year, 42,600 prints of aerial negatives were purchased through the Library by the public.

Many representatives of Federal and Provincial Government services and of commercial organizations visited the Library and were assisted in the selection and interpretation of aerial photographs, covering areas in which they were interested. This assistance included the stereoscopic examination of vertical aerial photographs covering several outlying wooded areas in Ontario, to assist in the locating of suitable logging roads to move the timber to mills or railway; the examination and selection of large numbers of aerial photographs covering areas in the Northwest Territories for the United States Army Engineers; the examining and supplying of vertical aerial photographs to the Aluminum Company of Canada covering the area under development in the vicinity of the Shipshaw Power Plant on Saguenay River; and the selection of photographs of a great many minor projects, most of which were closely related to the war effort.

Photographic Section

The greater part of the work is related closely to the field surveys carried on by the Bureau. Included are the development and printing of exposures made to illustrate geological and topographical types and conditions, the development and printing of special plates for photo-topographical surveying, and the preparation, development, and printing of wet plates for the reproduction of geological and topographical maps. Considerable time was devoted

to the photography of fossils, minerals, and other scientific specimens of the Bureau and the National Museum. The following work was completed:

Contact prints—1½ x 2½ to 36 x 48	10,518
Bromide enlargements—3 x 4 to 32 x 40	3,638
Exposures developed—1⅛ x 1⅛ to 5 x 7	8,334
Dry plate negatives—3 x 4 to 20 x 24	832
Wet plate negatives—8 x 10 to 24 x 30	85
Lantern slides—3¼ x 4	303
Photographs and maps (dry mounted)	2,142

Library

Stringent economy continued in the purchase of new books throughout the year, the number (with one exception) being the lowest in many years. This was offset, however, by an increased accession of pertinent material that could be had free or by exchange, so that the total number of accessions to the Library showed an increase of 1,138 over the preceding year, and includes:

Books acquired by purchase	95
Books (complete unbound volumes by purchase)	126
Books (by transfer and gift)	743
Pamphlets and reprints (by gift)	363
Canadian Government documents—individual issues (by exchange and gift)	1,293
British and Foreign Government documents—individual issues (by exchange and gift)	1,356
Canadian periodicals, individual issues	360
British and foreign periodicals, individual issues	1,353
Scientific societies' bulletins, proceedings, and transactions—individual issues (by exchange and gift)	2,423
Total	8,112

Following are other statistical data:

Maps and charts added to the Library	353
Maps and charts borrowed from the Library	282
Recorded loans of books, pamphlets, periodicals	8,341
Inter-library loans	480
Books borrowed from other libraries	270
Lantern slides loaned to educational institutions and to members of staff	918
Volumes bound	219
Cards added to general catalogue	7,519
Cards added to map catalogue	467
Cards added to slide catalogue	306

The cataloguing of all foreign maps in the Library was completed and the maps were lettered and filed.

Gaps in many North American exchange sets were filled. Important gifts to the Library included: sixteen volumes of German scientific works from the Censorship Division; most of the Proceedings of the 8th American Scientific Congress; current bibliographies from the Library of Congress; four valuable anthropological books from the University of Chicago; eight monographs from the Geological Society of America; ten from the Carnegie Institution of Washington; and many other important scientific works from various organizations and individuals.

Mechanical Section

The blue-print and photostat facilities of the Bureau were engaged about 50 per cent of the time in work for the Department of National Defence, the

Department of Munitions and Supply, and for other war departments. Of a total of 328,184 square feet of blue-prints, 25,255 square feet of Océ prints, and 12,290 sheets of photostat, 172,803 square feet of blue-prints, 7,280 square feet of Océ prints, and 6,090 sheets of photostat were for war departments. Other services included the preparation of 595 thin sections and 127 polished sections of rocks and minerals, and the construction and repair of exhibition and storage cases for scientific specimens and collections.

Equipment and Supplies Section

Field equipment and supplies, to the value of approximately $110,000, are stored, checked, repaired, and distributed in this section. Equipment and supplies were assembled and assigned to forty-two geological and topographical field parties and four parties engaged in work for the R.C.A.F., and other departments operating throughout Canada.

Geological Information and Distribution

A total of 76,910 publications of the Bureau of Geology and Topography, and of the National Museum, exclusive of French editions, was distributed. Of these, 7,978 were sent to addresses on the regular mailing lists and 68,932 were distributed in compliance with written and personal requests for named publications or requests for general or specific information. The French publications, which are distributed by the Editorial Division, numbered 972.

DRAUGHTING AND REPRODUCING DIVISION

Maps Published April 1, 1941, to March 31, 1942

Publication Number	Title	Remarks
	Northwest Territories	
590A	Leith, District of Mackenzie; scale, 1 inch to 4 miles	Topography. For separate distribution.
591A	Gordon Lake South, District of Mackenzie; scale, 1 inch to 1 mile	Topography. For separate distribution.
607A	Fort Smith, District of Mackenzie; scale, 1 inch to 4 miles	Geology. For separate distribution.
618A	Gordon Lake, District of Mackenzie; scale, 1 inch to 1 mile	Topography. For separate distribution.
644A	Gordon Lake, District of Mackenzie; scale, 1 inch to 1 mile	Geology. For separate distribution.
645A	Gordon Lake South, District of Mackenzie; scale, 1 inch to 1 mile	Geology. For separate distribution.
664A	Fort Resolution, District of Mackenzie; scale, 1 inch to 4 miles	Topography. For separate distribution.

Maps Published April 1, 1941, to March 31, 1942—Continued

Publication Number	Title	Remarks
	YUKON	
649A	Mayo; scale, 1 inch to 4 miles	Topography. For separate distribution.
	BRITISH COLUMBIA	
622A	McConnell Creek, Cassiar District; scale, 1 inch to 4 miles	Topography. For separate distribution.
627A	Okanagan Falls, Similkameen and Osoyoos Districts; scale, 1 inch to 1 mile	Geology. For separate distribution.
628A	Olalla, Similkameen, Osoyoos, and Kamloops Districts; scale, 1 inch to 1 mile	Geology. For separate distribution.
630A	Fort Fraser (East Half), Coast District; scale, 1 inch to 4 miles	Geology. For separate distribution.
631A	Fort Fraser (West Half), Coast District; scale, 1 inch to 4 miles	Geology. For separate distribution.
657A	Tatlatui, Cassiar District; scale, 1 inch to 4 miles	Topography. For separate distribution.
	ALBERTA	
652A	Wildcat Hills (East Half); scale, 1 inch to 1 mile	Geology. For separate distribution.
667A	Fish Creek; scale, 1 inch to 1 mile	Geology. For separate distribution.
669A	Moose Mountain; scale, 1 inch to 1 mile	Topography. For separate distribution.
	SASKATCHEWAN	
576A	Weitzel Lake; scale, 1 inch to 4 miles	Geology. For separate distribution.
577A	Brustad River; scale, 1 inch to 4 miles	Geology. For separate distribution.
578A	Upper Clearwater River; scale, 1 inch to 4 miles	Geology. For separate distribution.
579A	Haultain River; scale, 1 inch to 4 miles	Geology. For separate distribution.
580A	Porter Lake; scale, 1 inch to 4 miles	Geology. For separate distribution.
592A	MacKay Lake; scale, 1 inch to 1 mile	Geology. For separate distribution.
595A	Reindeer Lake; scale, 1 inch to 4 miles	Geology. For separate distribution.
596A	Spalding Lake; scale, 1 inch to 4 miles	Geology. For separate distribution.
599A	Crackingstone; scale, 1 inch to 1 mile	Topography. For separate distribution.
629A	Forget Lake; scale, 1 inch to 1 mile	Topography. For separate distribution.
638A	Etomami River; scale, 1 inch to 4 miles	Geology. For separate distribution.
639A	Mari Lake; scale, 1 inch to 1 mile	Geology. For separate distribution.
658A	Porcupine River; scale, 1 inch to 4 miles	Geology. For separate distribution.
659A	Stony Rapids; scale, 1 inch to 4 miles	Geology. For separate distribution.
663A	Nevins Lake; scale, 1 inch to 1 mile	Topography. For separate distribution.

Maps Published April 1, 1941, to March 31, 1942—Continued

Publication Number	Title	Remarks
	SASKATCHEWAN AND MANITOBA	
632A	Flin Flon; scale, 1 inch to 1 mile	Geology. For separate distribution.
633A	Schist Lake; scale, 1 inch to 1 mile	Geology. For separate distribution.
637A	Mafeking; scale, 1 inch to 4 miles	Geology. For separate distribution.
	MANITOBA	
665A	Wekusko; scale, 1 inch to 1 mile	Geology. For separate distribution.
666A	Athapapuskow Lake; scale, 1 inch to 1 mile	Topography. For separate distribution.
	ONTARIO	
619A	Port Dover; scale, 1 inch to 4 miles	Geology. For Memoir 226, by J. F. Caley, and separate distribution.
624A	Waterloo; scale, 1 inch to 4 miles	Geology. For Memoir 226, by J. F. Caley, and separate distribution.
650A	North Caribou Lake, Kenora District, Patricia Portion; scale, 1 inch to 4 miles	Topography. For separate distribution.
651A	Windigo Lake, Kenora District, Patricia Portion; scale, 1 inch to 4 miles	Topography. For separate distribution.
	ONTARIO AND QUEBEC	
660A	Valleyfield; scale, 1 inch to 2 miles	Geology. For separate distribution.
661A	Maxville; scale, 1 inch to 2 miles	Geology. For separate distribution.
662A	L'Orignal; scale, 1 inch to 2 miles	Geology. For separate distribution.
	QUEBEC	
401A	Opémisca (Second Edition), East Half, Abitibi Territory; scale, 1 inch to 1 mile	Geology. For memoir, also French edition, and separate distribution.
593A	Waconichi, Abitibi and Mistassini Territories; scale, 1 inch to 1 mile	Geology. For separate distribution.
602A	Opémisca (West Half), Abitibi Territory; scale, 1 inch to 1 mile	Geology. For memoir, also French edition, and separate distribution.
608A	Mechamego Lake, Abitibi Territory; scale, 1 inch to 1 mile	Geology. For separate distribution.
623A	Michwacho Lake, Abitibi Territory; scale, 1 inch to 1 mile	Geology. For separate distribution.
625A	Lake Routhier, Rouyn Township, Témiscamingue County; scale, 1 inch to 1,500 feet	Geology. For Memoir 233, by J. W. Ambrose, also French edition, and separate distribution.

Maps Published April 1, 1941, to March 31, 1942—Concluded

Publication Number	Title	Remarks
	QUEBEC—*Concluded*	
626A	Lac Dufault, Dufresnoy Township, Abitibi County; scale, 1 inch to 1,500 feet	Geology. For Memoir 233, by J. W. Ambrose, also French edition, and separate distribution.
634A	La Pause, Abitibi and Témiscamingue Counties; scale, 1 inch to 1 mile	Geology. For Memoir 233, by J. W. Ambrose, also French edition, and separate distribution.
635A	Clériсy, Abitibi and Témiscamingue Counties; scale, 1 inch to 1 mile	Geology. For Memoir 233, by J. W. Ambrose, also French edition, and separate distribution.
655A	Brock River, Abitibi and Mistassini Territories; scale, 1 inch to 4 miles	Topography. For separate distribution.
656A	Assinica Lake, Abitibi and Mistassini Territories; scale, 1 inch to 4 miles	Topography. For separate distribution.
	QUEBEC AND NEW BRUNSWICK	
620A	Matapédia, Restigouche and Bonaventure Counties; scale, 1 inch to 1 mile	Geology. For separate distribution.
	NEW BRUNSWICK	
604A	Salisbury, Westmorland and Albert Counties; scale, 1 inch to 1 mile	Geology. For separate distribution.
605A	Alward Brook, Westmorland, Queens, and Kings Counties; scale, 1 inch to 1 mile	Geology. For separate distribution.
621A	Campbellton, Restigouche County; scale, 1 inch to 1 mile	Geology. For separate distribution.
640A	Tetagouche River, Gloucester and Restigouche Counties; scale, 1 inch to 2 miles	Geology. For Memcir 227, by F. J. Alcock, and separate distribution.
641A	Jacquet River, Restigouche, Gloucester, and Northumberland Counties; scale, 1 inch to 2 miles	Geology. For Memoir 227, by F. J. Alcock, and separate distribution.
642A	Petitcodiac (East Half), Kings, Westmorland, and Albert Counties; scale, 1 inch to 1 mile	Geology. For separate distribution.
643A	Petitcodiac (West Half), Kings and Westmorland Counties; scale, 1 inch to 1 mile	Geology. For separate distribution.
646A	Moncton, Westmorland and Albert Counties; scale, 1 inch to 1 mile	Geology. For separate distribution.
647A	Hillsborough, Albert and Westmorland Counties; scale, 1 inch to 1 mile	Geology. For separate distribution.
648A	Albert, Albert County; scale, 1 inch to 1 mile	Geology. For separate distribution.

Maps Published April 1, 1942, to March 31, 1943

Publication Number	Title	Remarks
	NORTHWEST TERRITORIES	
675A	Indin Lake, District of Mackenzie; scale, 1 inch to 4 miles	Topography. For separate distribution.
676A	Hardisty Lake, District of Mackenzie; scale, 1 inch to 4 miles	Topography. For separate distribution.
690A	Snare River, District of Mackenzie; scale, 1 inch to 4 miles	Geology. For Memoir 235, by C. S. Lord, and separate distribution.
697A	Ingray Lake, District of Mackenzie; scale, 1 inch to 4 miles	Geology. For Memoir 235, by C. S. Lord, and separate distribution.
699A	Walmsley Lake, District of Mackenzie; scale, 1 inch to 4 miles	Topography. For separate distribution.
709A	Yellowknife Bay, District of Mackenzie; scale, 1 inch to 1 mile	Geology. For separate distribution.
727A	MacKay Lake, District of Mackenzie; scale, 1 inch to 4 miles	Topography. For separate distribution.
729A	Lac de Gras, District of Mackenzie; scale, 1 inch to 4 miles	Topography. For separate distribution.
730A	Carp Lakes, District of Mackenzie; scale, 1 inch to 4 miles	Topography. For separate distribution.
	YUKON	
711A	Ogilvie; scale, 1 inch to 4 miles	Geology. For separate distribution.
	BRITISH COLUMBIA	
671A	Houston, Coast District; scale, 1 inch to 4 miles	Geology. For separate distribution.
	ALBERTA	
653A	Jumpingpound; scale, 1 inch to 1 mile	Geology. For separate distribution.
654A	Bragg Creek; scale, 1 inch to 1 mile	Geology. For separate distribution.
670A	Bearberry; scale, 1 inch to 1 mile	Geology. For separate distribution.
672A	George Creek; scale, 1 inch to 1 mile	Topography. For separate distribution.
673A	Kitscoty; scale, 1 inch to 4 miles	Geology. For Memoir 232, by G. S. Hume and C. O. Hage, and separate distribution.
674A	Innisfree; scale, 1 inch to 4 miles	Geology. For Memoir 232, by G. S. Hume and C. O. Hage, and separate distribution.
677A	Wawa; scale, 1 inch to 1 mile	Topography. For separate distribution.
688A	Moose Mountain; scale, 1 inch to 1 mile	Geology. For Memoir 236, by H. H. Beach, and separate distribution.
695A	Brooks; scale, 1 inch to 4 miles	Geology. For separate distribution.

Maps Published April 1, 1942, to March 31, 1943—Continued

Publication Number	Title	Remarks
	ALBERTA—*Concluded*	
696A	Redcliff; scale, 1 inch to 4 miles	Geology. For separate distribution.
698A	Pekisko Creek; scale, 1 inch to 1 mile	Geology. For separate distribution.
714A	Beaver Mines, West of Fifth Meridian; scale, 1 inch to 1 mile	Topography. For separate distribution.
715A	Saunders, West of Fifth Meridian; scale, 1 inch to 1 mile	Topography. For separate distribution.
716A	Fall Creek, West of Fifth Meridian; scale, 1 inch to 1 mile	Topography. For separate distribution.
717A	Marble Mountain, West of Fifth Meridian; scale, 1 inch to 1 mile	Topography. For separate distribution.
718A	Tay River, West of Fifth Meridian; scale, 1 inch to 1 mile	Topography. For separate distribution.
719A	Alexo, West of Fifth Meridian; scale, 1 inch to 1 mile	Topography. For separate distribution.
720A	Langford Creek, West of Fifth Meridian; scale, 1 inch to 1 mile	Topography. For separate distribution.
721A	Limestone Mountain, West of Fifth Meridian; scale, 1 inch to 1 mile	Topography. For separate distribution.
722A	Callum Creek, West of Fifth Meridian; scale, 1 inch to 1 mile	Topography. For separate distribution.
724A	Dyson Creek, West of Fifth Meridian; scale, 1 inch to 1 mile	Topography. For separate distribution.
725A	Cowley, West of Fifth Meridian; scale, 1 inch to 1 mile	Topography. For separate distribution.
726A	Cripple Creek, West of Fifth Meridian; scale, 1 inch to 1 mile	Topography. For separate distribution.
	MANITOBA	
723A	Mikanagan Lake, West of Principal Meridian; scale, 1 inch to 1 mile	Topography. For separate distribution.
	MANITOBA AND SASKATCHEWAN	
713A	Assiniboine; scale, 1 inch to 8 miles	Geology. For separate distribution.
	ONTARIO	
687A	Fort Hope, Kenora (Patricia Portion) and Thunder Bay Districts; scale, 1 inch to 4 miles	Topography. For separate distribution.
691A	Huron; scale, 1 inch to 4 miles	Geology. For Memoir 237, by J. F. Caley, and separate distribution.
692A	Elgin; scale, 1 inch to 4 miles	Geology. For Memoir 237, by J. F. Caley, and separate distribution.

Maps Published April 1, 1942, to March 31, 1943—Continued

Publication Number	Title	Remarks
	ONTARIO—*Concluded*	
693A	Middlesex County and parts of adjacent Counties (Northern Part); scale, 1 inch to 2 miles....	Geology. For Memoir 237, by J. F. Caley, and separate distribution.
694A	Middlesex County and parts of adjacent Counties (Southern Part); scale, 1 inch to 2 miles.....	Geology. For Memoir 237, by J. F. Caley, and separate distribution.
710A	Prescott; scale, 1 inch to 2 miles.....	Geology. For separate distribution.
728A	Martin Falls, Kenora (Patricia Portion), Thunder Bay, and Cochrane Districts; scale, 1 inch to 4 miles.....	Topography. For separate distribution.
	ONTARIO AND QUEBEC	
684A	Stonecliffe, Nipissing District, Renfrew, Témiscamingue, and Pontiac Counties; scale, 1 inch to 1 mile.....	Topography. For separate distribution.
686A	Chalk River, Pontiac and Renfrew Counties; scale, 1 inch to 1 mile.....	Topography. For separate distribution.
701A	Point Alexander, Nipissing District, Renfrew and Pontiac Counties; scale, 1 inch to 1 mile....	Topography. For separate distribution.
	QUEBEC	
678A	Lac Charette, Abitibi County; scale, 1 inch to 2 miles.....	Topography. For separate distribution.
679A	Cuvillier, Abitibi County, scale, 1 inch to 2 miles..	Topography. For separate distribution.
680A	St. Michel, Maskinongé, Berthier, St. Maurice, and Joliette Counties; scale, 1 inch to 2 miles.....	Topography. For separate distribution.
681A	Lac au Sorcier, Laviolette, St. Maurice, and Maskinongé Counties; scale, 1 inch to 2 miles.	Topography. For separate distribution.
682A	Schyan Lake, Pontiac County; scale, 1 inch to 1 mile.....	Topography. For separate distribution.
683A	McGillivray Lake, Pontiac County; scale, 1 inch to 1 mile.....	Topography. For separate distribution.
685A	Clear Lake, St. Maurice and Maskinongé Counties; scale, 1 inch to 1 mile.....	Topography. For separate distribution.
689A	Mishagomish Lake, Abitibi and Mistassini Territories; scale, 1 inch to 4 miles.....	Geology. For separate distribution.
700A	Cullin Lake, Témiscamingue and Pontiac Counties; scale, 1 inch to 1 mile.....	Topography. For separate distribution.
702A	Mondonac Lake, Laviolette and St. Maurice Counties; scale, 1 inch to 1 mile.....	Topography. For separate distribution.
703A	Southern Quebec, West Sheet; scale, 1 inch to 12 miles.....	Geology. For Department of Mines and Fisheries, Quebec, and separate distribution.

Maps Published April 1, 1942, to March 31, 1943—Concluded

Publication Number	Title	Remarks
	QUEBEC—*Concluded*	
704A	Southern Quebec, Centre Sheet; scale, 1 inch to 12 miles	Geology. For Department of Mines and Fisheries, Quebec, and separate distribution.
705A	Southern Quebec, East Sheet; scale, 1 inch to 12 miles	Geology. For Department of Mines and Fisheries, Quebec, and separate distribution.
706A	Lac Boucher, Laviolette County; scale, 1 inch to 1 mile	Topography. For separate distribution.
707A	Wickenden Lake, Laviolette County; scale, 1 inch to 1 mile	Topography. For separate distribution.
708A	Lac Livernois, Laviolette and St. Maurice Counties; scale, 1 inch to 1 mile	Topography. For separate distribution.
712A	Assinica Lake, Abitibi and Mistassini Territories; scale, 1 inch to 4 miles	Geology. For separate distribution.

At the end of the year, maps of six areas in the Northwest Territories, one in Yukon, one in British Columbia, two in Alberta, thirty-two in Quebec, and four in Nova Scotia were in varying stages of progress.

Progress was made in the geographical and preliminary geological compilation of the Dominion on a scale of 1 inch to 10 miles. Thirty-six map and other figure drawings were prepared for reproduction by zinc-cut process for illustrating reports, papers, and memoirs; other draughting and related work necessary for staff, war departments, and public use amounted to seventy-one items.

GEOGRAPHIC BOARD OF CANADA

The Geographic Board consists of fifteen members, seven of whom are officers of the Federal Government and represent two departments, namely, Mines and Resources and National Defence. The remaining eight are Provincial members and represent British Columbia, Alberta, Saskatchewan, Manitoba, Ontario, New Brunswick, Prince Edward Island, and Nova Scotia. Quebec has its own Board to deal with geographic names in that Province, but is in direct contact with the Federal Board. The secretary is provided by the Bureau of Geology and Topography.

Owing to war conditions, no meetings of the Board were held, but the place-names for fifty-four maps and charts were considered and dealt with by the Executive Committee. Many inquiries were received, not only from the departments of government service, but also from without; these requests were investigated and the information was promptly supplied.

NATIONAL MUSEUM OF CANADA

No field work was carried on and the efforts of the staff were devoted chiefly to intensive studies of the more important phases of the biological and anthropological collections. Fourteen articles and papers prepared by senior members of the staff during the year were published in Canadian and other scientific periodicals.

In 1942 the National Museum, which originated with the Geological Survey in 1842, completed 100 years of public service.

Grateful acknowledgment is made to friends of the Museum who so generously contributed towards exchanges, donations, and other forms of co-operative assistance.

Certain sections of the Museum staff that were temporarily housed elsewhere were moved back to the Museum building.

ANTHROPOLOGICAL DIVISION

D. Jenness, Chief of the Division, was on loan to the Royal Canadian Air Force, where he is Deputy Director of Special Intelligence, but he maintained connection with the Division, to attend to anthropological inquiries and to be available for consultation.

C. M. Barbeau continued the preparation of an extensive, heavily illustrated museum monograph entitled "Haïda Carvings in Argillite". He helped in the preparation of an evening of folk-songs and handicrafts called "Bal chez Boule" given in Quebec and of three lectures on Canadian folk-songs given at Laval University; prepared three programs of folk-songs and dances for the Tercentenary celebration of Montreal; and organized a program of Canadian music for a meeting of the Canadian Authors Association. His other activities chiefly included: a field study of the ancient records of the Ursulines, Quebec, the Hôtel Dieu, Montreal, and of the Iberville potters of the past 100 years; photographing ancient specimens of Canadian handicrafts; delivering a series of evening lectures on North American geography to post graduate students of University of Ottawa; and assisting the National Geographical Society in a pictorial survey of the North Pacific coast. He also assisted in a government project for the advancement of folk arts in Canada; in a government-sponsored exhibition of handicrafts in New York; in the preparation of theses on Quebec wood carving and old silver; and in the arrangements for a Canadian ethno-botanical issue of The Journal of American Folk-lore. Three of his books, "Maîtres artisans de chez nous", "The Indian Speaks", and "Les Rêves des Chasseurs" were published during the year.

J. D. Leechman continued his study of Arctic archæology, particularly of the Cape Dorset Eskimo culture. He made detailed studies of certain elements in that culture, such as adze heads, curved knives, boot creasers, and harpoon foreshafts. He compiled an annotated and indexed list of plants used by the Canadian Indians as sources of food; presented before the Royal Society of Canada a paper entitled "Canadian Indian Art," published an article on "A New Type of Adze Head" in the *American Anthropologist;* and prepared a second article, "Some Wooden Tubes from Oregon", for publication in the *Journal of American Antiquity.*

BIOLOGICAL DIVISION

R. M. Anderson, Chief of the Division, continued research work on the scientific status, distribution of species, ecological relations, and economic values of the mammal life of Canada. One hundred and thirty-six specimens were added to the mammal collections as compared with forty-eight during the

preceding year. The catalogued collection of mammals totalled 17,282 specimens on March 31, 1943. In cataloguing zoological specimens in the National Museum all parts of any individual specimen are listed, labelled, and numbered under the same catalogue number.

Much progress was made in the revision of Canadian species and subspecies in the collection. Some nomenclatural changes were made to bring the collections in line with such recent studies on mammals of North America and the world as appear to be sound as far as they apply to Canadian forms. Five new subspecies were described and three apparently valid forms were revived and added to the Canadian list, and some other forms that were apparently described on insufficient evidence were dropped. Descriptions of several new races were written and approved, but were not published. The present range or geographical distribution of a large number of Canadian forms was rewritten on the basis of recent studies, and the location of most of the type specimens of Canadian mammal forms, most of which are in museums in other countries, was listed for inclusion in a Canadian Check-List.

A considerable number of mammal specimens were determined, references verified, and additional data supplied for preliminary reports on the faunas of several of the National Parks in Alberta, Saskatchewan, and Manitoba.

The difficulty of obtaining needed specimens from Canadian localities that are not adequately represented in the National Museum of Canada was met to some extent by co-operation between public museums in Canada and the United States. Series of specimens that were needed for study were obtained on loan from the Royal Ontario Museum of Zoology, Toronto; the British Columbia Museum of Natural History, Victoria; the Carnegie Museum, Pittsburgh; the Museum of Natural History, University of Iowa, Iowa City; the American Museum of Natural History, New York; and from J. Dewey Soper, Winnipeg; Stuart Criddle, Treesbank, Manitoba; Allan Cyril Brooks, Okanagan Landing, B.C.

Loans were made to J. R. Dymond, Royal Ontario Museum of Zoology (Arctic fishes); to I. M. Cowan, Department of Zoology, University of British Columbia, Vancouver (Pacific coast mammals); and to W. B. Davis, Department of Fish and Game, Agricultural and Mechanical College of Texas (lemmings of the genus *Lemmus*).

Claude E. Johnson was engaged largely in detail work for the Division of Vertebrate Palæontology and in preparing a panoramic background for a fossil tree exhibit in the Museum Hall.

Clyde L. Patch determined and catalogued such amphibians and reptiles as were sent in and wrote a number of letters in reply to inquiries on these animals. With the assistance of Miss W. K. Bentley he draughted and painted a 10-foot by 5-foot wall map of Canada showing natural fauna areas and designed to show selected specimens of mammals, birds, plants, etc. These are pinned to the map and are changed from time to time for the benefit of the public. The first exhibit consisted of forty-three small mammals of Canada.

D. J. Blakely and J. E. Perron were engaged in the systematic preparation of bird and mammal skins and skulls for exhibition and study purposes.

NATIONAL HERBARIUM

A. E. Porsild, Botanist, was on duty in the National Herbarium from the beginning of the fiscal year until July 5, 1942. He spent considerable time finishing a paper entitled "Contributions to a Flora of the Mackenzie District", in which he described eighteen new species and several new varieties and recorded many species that had not been known to occur in the region.

This work is particularly important in connection with recent developments in the North Pacific Planning Project. The manuscript was submitted for publication before he left to take up special duties under the Department of External Affairs as Canadian Consul at Godthaab, Greenland. His duties in Greenland allowed him a limited amount of time to make botanical collections and to obtain a number of mammals and birds and some specimens of ethnological interest. Before leaving Ottawa he determined 221 plants for the British Columbia Provincial Museum, Victoria. Permission was granted the United States War Department to reprint, in whole or in part, his booklet "Edible Plants and Berries of Northern Canada". On April 10 he read a paper on "Reindeer and Caribou Grazing" at the Seventh North American Wildlife Conference at Toronto, and on the same date he spoke at the University of Toronto on "Greenland".

Miss H. T. Harkness, Herbarium Assistant, mounted 2,409 herbarium sheets, thus increasing the number of listed specimens in the National Herbarium to 164,690. She rearranged the European herbarium making more room for the collection and indexed over fifty types and isotypes in the National Herbarium.

A total of 2,351 plants were received by exchange and 235 were received by donation, the number of plants sent by exchange being 235 and the number loaned being 901. The Herbarium was used extensively by students of botany, several of whom remained as long as a week in collecting information for botanical studies.

ORNITHOLOGICAL DIVISION

Though operating under wartime restrictions on space, personnel, and funds, the staff of the Division carried on routine research and some educational work.

P. A. Taverner retired in June after more than 30 years of service in the National Museum. During this period he carried out extensive investigations in the field and studies in the office on the birds of Canada and was instrumental in building up the ornithological collections of the National Museum to their present high standard of quality and completeness. Prior to his retirement, Mr. Taverner continued the preparation of his Manual of the Water and Game Birds of Canada. Apart from this the main research activities of the Section were a study of the recent bird collections from British Columbia; work in bringing the Macouns' Catalogue of Canadian Birds of 1909 up to date; work on a Naturalists' Guide to Canada and on a general treatise on bird behaviour; taxonomic reviews of various groups of Canadian birds, and an inquiry as to the status of the Hungarian partridge in the Ottawa-Montreal area. Various short papers incidental to these studies were prepared, including two papers on birds of the Mackenzie district by A. E. Porsild.

A. L. Rand prepared reports for the United States Government on aspects of Madagascar and New Guinea affecting current military activities. He also prepared a survey of bird life in parts of Polynesia for incorporation in a booklet for the United States Army, to be edited by the International Committee of Wild Life.

Four cases of birds were made available for the study groups of the local schools; lectures and study groups were conducted and manuscripts were prepared for pamphlets intended for general circulation, on "Some Familiar Canadian Birds", and on "Canadian Bird Life". These pamphlets are designed to meet the many requests received for information about birds. Ten press releases were prepared.

The following accessions, by exchange and donations, are gratefully acknowledged:

P. Brown, Game Warden in charge Vanderhoof district, B.C.: 1 skull of British Columbia timber wolf (*Canis lupus columbianus*); 4 skulls of beaver (*Castor canadensis*).

Frith's Greenhouse, Ottawa: 1 star-nosed mole, in the flesh.

George Magrum, Resolution, Mackenzie district, N.W.T.: 1 skull Hudson Bay tundra wolf (*Canis lupus hudsonicus*); 1 skull wolverine (*Gulo luscus*); 1 skull Arctic fox (*Alopex lagopus innuitus*); 1 skull cross fox (*Vulpes fulva*); 1 skull Keewatin mink (*Mustela vison lacustris*); 1 skull Richardson weasel (*Mustela cicognani richardsoni*), all from Back River; 2 skulls beaver (*Castor canadensis*); 1 skull mink, from Little Buffalo River, N.W.T.

Ronald W. Smith, R.C.A.F.: 1 skin with skull, topotype of maritime saddle-backed shrew (*Sorex arcticus maritimensis*), R. W. Smith, collected at Wolfville, Kings county, Nova Scotia, December 30, 1939.

Mrs. J. G. Cameron, Ottawa, Ontario: 1 big brown bat (*Eptesicus fuscus*), in the flesh.

Mrs. Hoyes Lloyd, Rockcliffe Park, Ottawa: 1 cottontail rabbit (*Sylvilagus floridanus mearnsi*), juvenile, in the flesh; 1 white-footed mouse (*Peromyscus* sp.) alive.

Northwest Territories Administration, Lands, Parks and Forests Branch, Department of Mines and Resources, Ottawa: 1 domestic reindeer (*Rangifer* sp.), female, skin with skull; 1 reindeer steer, skull only, antlers in velvet, from Reindeer Station, Tuktak, N.W.T.; 1 International Boundary grizzly (*Ursus internationalis*), male, skin and skull, from Richards Island.

Allan Cyril Brooks, Okanagan Landing, B.C.: 3 pocket gophers (*Thomomys talpoides*), skins and skulls.

A. LaRocque, Bureau of Geology and Topography, Ottawa: 1 little brown bat (*Myotis lucifugus lucifugus*), in the flesh.

R. Roberts, Division of Anthropology, National Museum of Canada, Ottawa: 1 big brown bat (*Eptesicus fuscus*), in the flesh.

Tom. H. Manning, R.C.N.V.R., Montreal: 1 skin with skull of Baffin Island wolf (*Canis lupus manningi*), topotype, from Hantzsch River, Baffin Island, east side of Foxe Basin.

American Museum of Natural History, New York City: 6 specimens of Spiny rat (*Proechimys o'connelli*), taken at Villa Vicencio, Colombia, South America; dried specimens from pickled series.

R. T. D. Wickenden, Bureau of Geology and Topography, Ottawa: 1 skull of northern white-tailed deer (*Odocoileus virginianus*), young, taken 12 miles west of Calabogie, Ontario; 1 skull of red fox, female, about 2 miles east of Hawthorne, Ontario.

Harold B. Hitchcock, Department of Zoology and Applied Biology, University of Western Ontario, London: 1 hoary bat (*Lasiurus cinereus*), collected on Southampton Island, Hudson Bay, June 17, 1942, and presented by the Hudson's Bay Company; 1 pipistrelle bat (*Pipistrellus subflavus obscurus*), and 2 big-eared brown bats (*Myotis lucifugus septentrionalis*), found hibernating in LaFleche Cave, Gatineau county, Quebec, December 19, 1942; 5 *P. S. obscurus*, 6 *M. k. septentrionalis* and 6 eastern masked bats (*Myotis subulatus leibii*), found hibernating in cave at Fourth Chute, Bonnechere River, Renfrew county, about 70 miles west of Ottawa, January 6, 1943.

H. J. Lackey, Ottawa: 1 northern grey squirrel (*Sciurus carolinensis leucotis*), in the flesh.

Douglas Leechman, Division of Anthropology, National Museum, Ottawa: 1 big brown bat (*Eptesicus fuscus*), in the flesh.

C. H. D. Clarke, National Parks Bureau, Ottawa: 1 skull of northern white-tailed deer (*Odocoileus virginianus borealis*), from Black Donald, Renfrew county, Ontario.

National Parks Bureau, Lands, Parks and Forests Branch, Department of Mines and Resources, Ottawa: 1 skull of Saskatchewan timber wolf (*Canis lupus griseus*), male, shot at Riding Mountain National Park, Manitoba, in January, 1943.

Professor E. H. Herrick, Department of Zoology, Kansas State College, Manhattan, Kansas: 18 small mammals (opossum, woodchuck, black-tailed jackrabbit, spotted skunk, fox squirrel, Mississippi valley pocket gopher, Richardson kangaroo rat, Bailey woodrat, Wyoming ground squirrel, striped ground squirrel, Kansas pocket mouse, woodland pine mouse, white-footed mice).

R. M. Anderson and A. L. Rand: 33 mammals, Gatineau Valley, Que.; C. L. Patch: 2 mammals, Ottawa; 9 from Gatineau Valley, Que.

R.C.M.P., Perry River, on Arctic Circle, N.W.T.: 1 blue goose and 1 gosling.

R.C.M.P., Ottawa, Ontario: 1 Maryland yellow-throat, found dead.

A. E. Bourguignon, Lake Deschenes, Ottawa, Ontario: 1 red-backed sandpiper.
Mr. Lockhart, Ottawa, Ontario: 1 warbling vireo, in flesh.
R.C.M.P., Hudson Bay: 1 wood duck, 1 meadow lark.
Telesphere Marcoux, Whale Head, Saguenay county, Quebec: 1 greater shearwater.
L. de K. Lawrence, Rutherglen, Ontario: 1 fox sparrow, in flesh.
Mrs. L. de K. Lawrence, Rutherglen, Ontario: 1 fox sparrow, in flesh.
E. V. Goodwill, Notre Dame de Pierreville, Quebec: 1 gannet, in flesh.
Mrs. J. A. Frasier, Cookshire, Quebec: 1 evening grosbeak, in flesh.
E. F. Pullen, Alexo, Alberta: 1 pygmy owl, in flesh.
A. L. Gormley, Haley's Station, Renfrew county, Ontario: 1 hawk owl, in flesh.
A. L. Killaly, about 10 miles south of Stony Lake, Ontario: 1 double-crested cormorant, in flesh.
J. P. Turner, Ottawa: 1 ruffed grouse, caught by dog.
C. H. D. Clarke, Ottawa, Ontario: 1 Hudsonian chickadee; 1 Alaska chickadee; 1 Sabine's gull.
P. L. Lukis, Choisy, Quebec: 1 grey partridge, found frozen to death.
Wayne Robinson, Ottawa, Ontario: 1 sharp-shinned hawk, in flesh.
R. W. Tufts, Wolfville, N.S.: 1 loon, 1 dovekie, in flesh.
E. G. Bunel, Ottawa, Ontario: 1 snowy owl, in flesh.
Mrs. Karsh, Ottawa, Ontario: 1 grouse, in flesh.
L. J. Sylvestre, Vankleek Hill, Ontario: 2 Hungarian partridge.
John W. Slipp, Seattle, Washington, U.S.A.: 1 great horned owl.
Museum Biological Division: 1 winter wren, 2 hermit thrush, 1 long-eared owl, in the flesh, from Blue Sea Lake region, Gatineau county, Quebec.
H. M. Peachy, Ottawa: 1 garpike, caught in Britannia Bay, Ottawa River, August 24, 1942; this fish has a small white rubber band passing around back of head, with skin covering the band on throat, apparently grown over after band was put on.
M. Pierre Michaud, Temiscouata, Que.: 1 six-rayed starfish, probably *Asterias polaris*, dried specimen.

EDUCATIONAL WORK

Despite limitations, due to the closing of two-thirds of the exhibition halls, made necessary by the transfer back to the Museum of members of the staff previously housed elsewhere, educational work was continued. Enough space was provided in front of the larger habitat groups to permit students and organized groups from the armed forces to see and study them. For class study groups, one of which had a total attendance of 6,792, exhibits of small mammals were rearranged and exhibits of birds were specially prepared to meet school curricula. The Dinosaur Hall, the only hall fully open to the public, was being rearranged and it provides better facilities for study groups. Members of the scientific staff of the National Museum arranged the educational exhibits and conducted the study groups.

More than 136,200 persons visited the sections of the National Museum still open to the public, and in addition many thousands of junior and senior school pupils came in organized study groups. Other Museum activities were attended by 44,546 persons, making a total attendance of 180,746 for the year.

Information and assistance was given to persons interested in anthropology, biology, and other phases of the natural history of Canada, through the medium of correspondence, publications, and visual aids. Much time was given to the identification of specimens, the loan of material, and to the selection of photographs to illustrate scientific journals, school textbooks, and magazine and newspaper articles. Particular attention was given to the loan of motion pictures and lantern slides to Canadian educational institutions and to other museums. Three new motion pictures and two lantern slide sets were added to the Museum loan collection. Museum films and slides were seen by 129,292 persons. The figures are lower than for a number of preceding years, due principally to transportation difficulties of the past winter.

NATIONAL MUSEUM LECTURES

The National Museum each year organizes a series of lectures illustrated with lantern slides and motion pictures and programs of motion pictures. All film programs of popular science, travel, or documentary subjects, including those showing Canada's part in the present war as well as that of the Allied Nations, are shown to enthusiastic capacity audiences.

The Lecture Committee presented, in addition to the three series of regular programs, four motion picture programs designed to provide entertainment to lower paid civil servants in wartime departments and to men and women in uniform. The regular series was given on Saturday mornings to audiences of children and to adults on Wednesday evenings. The special wartime program was given on Wednesday evenings only and the excellent attendance showed the need for entertainment of this sort for these groups.

The subjects of the regular Museum lecture series were:

Leaders of To-morrow's Battles, by Colonel M. F. Gregg, V.C., M.C., Brockville, Ontario.
The 400,000,000 (China at War, motion picture).
Electricity in Modern Warfare, by G. E. Bourne, B.Sc., Canadian General Electric Company, Toronto, Ontario.
Art of Children, by Miss Mabel May, A.R.C.A., National Gallery of Canada, Ottawa.
Our Fighting Allies—United States and Russia (motion pictures).
Our Fighting Empire (motion pictures).
The Inland Road to Tokyo, by H. H. Beach, Ph.D., Geological Survey, Ottawa.
The Film at War, by Stuart Legg, National Film Board, Ottawa.
Across Africa from Dakar, by Laura Boulton, National Film Board, Ottawa.
Cuba, Pearl of the Antilles, by Mario C. J. Harrington, Staff of the Chilean Legation, Ottawa.
From Yesterday to You, by C. M. Sternberg, Geological Survey, Ottawa.
Background for To-morrow (motion picture).
One Hundred Years of the Geological Survey, 1842-1942, by F. J. Alcock, Geological Survey, Ottawa.

The lecture series was concluded with an address entitled "One Hundred Years of the Geological Survey, 1842-1942", by F. J. Alcock. A motion picture in colour "The Face of Time", on the history and work of the Geological Survey, shown at the conclusion of the lecture, was produced by the National Film Board to mark the centenary year.

The total attendance on Saturday mornings was 10,213 and at the Wednesday evening presentations, 9,705.

LECTURE HALL

The lecture hall of the National Museum has a seating capacity of 598 and is equipped with motion picture projectors for showing both 35 millimetre and 16 millimetre films, sound and silent, and with a projection lantern. During the year, in addition to its use by the National Museum, 122 reservations were made by scientific or educational organizations. A total of 24,628 persons attended these meetings.

BUREAU OF MINES

The laboratories and other facilities of the Bureau were utilized mainly in work of direct war interest. Almost all the investigations in the Physical Metallurgy Laboratories had to do with metallurgical problems affecting the production of war equipment, and a large proportion of the investigations in the Ore Dressing Laboratories were on strategic minerals.

Much time was given to acquiring and preparing information for use of the Metals Controller, the Coal Administrator, and the Oil Controller involving field investigations and surveys. In the work on industrial minerals, chief attention was given to those minerals urgently required in the production of munitions. Inspection of new factories and plants greatly increased the work in connection with the administration of the Explosives Act and necessitated additions to inspectional and clerical staffs.

During the fiscal year, 13,588 copies of Bureau of Mines reports, memorandum series, lists of mines, metallurgical works, etc., were distributed; 19,450 mimeographed sheets were printed, and 3,500 notification cards were sent out. A total of 1,627 publications in French was distributed.

ECONOMICS DIVISION

Inquiries received and answered related mostly to the war minerals; and the mineral information service was freely used by the Metals Controller and by others directly concerned with the production of such minerals and with their application to war needs. Special attention was given to those essential war minerals that Canada normally imports. The exigencies of war restricting, and in some cases cutting off, the flow of supplies from these normal outside sources as well as increasing requirements arising from expanding armament production, have made it imperative that Canada's resources in these minerals be thoroughly explored and workable deposits brought into production as speedily as possible.

The second edition of "Prospectors Guide for Strategic Minerals in Canada", designed to stimulate the interest of prospectors in taking up the search for these deficiency war materials, was given effective distribution to prospectors, mainly through the co-operation of the Provincial Departments of Mines and their Mining Recorders. The handbook was again revised in the latter part of the year with the assistance of the office of the Metals Controller in order to bring it up-to-date in respect to the essential war minerals currently in short supply; and the third edition will be available for distribution through the same channels to prospectors before the beginning of the 1943 prospecting season.

An engineer of the Division devoted most of his time to studies and investigations related to known deposits of such strategic minerals as the ores of tungsten, chromium, molybdenum, and mercury. About 3 months were spent in field examinations of tungsten, molybdenum, and chromium deposits in the Eastern Townships of Quebec, in northern and eastern Ontario, and in northwestern Quebec, and detailed reports were prepared for submission to the Metals Controller. The tests of mill products of Canadian gold mines for scheelite, begun in the preceding year, were completed; and most of the mines indicated by these tests as containing the mineral were later investigated by geologists of the Branch.

The annual survey of the deliveries for consumption of fuel oil and other petroleum fuels in each of the provinces was completed, the usual field work in that connection not being required. The printed tabulated statement comprising the report of the survey was available for distribution at the end of August. The report "Petroleum Fuels in Canada, 1927-1940", summarizing the results of the annual surveys for that period, was also completed and distributed. The List of Coal Mines in Canada was again reviewed as at the beginning of 1943, with additional information of direct interest to the Coal Administrator and to the Government coal-purchasing agencies. Both of these surveys, which had been carried on prior to the war primarily for the use of the Dominion Fuel Board, are of special value to the Coal Administrator.

Studies were made on such subjects as Canada's mineral resources in post-war development, for the Committee on Post-War Reconstruction; Canada's

probable gold production for the fiscal year, for the Bank of Canada; the probable effect of applying the United States Governmental policy restricting gold mining operations to Canadian gold mines, for the Metals Controller; the iron ore and coal reserves of Texada Island and Comox district respectively; and substantial progress was made on an exhaustive survey of available information of the mineral possibilities of the areas in Yukon and British Columbia within convenient reach of the Alaska Highway.

Special reports on mining properties were prepared for the Deputy Minister in assisting the Commissioner of Income Tax in dealing with applications received under Section 89, Income War Tax Act, authorizing a 3-year exemption from corporation tax of company incomes derived from the operation of new metalliferous mines; and in considering matters arising from the administration of amendments made to the Income War Tax Act and the Excess Profits Tax Act in the 1942 session of Parliament in respect of base metal and strategic minerals.

Almost 1,000 requests for information on mining properties and a wide variety of mining subjects were answered. Interviews were given to many prospectors, mine operators, and others in search of information pertaining to Canada's mineral resources, mine development problems, mining laws and regulations, mineral markets, etc., especially in relation to minerals of war importance. Papers on subjects pertaining to the different phases of mineral resources development were prepared for departmental use, for presentation at meetings of technical associations, or for publication by the press. The "Annual Review of the Canadian Mineral Industry in 1941" was completed and made available as mimeographed separates for select distribution; and several lists of mine operators were also revised and similarly reproduced for the answering of inquiries.

Mineral samples received and reported upon included: forty-five examined for tungsten, thirty for molybdenum, six for chromium, seven for manganese, four for diatomite, two for garnet, and twenty-six for other minerals.

Three officers of the Division continued on loan to other Departments on direct war work, its Chief and one engineer to the office of the Metals Controller, and a senior map draughtsman to the National Research Council. One of the senior officers of the Division was occupied throughout the year and two others of its staff for most of the year in the Director's office on the administration of strategic mineral and petroliferous projects financed from the War Appropriation. The remaining staff of the Draughting Section of the Bureau of Mines which was attached to the Division, including a Principal Map Draughtsman and a Senior Map Draughtsman, were transferred to the Map Draughting and Reproducing Division of the Bureau of Geology and Topography as a further measure of consolidation of Branch services.

Library

The Librarian reports the following additions:

Books and pamphlets ordered	176
Bureau of Mines reports added to the circulating division	14
Canadian Government documents—individual issues (by exchange and gift)	2,619
British and Foreign Government documents—individual issues (by exchange and gift)	1,308
Scientific societies' bulletins, proceedings, and transactions—individual issues (by exchange and gift)	1,374
Periodicals (other than scientific societies, Canadian, British, and Foreign Government documents)—individual issues	1,965
Trade catalogues (by gift)	47
Books and pamphlets (by gift)	235
Periodicals and annuals subscribed for	213
Annuals, continuations and periodicals (by gift)	390
Cards added to the catalogue	1,173
Volumes bound	147
Recorded loans	6,153

METALLIC MINERALS DIVISION

The work increased greatly and necessitated an enlargement of the laboratory facilities and an increase in staff. On the recommendation of a special committee representing the War Departments, the construction of new Physical Metallurgy Laboratories was approved and it is expected that they will be completed and occupied late in 1943. They consist of a group of three buildings which will be equipped with all the usual modern facilities for metallurgical research. A foundry will be included with melting furnaces, sand testing and moulding laboratories, space for experimental rolling mill equipment, die-casting equipment, and extrusion presses. All types of modern heat-treating equipment will be provided. There will be a strength of materials laboratory, including low-temperature test rooms; microscopic, spectrographic, and X-ray laboratories; physical measurement laboratories; creep testing laboratories; and powder metallurgy laboratories. Other auxiliary equipment will also be installed. The main research laboratory will be air-conditioned for the control of dust and moisture. Such facilities as these new laboratories will provide have been lacking in Canada.

The Physical Metallurgy Laboratories made reports on over 700 investigations and research projects for the War Departments, and heat-treated 13,000 ordnance parts weighing 26,588 pounds, in addition to the regular heat-treatment work required in connection with the investigations.

The Mineral Dressing Laboratories were also very active, working on domestic procurement problems of strategic, critical, and essential minerals, and the development of metallurgical processes to speed the mine-to-metal cycle.

The Chemical Laboratories were enlarged to take care of the increased volume of analyses. Twenty-five thousand reports were issued, covering analyses of minerals and metals purchased by the Government, or in connection with exploration and development of mineral deposits. These reports cover the analyses of many rare metals and minerals, including tantalum, boron, vanadium, tin, beryllium, tungsten, radium and uranium, etc.

The facilities of the Spectrographic and Mineragraphic Laboratories were again used to excellent advantage and the availability of this equipment has prevented months of delay in carrying out research projects in connection with the development of new processes for the production of materials for war.

Private mining and industrial companies make use of the Division's facilities to work on projects connected with various procurement problems associated with the war program.

The laboratories continued to carry out custom work on the treatment of tungsten ore, and treated 142,092 pounds of ore producing 18,741 pounds of tungsten trioxide (WO_3) valued at $45,000.

A process suggested for the utilization of waste asbestos rock to produce magnesium chloride, suitable for conversion to magnesium metal by electrolysis, was tested out and operated on a pilot plant scale. The work being carried out by the American Nepheline Corporation on a process for the extraction of alumina from nepheline, referred to in last year's report, was completed and work was started on the extraction of alumina from clays.

The details of such work as mentioned above, as well as many of the reports listed below, are classed as "Secret" and are not available except to authorized persons.

List of Physical Metallurgy Investigations Reported Upon

1144. Armour plate improvements as related to statistical analysis of manufacturing data. (January 9, 1942.) (First report on armour statistics.)
1145. Examination of materials in spar member and elevator hinge from the Cessna-Crane Aircraft 7664. (National Research Council.) (January 10, 1942.)
1150. Examination of Universal carrier track link. (I.B.U.K. & C.) (January 21, 1942.)
1151. Examination of weld between mild steel base and tubular body of 75-mm. smoke shell cases. (I.B.U.K. & C.) (January 22, 1942.)
1153. Examination of extruded aluminium alloy shapes. (A.C.I.M., B.A.C., Washington.) (February 5, 1942.)
1154. An examination of tank track pins. (I.B.U.K. & C.) (February 4, 1942.)
1157. Armour plate quality and its relation to physical and chemical tests. (B.C.S.O., Washington, D.C.) (February 6, 1942.) (Second report on armour statistics.)
1158. Examination of cracked manganese steel tractor pad casting. (Sorel Steel Foundries, Limited, Sorel, Quebec.) (February 10, 1942.)
1159. Investigation of disintegration of manganese steel roll shell. (Sorel Steel Foundries, Limited, Sorel, Quebec.) (February 10, 1942.)
1161. Continuation of examination of welds in 75-mm. smoke shell cases. (Subsequent to investigation 1151.) (I.B.U.K. & C.) (February 10, 1942.)
1162. Examination of superheater tubes. (Subsequent to investigation 1094.) (D.N.D., Naval Service.) (February 11, 1942.)
1163. Third report on armour statistics. (February 14, 1942.)
1164. Examination of tracer body tubes. (Tracer No. 12.) (I.B.U.K. & C.) (February 13, 1942.)
1165. Investigation of "Meta" aluminium solder. (D.N.D., Air Services.) (February 16, 1942.)
1166. Fourth report on armour statistics. (February 18, 1942.)
1167. Microscopic examination of ground wire for transmission line used at Shawinigan Falls, Quebec. (National Research Laboratories.) (February 25, 1942.)
1168. Report on the Misfeldt processes. (D.N.D., Air Services.) (February 25, 1942.)
1169. Crack tests on steel helmets. (D.P. & N.H., Ottawa.) (February 28, 1942.)
1170. Examination of English Valentine track pin. (I.B.U.K. & C.) (March 2, 1942.)
1171. Examination of a cracked spigot on the barrel of a 3-inch trench mortar. (I.B.U.K. & C.) (March 4, 1942.)
1172. Tin conservation report. (March 14, 1942.)
1173. Examination of spot-welded aluminium strips. (D.N.D., Air Services.) (March 9, 1942.)
1174. Examination of a piece of manganese steel cone. (Sorel Steel Foundries, Limited, Sorel, Quebec.) (March 9, 1942.)
1175. Examination of steel helmet, American model U.S.M. I. (I.B.U.K. & C.) (March 11, 1942.)
1176. Examination of "Nitralloy" bushings. (I.B.U.K. & C.) (March 11, 1942.)
1177. Examination of annealed high-pressure tubing for Calgary Ammonia Plant, Defence Project No. 12. (Alberta Nitrogen Company, Limited, Calgary, Alberta.) (March 12, 1942.)
1179. Examination of extruded aluminium alloy shapes (II), subsequent to Investigation 1153. (A.C.I.M., B.A.C., Washington, D.C.) (March 14, 1942.)
1180. Examination of springs, part No. 5277Q5. (I/C, B.A.C., Canadian Aircraft Group, Montreal, Quebec.) (March 16, 1942.)
1183. Examination of copper-nickel alloy strip and bullet envelopes. (I.B.U.K. & C.) (March 20, 1942.)
1184. Examination of welding failure on a Cessna Aircraft Control Elevator Walking Beam. (D.N.D., Air Services.) (March 19, 1942.)
1185. Examination of Boeing Aircraft Casting 28-L-054. (G/C A. L. Johnson, for C.O.A.S., D.N.D., Air Services.) (March 19, 1942.)
1186. Examination of bracket castings for tanks. (I.B.U.K. & C.) (March 19, 1942.)
1187. Comparison of frictional properties of P.M.G. 2 metal and PB-16 metal. (B.A.T.M.) (March 23, 1942.)
1188. Examination of 8-inch Howitzer recuperator pintle. (I.B.U.K. & C.). (March 21, 1942.)

1190. Examination of defective steel in 3·7 anti-aircraft gun. (I.B.U.K. & C.) (March 23, 1942.)

1191. Examination of steel bar which failed by fatigue. (D.N.D., Air Services.) (March 27, 1942.)

1192. Investigation of atomic hydrogen welding test specimens. (D.N.D., Air Services.) (March 26, 1942.)

1193. Examination of a boat trailer wheel springing mechanism. (Eng. Div., M. & S.) (March 27, 1942.)

1195. Examination of Snowmobile Bogie Wheel suspension assembly. (A.E.D.B., M. & S.) (March 30, 1942.)

1196. Examination of broken Churchill tank track link. (A.E.D.B., M. & S.) (March 31, 1942.)

1197. The effects of low temperatures on the properties of track pins. (I.B.U.K. & C.) (April 2, 1942.)

1198. An examination of three Hull Iron and Steel Foundries towing hooks. (I.B.U.K. & C.) (April 6, 1942.)

1199. Report on low-temperature impact tests on a zinc-base die-casting alloy. (A.D.I., I.B.U.K. & C.) (April 8, 1942.)

1200. Report on malleable iron Universal carrier track links. (April 10, 1942.) (A.D.I., I.B.U.K. & C.)

1203. Investigation of a Dominion Foundries and Steel, Limited, towing hook. (I.B.U.K. & C.) (April 15, 1942.)

1204. Examination of superheater tubes. (D.N.D., Naval Service.) (April 16, 1942.)

1209. Examination of small pieces of metallic material found in seized Jacobs aircraft engine. (D.N.D., Air Services.) (April 29, 1942.)

1210. Investigation of nitrided track pins. (C.W. & C.F., Muskegon, Mich.) (April 29, 1942.) (Track Pin Committee, I.B.U.K. & C.)

1211. Examination of broken Universal carrier track pins. (M. & S.) (May 1, 1942.)

1212. Examination of Ford towing hooks. (I.B.U.K. & C.) (May 4, 1942.)

1213. Possibilities offered by the malleable irons in the present war effort. (May 6, 1942.)

1214. Investigation of tracer tube body. (Tracer No. 12.) (I.B.U.K. & C.) (May 7, 1942.)

1215. Examination of track bonding clips. (D.S.D.B., M. & S.) (May 7, 1942.)

1216. Kinking of aircraft target towing cable. (D.N.D., Air Services.) (May 12, 1942.)

1217. Examination of magnesium alloy castings. (Control handles A.H. 2040.) (I/C, B.A.C., Can. Air Grp., Montreal.) (May 9, 1942.)

1218. Investigation on cast tungsten carbide. (Electric Metallurgical Company, Welland, Ontario.) (May 12, 1942.)

1219. Cold-temperature tests on armour. (I.B.U.K. & C.) (May 11, 1942.)

1221. Comparison of the properties of two steels used in Vickers machine gun manufacture. (Ottawa Car & Aircraft, Limited.) (May 15, 1942.)

1222. Second report on the Misfeldt processes: copper-beryllium alloy extrusion mouldings and sand castings. (1st report, Invest., No. 1168.) (May 14, 1942.)

1223. Examination of lookout block No. 20958 for Valentine tanks. (I.O.T., I.B.U.K. & C.) (May 14, 1942.)

1224. Examination of carbo-nitrided Universal carrier track pins. (M. & S.) (May 18, 1942.)

1226. Investigation of metallic characteristics of 12 mm. homogeneous type armour plate. (I.B.U.K. & C.) (June 1, 1942.)

1229. Examination of Mark III track pins. (Brit. Purch. Comm., Wash., D.C.) (May 21, 1942.)

1233. Comparative microscopic grain analyses of three samples of standard English tetryl and two samples Canadian (D.I.) tetryl. (May 23, 1942.) (Explosives Directorate, I.B.U.K. & C.)

1235. Quality control: engineering science applied to inspection practice. (June 1, 1942.)

1236. Examination of broken Allied Products Limited Universal carrier pins. (June 1, 1942.) (M. & S.)

1237. Examination of front axle spindle connecting rod. (I.B.U.K. & C.) (June 3, 1942.)

1238. Tinned steel retaining pins. (D.N.D., Naval Service.) (June 5, 1942.)

1240. Examination of steering Knuckle flange casting. (I.B.U.K. & C.) (June 9, 1942.)

1241. Experimental tests on Fisch carburizing compound and isolating paste. (*See* Invest. No. 1102.) (June 19, 1942.) (Mr. J. Fisch, Internee, Sherbrooke, Quebec.)

1242. Examination of broken Companion flange from Ram tank. (M. & S.) (June 16, 1942.)
1243. Examination of cracked, Campbell, Wyant and Cannon, Mark III, track pin. (M. & S.) (June 10, 1942.)
1244. Investigation into cause of failure of pinion and shaft from 4·5/5·5 carriage. (June 20, 1942.) (I.B.U.K. & C.)
1245. Investigation of drop forged naval gun cam. (B.A.T.M.) (June 19, 1942.)
1246. Metallurgical examination of manganese steel armour plate. (D.N.D., Naval Services.) (June 12, 1942.)
1251. Investigation of homogeneously hardened S.A.E. steel, Universal carrier track pins. (M. & S.) (June 23, 1942.)
1252. Shatter cracks in test pieces from 2-pdr. breech ring. (I.B.U.K. & C.). (June 24, 1942.)
1253. Investigation of S.A.E. X1315, Universal carrier pins. (Ford Motor Company of Canada, Limited.) (June 24, 1942.) (Track Pin Committee).
1254. Twisted shaft on steer gear of reconnaissance car. (I.B.U.K. & C.) (June 25, 1942.)
1255. Examination of defective ball bearings. (Alexander Fleck, Limited, Ottawa, Ontario.) (July 2, 1942.)
1256. Physical tests on an aircraft engine adapter casting. (D.N.D., Air Services.) (July 3, 1942.)
1257. Heat treatment and examination of high-speed steel cutters. (D.N.D., Naval Services.) (July 3, 1942.)
1258. Report on attachment nut from a Kittyhawk oleo leg. (S/L A. J. Smith, D.N.D., Air Services.) (July 3, 1942.)
1259. Examination of Oxford undercarriage micro switch springs. (D.N.D., Air Services.) (G/C A. L. Johnson.) (July 7, 1942.)
1260. Examination of mainplane drag wire connecting lug from Crane aircraft. (G/C A. L. Johnson, D.N.D., Air Services.) (July 10, 1942.)
1262. Examination of welded steel tubing. (Lot No. 208.) (B.A.C., Wash.) (July 16, 1942.)
1263. Examination of zinc alloy die castings for a tank periscope. (M. & S.) (July 16, 1942.)
1265. Report on sintered tungsten carbide cores from Carboloy. (July 21, 1942.)
1266. Examination of two steel rings. (Requested by B/C G. P. Morrison, D.N.D. (Army).) (July 24, 1942.)
1267. Heat treatment of medium carbon molybdenum-manganese cast steel. (Request of Hull Iron & Steel Company.) (July 23, 1942.)
1268. Examination of two failed austenitic manganese steel castings. (Requested by Joliette Steels, Limited.) (July 24, 1942.)
1270. Metallurgical examination of a Ram tank volute spring. (Requested by Department of Munitions and Supply.) (July 24, 1942.)
1271. Recovery of vanadium from Dominion Steel and Coal (D.O.S.C.O. pig iron.) (July 25, 1942.)
1272. A metallographic study of three spot welds. (Submitted by Mr. Moss of the British Bureau of Ships, Wash., D.C.) (August 13, 1942.)
1273. Investigation of decarburized and recarburized, homogeneous S.A.E. 9255, Universal carrier track pins. (I.B.U.K. & C.) July 27, 1942.) (Track Pin Committee.)
1274. Examination of defective 6-pdr., Mark III, breech block 457. (Requested by the I.B.U.K. & C.) (July 27, 1942.)
1275. Examination of the heat treatment of brass fuse bodies. (Requested by the I.B.U.K. & C.) (July 30, 1942.)
1276. Examination of ·303-inch, Mark VIIIz streamlined bullet. (D.S.A.A., I.B.U.K. & C.) (August 4, 1942.)
1277. Examination of X4130 tubes manufactured by Page-Hersey. (D.N.D., Air Services.) (August 4, 1942.)
1278. Examination of shell Q.F., H.E., 40 mm., Mark IIT. (Request of I.B.U.K. & C.) (August 5, 1942.)
1279. Examination of a broken crusher lug, manganese steel casting. (Sorel Steel Foundries, Limited, Sorel, Quebec.) (August 6, 1942.)
1280. Investigation of a broken Universal carrier rack link. (M. & S.) (August 7, 1942.)
1284. Investigation of S.A.E. 1020 cyanided Universal carrier track pins. (A.E.D.B., M. & S.) (August 17, 1942.)

1285. Examination of an idler steel from a Ram tank. (Request of Prof. J. U. McEwan, M. & S.) (August 24, 1942.)

1287. Examination of magnesium alloy castings (Jacobs L-6 engine crankcase), requested by D.N.D., Air Services. (August 27, 1942.)

1288. Continuation of examination of defective 6-pdr., Mark III, breech block 457. Subsequent to Invest. No. 1274, July 27, 1942. (I.B.U.K. & C.) (September 2, 1942.)

1291. Some notes on the performance of high-velocity projectiles. (October 18, 1942.) (By Dr. R. Potvin and Capt. A. B. Holt, R.N.A.F.)

1297. Investigation of austempered S.A.E. 9255 Universal carrier pins. (Supt., York Arsenal, Toronto, Ont.) (September 9, 1942.) (Track Pin Committee.)

1298. Dominion Foundries and Steel, Limited, 60 mm. armour plate ballistic limit test results presented in quality control chart form. (No. 5 of series.) (September 19, 1942.)

1300. Investigation of C.P.R. pack carburized Valentine tank track pins bent in service. (A.E.D.B., M. & S.) (September 17, 1942.)

1302. A metallographic study of two Bolingbroke compressor springs. (Requested by F. Bisson of the B.A.C., Montreal, P.Q.) (September 18, 1942.)

1303. Examination of two Ram tank volute springs. (Prof. J. U. McEwan, M. & S.) (September 21, 1942.)

1308. Investigation of aircraft oleo leg steel forging 22666. (I/C, Canadian Aircraft Group, B.A.C., Montreal, P.Q.) (September 28, 1942.)

1309. Examination of Valentine tank sprocket hub No. 15611-T. (Requested by Dr. C. W. Drury, M. & S.) (September 28, 1942.)

1310. Examination of a failed exhaust ring from a Lysander IIIA aircraft. (Requested by G/C A. L. Johnson.) (September 30, 1942.) (D.N.D., Air Services.)

1312. Flexible wire rope endurance tests. (Requested by F/L E. R. Cook, R.C.A.F.) (October 5, 1942.) (D.N.D., Air Services.)

1313. Examination of a pontoon bolt racking. (D.N.D., Army.) (October 9, 1942.)

1314. Investigation of a cracked Valentine tank track link. (Request of Dr. C. W. Drury, M. & S.) (October 9, 1942.)

1316. An examination of three malleable cast iron test bars, ex Sawyer-Massey, Hamilton. (B.A.T.M.) (October 19, 1942.)

1317. Examination of nickel-bronze test bars. (A.E.D.B., Dept. of M. & S.) (October 20, 1942.)

1318. Examination of track link, track pin and cotter pin from a German P.Z. K.W. III tank. (I.B.U.K. & C.) (October 21, 1942.)

1319. Hardenability of 60 mm. armour plate (Dominion Foundries and Steel), and its relationship to ballistic limit. (No. 7 of series.) (October 30, 1942.)

1320. Examination of a high manganese steel Valentine tank track link. (I.B.U.K. & C., Req'n. O.T. 3271.) (November 4, 1942.)

1321. Correlation between metallurgical tests and ballistic limit on Dominion Foundries and Steel 60 mm. armour plate. (No. 8 in series.) (November 11, 1942.)

1322. Examination of a Cheetah IX, cylinder barrel chromium-plated by the Van der Horst process. (D.N.D. Air Services.) (November 6, 1942.)

1324. Examination of high purity copper rods for use in production of copper crushers (pressure cylinders). (D.A.D.S.A., I.B.U.K. & C.) (November 17, 1942.)

1325. Copper crushers: notes on specifications and abstracts from technical literature. (November 1, 1942.) (D.A.D.S.A., I.B.U.K. & C.)

1330. Examination of Universal carrier track pins from field tests O-6, 13-W, 16-W, Windsor, Ont. (Track Pin Committee.) (November 30, 1942.)

1331. Investigation to identify inclusions in fractured transverse tensile test pieces from a gun barrel. (Materials Division, I.B.U.K. & C.) (December 2, 1942.)

1332. Examination of a "Newhouse Crusher Mantle" manganese steel casting. (Sorel Steel Foundries, Limited, Sorel, Quebec.) (December 3, 1942.)

1333. Examination of austenitic manganese steel test bars and track links. (Beach Foundry, Limited, Ottawa, Ontario.) (December 4, 1942.)

1334. An examination of some Universal carrier bogey wheel springs. (M. & S. No. 9/D. A.E.D.B.) (November 7, 1942.)

1336. The heat treatment of 120 mm. trench mortar bombs. (Ammun. Prod. Br., Dept. of M. & S.) (December 19, 1942.)

1337. Examination of a Lancaster spar aluminium-alloy extrusion. (I/C B.A.C., Montreal, P.Q.) (December 23, 1942.)

1338. Torsion tests on two steel shafts for 2-pdr. Mark VIII gun mountings. (B.A.T.M., Ottawa—Lieut. Comm. (E) G. Taylor.)
1339. Examination of manganese steel crusher jaw plates. (Sorel Steel Foundries, Limited, Sorel, Quebec.) (December 30, 1942.)

1942:

Quality Control Reports:
Nos. 1144, 1157, 1163, 1166, 1235, 1319, 1321.

Track Links:
Nos. 1150, 1196, 1200, 1280, 1314, 1318, 1320, 1333.

Track Pins:
Nos. 1154, 1170, 1197, 1210, 1211, 1224, 1229, 1236, 1243, 1251, 1253, 1273, 1284, 1297, 1300, 1318, 1330.

Tungsten Carbide:
Nos. 1218, 1265, and (indirectly) 1291.

List[1] *of Ore Dressing Investigations Reported Upon*

1146. Microscopic examination of two samples of gold ore from Wampum Gold Mines, Limited, Toronto, Ontario. (January 6, 1942.)
1147. Concentration of cobbed scheelite ore from the Gilmour Lake area, Northwest Territories. (A. W. Jolliffe, Bureau of Geology and Topography, Ottawa.) (January 21, 1942.)
1148. The determination of gold values in ore from the Lone Star mine, Dawson, Yukon Territory. (Pioneer Gold Mines of B.C., Ltd., Vancouver, B.C.) (January 14, 1942.)
1149. Concentration and amalgamation of gold ore from the Orelia property of the Goldorel Mining Company, Limited, Mine Centre, Ontario. (Goldorel Mining Company, Limited, 21 King St. E., Toronto.) (January 16, 1942.)
1152. Frothing properties of the Standard Chemical Company's oil No. 33. (January 24, 1942.) (For Canadian Industries, Limited.)
1155. Gravity concentration of chromite ore from H. Bruce Fletcher, Sherbrooke, Quebec. (February 3, 1942.)
1160. Frothing properties of eight samples of low-boiling fractions obtained from crude, Douglas fir tar. (Forest Products Laboratories.) (March 30, 1942.)
1178. Magnetic concentration of magnetite from the Bessemer mine, Hastings county, Ontario. (March 20, 1942.) (Frobisher Exploration Company.)
1181. Concentration tests on a sample of cobalt ore from Massey, Ontario. (D. J. Russell, M.E., Cobalt, Ont.) (March 16, 1942.)
1182. Concentration tests on a sample of sluice box concentrate, containing ferberite, from the Canadian Creek property of Canadian Tungsten, Limited, Britannia Creek, Yukon Territory. (March 24, 1942.)
1194. Gold ore from Claim 1724, Guillet township, Belleterre mining area, Témiskaming county, Quebec. (A. Cook, Bartonville, Ontario.) (March 30, 1942.)
1201. Flotation concentration of copper ore from the Amity Copper Mine, Boston Creek, Ontario. (D. M. Briden, Dobie, Ontario.) (April 11, 1942.)
1202. Sink-and-float tests on samples of magnesite ore from Canadian Refractories, Limited, at Kilmar, Quebec. (Canadian Refractories, Montreal.) (April 14, 1942.)
1205. Gravity concentration and amalgamation of gold ore from the Pershing Manitou Gold Mines, Limited, Belcourt, Abitibi county, Quebec. (April 20, 1942.)
1206. Sink-and-float tests on a sample of zinc ore from the Golden Manitou mine, near Val d'Or, Quebec. (April 21, 1942.)
1207. Gold ore from the S. and O. claims, Sulphide Lake, via Lac la Ronge P.O., Saskatchewan. (A. Studer, Lac la Ronge P.O., Sask.) (April 23, 1942.)
1208. Gold ore from the Queenston Gold Mines, Limited, Gauthier township, East Kirkland Lake area, northern Ontario. (Upper Canada Mines, Limited, Dobie, Ont.) (April 29, 1942.)
1220. Gold ore from the Elmos property, Geraldton, Ontario. (Tombill Gold Mines.) (July 28, 1942.)
1225. Investigation on the suitability of material containing para-cymene as frothing agents in flotation of sulphides and gold ores. (Dominion Tar and Chemical Company, Limited, Montreal Quebec.) (May 19, 1942.)
1227. Flotation and cyanidation tests on a pyritic gold ore from the Tide Lake group, Portland Canal area, Stewart, British Columbia. (A. Thomas, Stewart, B.C.) (May 21, 1942.)
1228. Mill tailing from the Stadacona Rouyn Mines, Limited, Rouyn, Quebec. (May 21, 1942.)
1230. Preliminary report on molybdenite ore submitted by C. W. Greenland, Geologist, 779 Bayview Avenue, Toronto, Ontario. (June 20, 1942.)
1231. Gold ore from Prosperous Lake, Yellowknife District, Northwest Territories. (A. S. Hodgson, Limited, Edmonton, Alta.) (May 22, 1942.)
1232. Concentration of graphite ore from the Rainy Lake area, near Fort Frances, Ontario. (Dr. D. R. Young, Emo, Ont.) (May 23, 1942.)

1234. Sink-and-float tests on samples of quartz ore from Powell Rouyn mine at Noranda, Quebec. (May 26, 1942.)
1239. Mill tailing from Trout Lake, British Columbia. (J. M. Tillen.) (June 19, 1942.) (Cyanidation and flotation tests.)
1247. Batch and pilot plant tests on the flotation concentration of scheelite ore. (Little Long Lac Gold Mines, Limited, Geraldton, Ontario.) (June 15, 1942.)
1248. Preliminary flotation tests on a graphite ore from Buckingham township, Quebec. (R. F. Kelly, Lord Elgin Hotel, Ottawa.) (June 9, 1942.)
1249. Flotation concentration of manganese ore from Manuels manganese deposits of Conception Bay, Newfoundland. (C. K. House, Government Geologist, St. Johns, Newfoundland.) (June 17, 1942.)
1250. Flotation tests on scheelite ore. (Leitch Gold Mines, Limited, Beardmore, Ont.) (June 22, 1942.)
1261. Copper-gold ore from the Camilla Canadian Mining Corporation, Limited, Sudbury, Ontario. (John Grundeff, Barrister, 85 Richmond Street W., Toronto 2, Ontario.) (July 11, 1942.)
1264. Flotation tests on five samples of ore from the Toburn Gold Mines, Limited, Kirkland Lake, Ontario. (July 17, 1942.)
1269. Recovery of scheelite from the jig concentrates from the McMarmac Red Lake Gold Mines, Limited, McKenzie Island, Ontario. (July 24, 1942.)
1281. Examination of mill tailing and mill solution from the DeSantis Porcupine Mines, Limited, at Timmins, Ontario. (August 12, 1942.)
1282. Deister table concentrate from the Sand River mine of the Magnet Consolidated Mines, Limited, Geraldton, Ontario. (August 13, 1942.)
1283. Recovery of scheelite from the mill tailing from International Tungsten, Limited, formerly known as the Slave Lake Gold Mines, Limited. (International Tungstens, Limited, Toronto, Ont.) (August 13, 1942.)
1286. Experimental tests on samples of gold ore from Renabie Mines, Limited, at Missanabie, Ontario. (Renabie Mines, Limited, Kirkland Lake, Ont.) (August 26, 1942.)
1289. The investigation of a process for production of magnesium chloride from asbestos waste rock. (September 2, 1942.) (Col. T. W. MacDowell, V.C., Westmount, Que.)
1290. Concentration of a lead-zinc ore from the Kootenay Florence Mining Company, Ainsworth, British Columbia. (September 2, 1942.)
1292. Concentration and roasting tests on a sample of arsenical gold ore from the Wampum Gold Mines, Limited, at Flin Flon, Manitoba. (A. J. McLaren, C.E., 231 Glengrove Ave., West, Toronto, Ont.) (September 4, 1942.)
1293. Molybdenite ore from LaPause township, Quebec. (J. A. Turgeon, Villemontel, Quebec.) (September 8, 1942.) (Flotation concentration.)
1294. Flotation tests on a sample of scheelite-bearing chalcopyrite ore from the Beaverhouse Lake Gold Mines, Limited, Gauthier township, Ontario. (Toburn Gold Mines, Limited, Kirkland Lake, Ontario.) (September 8, 1942.)
1295. Concentration of a zinc ore from Haynes Fork of Lynn Creek, British Columbia. (Palisades Zinc Mines, Limited, Vancouver, B.C.) (September 10, 1942.)
1301. Recovery of chrome-nickel-iron concentrate from asbestos tailing supplied by Canadian Johns-Manville Company at Asbestos, Quebec. (September 18, 1942.)
1304. Flotation concentration of a lead-zinc ore from the Orvan Brook Property, Bathurst, New Brunswick. (Guysborough Mines, Limited, Halifax, N.S.) (September 21, 1942.)
1305. Magnetic concentration of vanadium bearing titaniferous magnetite from Mattawa, Ontario. (Consolidated Mining & Smelting Company, Limited, North Bay, Ont.) (September 22, 1942.)
1306. Cobalt ore from the Shakt mine at Latchford, Ontario. Concentration tests. (Mrs. H. S. Davis, Montreal.) (September 24, 1942.)
1307. Scheelite ore from the Lucky Boy mine on Kaslo Creek, British Columbia. (J. M. Tillen, Trout Lake, B.C.) (September 23, 1942.)
1311. Concentration of wolframite from Burnt Hill Brook, New Brunswick. (Ventures, Ltd., Toronto, Ont.) (October 3, 1942.)
1315. Concentration of molybdenum ore from Indian Peninsula, Kewagama Lake, Abitibi district, Quebec. (Sigma Mines, Limited, Bourlamaque, Que.) (October 15, 1942.)
1323. Tabling and flotation tests on scheelite ore from the Jack Nutt Prospecting Syndicate, Herb Lake, Manitoba. (H. O., Toronto.) (November 13, 1942.)
1327. Interim report of concentration tests on a chromite ore from the Page claims, Bird River, Manitoba. (November 20, 1942.)
1329. Sink-and-float tests on samples of chromite ore from Bird River, Manitoba. (R. J. Jowsey, God's Lake-Gunnar Chrome project, Toronto.) (November 26, 1942.)
1335. Cyanidation and concentration tests on a gold-silver-zinc ore from the Golden Manitou Mine, Limited, at Val d'Or, Quebec. (December 17, 1942.)

[1] Investigation Nos. 1147, 1189, 1247, 1250, 1264, 1289, 1282, 1283, 1294, 1307, 1311, and 1325 are on tungsten; 1155 is on chrome; 1178, 1196, 1301, and 1305, on iron ores; 1249 is on manganese; 1201, 1261, and 1296, on copper; 1206, 1239, 1290, and 1304, on silver, lead, and zinc; 1230, 1293, and 1315, on molybdenum; 1181 and 1306, on cobalt.

Forty-six information memoranda were prepared for use of the various war departments and organizations, the subjects of some of the more important being:

TOPIC

Information on Russian conditions obtained from a report submitted by Mr. S. C. McLaren of the I.B.U.K. & C. (Valentine tanks).
Literature survey on low-temperature properties of metals.
Effect of alloying elements in Hadfield's steel.
Suggestions of suitable alternatives or substitutes for heat- and corrosion-resisting alloy steels for Tribal destroyers.
Towing hooks.
Alloying elements as used in ordnance.
Manufacture of Bren gun magazine platform by powder methods.
Fahrenwald reduction process.
The use of alternative track pin steels.
High-test iron for tool shanks.
Quality control on metal fuse parts.
Use of oilite driving bands in shell.
Use of lower alloy steels in armour.
Cold temperature room at John A. Roeblings Sons Company, Trenton, N.J., U.S.A.
A method of studying large numbers of observations.

Thirty-three memoranda were prepared on field visits, a list of typical subjects being:

TOPIC

Shot blasting of springs.
Pluramelt armour.
Manufacture of blackheart malleable iron union carrier track links by International Harvester Company of Canada, Limited, Hamilton, Ont.
Westinghouse ultra high speed radiographic equipment.
Visit to United States Navy proving ground, Dahlgren, Virginia.
Supersonic testing of metals.
Visit to Westinghouse Research Laboratories, East Pittsburgh, Pa.
Development of the Triplex Steel Making Process in United States and Canada.
Unionmelt welding.
Aircraft Cable Research at John A. Roeblings Sons Company, Trenton, New Jersey.
Powder metallurgy in United States ordnance.
Desiliconizing practice at the Middleton (Ohio) plant of the American Rolling Mill Company.
Automatic Gas Flux Company, method of copper cladding steel.
Powdered iron in service components.
Brake drum production in Canada.

Partial list of subjects, physical metallurgy laboratory reports:

Laboratory Report No.	TOPIC
5001	One 3·7 A. A. breech block cut in two to be macro-etched.
5010	Thin-section of sample submitted for identification by L. Charlebois, Director, Sorel Industries, Limited.
5043	Alberta Nitrogen Company, Limited, information re bolts for Calgary Ammonia Plant.
5044	Check tests on a "Tail Wheel Spring", submitted by S/L A. J. Smith, Air Force.
5053	Fatigue tests on aircraft cable (B. Greening Wire Company, Limited).
5082	Examination of Cheetah IX cylinder adaptor ring.
5095	Investigation of a fractured crank shaft (I.B.U.K. & C.).
5099	Microscopic examination of a piece of shot proof steel (I.B.U.K. & C.).
5110	Physical metallurgical examination of four base plates (I.B.U.K. & C.).
5117	Brass fuse cover cone (I.B.U.K. & C.).
5127	An investigation of the properties of two iron brake pedals (Lt. Comm. (E) G. Taylor, R.N.V.R.).
5143	Fafowi method of hot-pressing non-ferrous metals.
5163	Examination micro-structure of austenitic manganese steel plate which failed ballistic tests.
5193	Substitute metal for gunmetal and phosphor bronze for castings, Department of National Defence (Navy).
5216	Report on broken pinion shaft of Logansport traversing gear as installed in Ram tank (I.B.U.K. & C.).

Laboratory Report No.	Topic
5241	Physical test, cold drawn seamless tubing (B.A.C.).
5300	Physical analysis of austenitic manganese steel track link submitted by Hull Iron and Steel Company.
5308	Weld substitutes Tobin bronze.
5344	Six smoke shells, Department of Munitions and Supply.
5682	Sample of armour plate, submitted by C. W. Drury, Army Engineering Design Branch, Req. No. 305, Lot No. 151.
5706	Sample of 120 mm. trench mortar bomb.
5773	Sample of galvanized aircraft cable, submitted by B. Greening Wire Company.
5794	Target towing cable, submitted by Canadian Wire Rope Company.

During 1942, 7,189 samples were received, and reports of analyses were issued on all samples; 25,818 determinations were made on these samples, involving approximately 45 different mineral constituents.

The samples were made up from the following:

	No. of samples	Per cent of total
Metallic mill products	4,378	60·90
Industrial Minerals Division	462	6·43
Division of Economics	201	2·79
Pyrometallurgical Laboratories	98	1·36
Bureau of Topography and Geology	270	3·75
Miscellaneous	782	10·88
Department of National Defence	95	1·32
Inspection Board of United Kingdom and Canada	308	4·28
British Air Commission	158	2·20
National Research Council	60	0·83
Fuel Testing Laboratories	10	0·14
Department of Munitions and Supply	89	1·24
British Admiralty Technical Mission	15	0·21
Custom assays and analysis	171	2·38
Sources of vanadium	92	1·29
	7,189	100·00
Total determinations	25,818	
" gold assays	2,360	9·14
" silver assays	512	1·98

Determinations made on samples of war supplies etc., during 1942:

Department	No. of samples	No. of determinations
Department of National Defence	95	1,182
Inspection Board of United Kingdom and Canada	308	2,997
British Air Commission	158	1,682
National Research Council	60	572
Department of Munitions and Supply	89	878
British Admiralty Technical Mission	15	200
Pyrometallurgical Laboratory (Samples from problems related to war supplies)	98	819
	823	8,330

These determinations represent 32·6 per cent of the work of the Chemical Laboratories staff.

INDUSTRIAL MINERALS DIVISION

The Division is divided into three sections dealing respectively with: the resources of industrial or non-metallic minerals, their economic characteristics, mining, marketing, and use; the crushing, grinding, and purification of the minerals; and problems of processing in the manufacture of mineral products, particularly ceramic products. The activities of the staff were devoted almost entirely toward promoting the development of those minerals required in the production of munitions or to supply deficiencies caused by the restrictions on imports. Officers of the Division were in close co-operation with the Department of Munitions and Supply, and much of the field work was conducted at the request of the Metals Controller.

Throughout the year, laboratory and consulting services were rendered to the Department of National Defence, the Inspection Board of the United Kingdom and Canada, the War Production Board of the United States, and other war services, and to the Departments of National Revenue, Trade and Commerce, Public Works, and other Dominion and Provincial bureaux.

Field investigations on occurrence, mining, preparation for the market, and industrial requirements were conducted on apatite, beryl, brucite, diopside, dolomite, graphite, Iceland spar, limestone, mica, talc, china clay, silica sand, peat, and industrial waters.

Annual reviews, covering thirty minerals, were brought up to date.

An unusually large number of mineral samples from prospectors and others were submitted for examination and report on their economic usefulness, and numerous inquiries on various mineral subjects were dealt with by correspondence and direct consultation.

Special memoranda were prepared on nepheline syenite, for the Australian High Commissioner's Office; on beryl, lithium minerals, and tantalite, for the Board of Economic Warfare of the United States; on mica and graphite, for the War Production Board of the United States; on mica, for the British Central Scientific Office, Washington; on talc, for the Army and Navy Munitions Board of the United States; on magnesia for the War Production Board; on magnesite and brucite for the United States Geological Survey; and on Canadian industrial mineral developments in 1941 for the United States Bureau of Mines.

Several inspection visits were made to the new muscovite mica field at Eau Claire, Ontario, in company with officers of the United States War Production Board, and Metals Controller's staff, with whom also a number of graphite deposits were visited.

Investigational work was done on brucite, magnesium, hydromagnesite, lime, and magnesite, and supervision was given to a diamond drilling campaign on a deposit of brucitic limestone near Wakefield, Quebec.

The process developed in the laboratories of the Division for the recovery of magnesia and lime from brucitic limestone was put into commercial operation at a plant near Ottawa. Considerable time was spent in an advisory capacity at this plant.

Much processing work was conducted in the Milling Laboratory in connection with the development of the ferrosilicon process of producing magnesium metal. A number of consultations in connection with plant practice were held with companies employing the process. Close touch was maintained with current developments in the magnesia and magnesium situation in the United States and Great Britain.

Field work was carried out in Nova Scotia, New Brunswick, and Quebec at the request of the Naval Service, in connection with gravel for use in making plastic armour.

Laboratory investigation was conducted on the stabilizing effect of mine tailings on road base soils.

A study was made of the abrasive characteristics of several samples of sand for the Inspection Board of the United Kingdom and Canada.

Samples of stone were tested for ballast purposes for the Canadian National Railways and a special memorandum was prepared on the gravels and stones available for use as ballast along certain eastern lines.

Twenty-three peat moss deposits in Quebec, Ontario, Manitoba, Alberta, and British Columbia were investigated and a report covering this work was published. Fifty-five samples were collected and analyses were made to determine the quality of the mosses, and a number of samples, sent by owners of bogs in various parts of the country, were also tested to determine their suitability for the peat moss trade.

Sixty-five samples of industrial waters were collected from surface waters and civic water supplies in Quebec, Ontario, Manitoba, Saskatchewan, Alberta, and British Columbia. These and nine other water samples were analysed. A report on the water investigation for the period from 1934 to 1940 was completed and published.

INDUSTRIAL MINERALS MILLING LABORATORIES

The following operations were conducted for the public and in connection with departmental investigations:

Apatite. Flotation tests for the concentration of apatite on a sample submitted by the Barry Lake Mining Company, Quebec.

Sampling operations on four samples of apatite rock (total weight 5½ tons), at the request of A. O. Dufresne, Deputy Minister of Mines, Quebec. The samples were from the Little Union and High Rock properties near Buckingham, Quebec.

Flotation tests for the concentration of apatite on one of the samples from the High Rock property.

Corundum. Concentration tests for the recovery of corundum on several samples from Craigmont and Bancroft areas, for the Metals Controller's Office.

Concentration of corundum by jigging, flotation, and tabling on samples of corundum-rich nepheline syenite rock from Lakefield, Ontario, for the American Nepheline Corporation, Lakefield.

Dolomite. Several samples of dolomite, aggregating 90 tons, crushed, screened, calcined and briquetted for Dominion Magnesium, Limited, to be used in its experimental investigation of producing magnesium metal at the National Research Council Laboratories.

Feldspar. Two samples of feldspar (total weight 230 pounds), ground and screened for J. K. Crang Corporation, Toronto.

Crushed and screened a 97-pound sample of feldspar for Lithium Corporation of Canada, Limited, Winnipeg.

Fluorite and Celestite. Flotation tests on two samples of fluorspar from Haliburton district, for L. K. Fletcher, Toronto.

Flotation tests on two samples of fluorspar for the concentration of sulphides, fluorite, and celestite from Birch Island, British Columbia, for George B. Webster, Toronto.

Graphite. Crushing and screening tests to obtain a flake graphite, on a sample for Thomas Morrison, Wilberforce, Ontario.

Crushing and screening tests, to obtain flake graphite, on a sample from Argenteuil county, Quebec, for A. Lachance, Montreal.

Kaolin. Classification test on a 20-pound sample of kaolin for the Allied War Supplies Corporation, Montreal, Quebec.

Magnesia. Thirty tons of magnesia from Wakefield, Quebec, ground and air-separated to pass 120 mesh, for Canadian Refractories Limited, Kilmar, Quebec.

Nepheline. In addition to the test work involved in recovering a high-grade corundum product from the samples of corundum-rich nepheline syenite from Lakefield (see above), tests were made on the nepheline product to remove remaining impurities.

Salt. Continued research and laboratory tests were conducted to produce a salt product, suitable for the fishery industry, from rock salt samples submitted by Malagash Salt Company, Limited, New Glasgow, Nova Scotia.

Sand-Silica. Processing tests on two samples of silica sand from D. Goulet, Ville Marie, Quebec.

Sandstone. Crushing, grinding, washing, screening, and concentration tests on four samples of sandstone, aggregating 7 tons, for A. D. Bartlett of Kingston Silica Mines, Limited, Kingston, Ontario.

Sericite. Sample of sericite ground and air-separated for J. M. Balderson, Sharbot Lake, Ontario.

Talc. Flotation tests on samples of talc from Canada Talc, Limited, Madoc, Ontario, to produce a product having a low lime content and meeting the specifications required for the making of steatite-porcelain bodies.

In addition to small-scale laboratory tests, three flotation pilot tests were made to study continuous operating conditions and, also, to produce a sufficient amount of low-lime talc for ceramic investigation.

The following services were rendered to other Government departments:

A washing unit capable of cleaning and sizing 200 pounds an hour of used grain carborundum was designed and installed for essential war work.

A half ton of oyster shells was ground for the Poultry Division, Dominion Experimental Farm.

CERAMIC LABORATORIES

At the request of the Signals Production Branch, Department of Munitions and Supply, there was undertaken a study of the possibility of establishing a production of steatite porcelain electric insulators for high frequency service. A large amount of laboratory work was carried out in connection with this project; a study was made of the industry in the United States where helpful co-operation was received; and following a survey of the whiteware industry in Eastern Canada, a plant to manufacture this special product was chosen. Reports were made to the Department of Munitions and Supply and much technical assistance rendered to the company, with the result that early production is anticipated.

The investigation of the use of bauxite tailing to improve the refractoriness of firebrick and also a research on the use of brucite magnesia and serpentine in porcelain bodies were discontinued owing to the transfer of one of the ceramic engineers to special war duties.

Advice was given in connection with the exploratory work under way at the kaolin deposit at Point Comfort, Quebec, and forty samples from the drilling were examined.

A large amount of petrographic work was done in connection with various investigations within the Division and in the identification of seventy-five minerals submitted for examination.

Fifty-four samples of clays and shales and sixteen samples of firebrick and other refractory materials were tested and reported upon.

DIVISION OF FUELS

The Chief of Division and senior technical officers, by means of inspection trips, interviews, and correspondence, kept informed on technical problems of the coal mining and preparation industry, the by-product coke and gas, the oil refining, and the natural gas industries. They attended committee meetings and conferences with other Government organizations relating to testing and research work on Canadian coals and other solid fuels, petroleum oils, and natural gas. Reports were prepared and distributed to interested parties: on physical and chemical survey of coals from Canadian collieries; burning tests on domestic-type fuels in army camp stoves; coking characteristics of certain British Columbia coals for the production of by-product coke for domestic and metallurgical purposes; and the chemical treatment of American and other buckwheat anthracites to render them suitable as "blower" fuels in respect to clinkering.

Work of direct war interest included: a continuation of an investigation of Canadian and imported crude oils for the production of toluene for use in explosives; research work on Canadian coals and other raw materials as a

source of activated carbon suitable for gas mask and industrial purposes; the testing of a large number of samples of coal and briquettes and of oils, including gasoline fuel oils and lubricating oils, submitted by the Department of National Defence, the Coal Administrator, and the Oil Controller.

The part-time services of five technical officers were utilized in a consulting capacity on work for the Army and Air Services of the Department of National Defence, the Chemical Warfare Laboratories, and the Department of Munitions and Supply. One senior engineer continued on transfer-loan to the Department of Munitions and Supply, another to the Office of the Oil Controller, and two others to the Special (strategic) Minerals Projects.

PURCHASE OF COAL BY SPECIFICATION

Samples submitted regularly by the Department of Pensions and National Health and by the Penitentiaries Branch, Department of Justice, were analysed in reference to the purchase of coal supplies according to specification. The facilities of the laboratories were again utilized by the Departments of Munitions and Supply and National Defence in reviewing and advising on coal tenders and in checking the quality of coal deliveries against that guaranteed by contract.

COAL ANALYSIS SURVEY

Two series of coal samples were collected and the results of analyses were reported to interested parties. These comprised commercial grades of coal as produced and shipped from the collieries, namely, seventy samples of bituminous coal from thirty-one mines in New Brunswick, and one hundred and five samples of bituminous and sub-bituminous coals from thirty-seven mines in Alberta. The Alberta analysis survey was conducted in co-operation with the Fuel Department, Canadian National Railways.

COMBUSTION ENGINEERING INVESTIGATIONS

Routine weather studies with respect to the degree-day heating load for Ottawa were continued and plans were made to extend this work in the new fiscal year to include representative cities throughout Canada. The data compiled will be of value to the fuel and heating trade requesting information along this line and when completed will be available for publication in printed form at yearly intervals.

The services of engineers of the Division were made available to other Government departments, public institutions, industrial concerns, and to individuals seeking advice on particular heating problems. Burning tests on several different kinds of coal in a station agent type stove such as is used in military hutments, and tests on the briquetting, or the making of blocks, with cement as a binder from bituminous, sub-bituminous and lignite "slack" coals were made for the Department of National Defence (Army).

A technical officer of the staff previously assigned for the duration of the war continued his services in an advisory capacity on heating problems to the Office of the Coal Administrator, the Fuel Purchasing Section of the Department of Munitions and Supply, and to the Fuel Advisers of the Army and Air Force Headquarters. This work necessitated the preparation of numerous reports and memoranda of information dealing with many phases of fuel and heating. Several conferences were also attended on interrelated problems and four field trips were made, two to Petawawa Military camp, one to Camp Borden, and one to Renfrew.

At the request of the Oil Controller, tests were made to determine the burning qualities of coloured gasolines in comparison with clear gasoline in "Coleman" lanterns. Series of tests to determine what sizes of anthracite, coke, and other solid fuels are satisfactory in chicken-brooding stoves were

made at the Central Experimental Farm in co-operation with the Poultry Division, Department of Agriculture, the results of which were published by that department.

The process for the chemical treatment of blower coals to produce a suitable clinkering ash residue on combustion was patented and made available to the public. Tests were conducted on various buckwheat anthracites for those interested in applying the process and negotiations were carried on with a view to licensing dealers to prepare treated blower coal for the coming heating season.

Meetings of Subcommittee of Producer Gas of the Associate Committee on Substitute Fuels of the National Research Council were attended by a member of the Division, and in this connection inspection trips were made to Quebec, Three Rivers, and Montreal.

COAL PREPARATION, STORAGE, CARBONIZATION, AND BRIQUETTING

The physical and chemical survey of bituminous coals from Canadian collieries was continued in two parts as during the past year. The first part, comprising a fundamental study of the coals as mined, pertained to the examination of ton-lot samples from mines in British Columbia and New Brunswick. Seven reports in mimeograph form were prepared and distributed to interested parties. The second part, consisting of the systematic collection and analysis of commercial grades of coal as shipped from the collieries, pertained mainly to the Minto-Chipman and Beersville areas in New Brunswick and to the Joggins area in Nova Scotia. When collecting the samples, general coal preparation information was gathered and, in New Brunswick in particular, studies were made on the possibility of stabilizing the coal industry by cleaning and processing the raw coal. Mimeograph reports on this study and on the results of analyses of the samples collected were prepared.

The storage of coal at military establishments was specially studied and suggestions as to the best methods of storing different kinds of coal were offered to the Department of National Defence.

Laboratory-scale tests on the coking characteristics of certain British Columbia coals were continued to determine their amenability for the production of metallurgical coke. On behalf of the Coal Administrator, an engineer conducted an investigation at the gas plant of the B.C. Electric Company to determine yields of gas, coke, and other products from various coals in order to establish subvention rates on new coals and blends not formerly used.

Other carbonization and activation investigations made during the year comprised tests conducted in co-operation with the Chemical Warfare Laboratories of the Department of National Defence, on the suitability of selected Canadian coals and other raw materials for the production of activated carbon for gas-mask and industrial purposes. A study of New Brunswick and Nova Scotia oil-shales as a source of vanadium was also made. The vanadium content of these shales and the shale oil therefrom was found to be too low to be considered a source of this metal, which is required for special steel alloys.

Interest in briquetting was maintained especially in the application of high-pressure briquetting without the use of a binder for coals varying in rank from lignite and sub-bituminous to medium volatile bituminous. A satisfactory procedure for preparing cement bound blocks from slack coal was worked out and reported to the Department of National Defence. Laboratory-scale tests on the briquetting of two different non-carbonaceous products, namely, sodium sulphate, and chromite ore mixtures, were also carried out.

HYDROGENATION AND ASSOCIATED RESEARCH WORK ON PETROLEUM OILS

The relative "Yields of Gasoline by Hydrogenation of Various Canadian Raw Materials" referred to in annual report for the previous fiscal year is amplified here by means of the following table. For the coals the yields are on the "as mined" basis. The Durham coal was used as a standard.

Material Hydrogenated District, Province (Mine)	Classification of Coals (and other material)	Estimated yield of gasoline Imperial gals./ton of 2000 lbs.
Bitumen from bituminous sands—		
McMurray, Alta	(Bitumen)	194
Coals—		
Sydney, N.S. (Princess)	Bituminous, high volatile A	143
Pittsburgh, Pa. (Burceton)	Bituminous, high volatile A	129
Durham county, England	Bituminous, high volatile A	121
Nicola, B.C. (Middlesboro)	Bituminous, high volatile B	121
Vancouver Island, B.C. (Comox)	Bituminous, high volatile A	112
Crowsnest, B.C. (Michel)	Bituminous, medium volatile	111
Inverness, N.S. (Inverness)	Bituminous, high volatile C	102
Drumheller, Alta. (Rosedale)	Sub-bituminous B	93
Saunders, Alta. (Alexo)	Bituminous, high volatile C	89
Edmonton 11 (Black Diamond)	Sub-bituminous C	78
Bienfait, Sask	Lignite	68
Onakawana, Ont	Lignite (or brown coal)	50
Peat—		
Alfred, Ont	Peat (30 per cent moisture)	59

It is also to be noted that whereas, with one exception, the high volatile bituminous coals showed prospective gasoline yields above 100 gallons per ton, the lower rank sub-bituminous and lignite coals ranged from 93 gallons for Drumheller coal down to 50 gallons for Onakawana lignite. The highest yield shown is for bitumen after extraction from Alberta bituminous sands.

Further experimental work on the high-pressure processing of Alberta bitumen by both liquid and vapour phase hydrogenation as a source of aviation gasoline and other petroleum products was begun. Reports and memoranda regarding the recovery and refining of bitumen were prepared for the Oil Controller, for Committees of the Department of Mines and Resources and of the National Research Council.

A comprehensive survey of Canadian and imported crude petroleum oils was made to determine their suitability as sources of toluene required for the manufacture of T.N.T. in the explosives industry. This survey was conducted in collaboration with the Shell Oil Company of Canada, and the Shell Development Company. The results indicate that the six crude oils that were intensively examined, are potential sources of toluene. Turner Valley crude oil gave a higher yield of toluene than any of the imported oils, and Fort Norman crude showed a toluene yield equal to the average from the Illinois, Texas, and Venezuela crudes. The results further indicate that Canada's total requirements of toluene can be produced either from the amount of Illinois crude currently imported or from the present production of Turner Valley crude oil.

Considerable experimental work on small and large laboratory scale was conducted on methods of dehydrating troublesome crude oil-water emulsions from the Vermilion field in Alberta. This was undertaken at the request of the Oil Controller on behalf of Cannar Oils, a subsidiary company of the Canadian National Railways, which has been organized to increase output in the Vermilion field.

Other work included: inspection, on behalf of the Royal Canadian Air Force, of a lubrication oil-reclaiming plant in Western Canada; hydraulic pressure tests for the Inspection Board of the United Kingdom and Canada; and certain minor investigations for the Inspection Board, the Chemical Warfare Laboratories, and the Royal Canadian Engineers.

ROUTINE CHEMICAL LABORATORY WORK

As shown below, 1,731 samples of solid, liquid, and gaseous fuels were analysed, the examination of which involved some 12,550 separate chemical and physical determinations, mostly in duplicate, of the different items of analysis. The total included 335 samples of mine air from British Columbia and Alberta; 97 samples of petroleum ash residues from Wartime Metals Corporation for vanadium content; and 455 coals and oils from the Departments of National Defence and Munitions and Supply. Although the analysis work conducted for these two departments shows an apparent decrease from about 33 per cent to 26 per cent of the total, a large proportion of the samples pertaining to divisional investigations concerned special wartime services to the National Defence and other Government departments.

	Number of samples	Per cent of total
1. Samples pertaining to investigations of Fuels Division—		
Solid Fuels	473	27·3
Coals 457		
Cokes, peat, briquettes, and miscellaneous 16		
Liquid Fuels	40	2·3
Crude oils 22		
Gasoline, fuel oils, lubricating oils, etc 18		
Gases	9	0·5
Natural gas 2		
Manufactured gas, flue gas, and miscellaneous 7		
2. Samples from other divisions of Department of Mines and Resources (including 72 samples of peat from the Industrial Minerals Division)	71	4·1
3. Samples from other Government departments—		
Department of National Defence—Army, Air, and Naval Services	358	20·7
Coals, cokes, and briquettes 211		
Gasoline, fuel oils, and lubricating oils 147		
Department of Pensions and National Health—		
Coals	40	2·3
Department of Justice (Penitentiaries Branch)—		
Coals	97	5·6
Department of Munitions and Supply (Oil Controller)—		
Gasoline	97	5·6
Other Government departments (including 97 samples of petroleum ash, from Wartime Metals Corporation)	147	8·5
Provincial Governments—mostly mine air from Alberta and British Columbia	337	19·5
Commercial firms, private individuals, etc	62	3·6
	1,731	100·0

EXPLOSIVES DIVISION

Many new plants and projects, started because of war requirements, began operation during the year. The preparation of licences for these entails much correspondence, interviews, and checking of plans with the manufacturers and designers. Inspection of new factories and plants greatly increased the work of the Division and necessitated additions to inspectional and clerical staffs. These included an inspector for the Montreal and Toronto areas and another for Western Canada. The latter was appointed to inspect magazines and new projects, including the Alaska Highway and related projects.

The administration of P.C. 2903 (July 4, 1940), which controls the sale and possession of explosives, continued to make great demands on available time. In issuing Explosives Purchase Permits required by this order the Division has had the co-operation of provincial police forces and the invaluable assistance of the Royal Canadian Mounted Police. The order has proved a useful aid in ensuring that proper precautions are being exercised by permit holders in storing and handling explosives. Permits also serve to bring to the attention of the Division purchasers whose requirements of explosives necessitate a magazine licence. In excess of 17,000 Explosives Purchase Permits were issued. The Division was greatly assisted by inspectors of the Department of Mines of the various provinces who issued Explosives Purchase Permits to mine and quarry operators. A total of 1,024 permits were issued.

The Explosives Act proved inadequate to restrain many employees of explosives factories and shell-filling plants from carrying matches and smoking in danger areas, and, accordingly, P.C. 3561 (April 30, 1942) was passed under the War Measures Act and provides penalties that, on summary conviction, must be imposed by trial magistrates. Since the passing of this order, a large number of employees of war plants have been prosecuted.

LABORATORY

The chemical and physical testing laboratory on Booth Street was transferred to new buildings in the National Research Council Annex, Montreal Road. All equipment and instruments were transferred from Booth Street and some new testing machines and apparatus such as ballistic mortar, friction pendulum, chronograph, and presses were set up. Projects related to the properties of explosives and their use were under way. The National Research Council supplied additional staff to cope with increased demands. The laboratory staff examined 243 samples, of which 25 were commercial, the remainder being samples sent for examination from sources connected with the war effort. One new explosive was added to the authorized list.

FACTORIES

There was no change in the number of commercial factories, but production of certain kinds of explosives showed a marked increase over previous years. The manufacture of commercial fireworks for display or amusement has greatly declined, largely owing to war conditions. Inspections of commercial factories were less frequent than in former years because of the demands of war factories.

INSPECTIONS

—	Factories	Magazines	Unlicensed premises
Explosives Division inspectors	269	212	485
R.C.M. Police	.....	502	2,509
B.C. Police	.....	7	.....

MAGAZINES

Magazine licensees rendered valued assistance in safeguarding explosives. Nevertheless, all holders of permanent magazine licences were again circularized, pointing out the need for continued precautionary measures. A total of 361 permanent magazine licences were in force at the end of the fiscal year; 417 temporary magazine licences were issued.

IMPORTATION PERMITS

For the importation of explosives, 380 ordinary permits, 17 special permits, and 7 special war permits were issued.

ACCIDENTS

Three accidents occurred in commercial factories, resulting in the death of four persons and injuries to eight. One accident occurred in a black powder plant, killing two men. An investigation was conducted, but the cause was not definitely determined. An accident occurred in a fireworks factory while an employee was mixing "Green Star" composition. He suffered fatal burns and injuries and six persons in the vicinity received injuries from projected debris. The probable cause of the explosion was sparks or friction generated by the operator while hand sieving the star mixture.

A number of investigations were conducted into the circumstances attending explosions in war plants and factories and special confidential reports were made.

In using and handling explosives, 38 accidents occurred in which 14 persons were killed and 37 were injured; 29 accidents resulted from playing with detonators and explosives and from miscellaneous causes, and in these six persons were killed and 162 were injured. At Dawson Creek, British Columbia, a large quantity of dynamite and detonators exploded while improperly stored in a barn near the centre of the town. A fire started in the barn and when it reached the dynamite a violent detonation took place, causing the death of at least 4 persons, injury to about 125 others, and great property damage.

PROSECUTIONS

There were 19 prosecutions under the Explosives Act of which 8 were for smoking or having matches in explosives plants, 9 for improper storage of explosives, and 2 for leaving explosives unattended during transportation. Proceedings were entered under P.C. 2903 in 29 cases, resulting in 23 convictions, 2 dismissals, and 3 withdrawals. In 9 cases proceedings were taken under the Criminal Code, 6 of which were for theft of explosives, 1 for sending a rifle bullet in the mail, and 2 for alleged sabotage. Reports were received of 156 persons being charged with infractions of P.C. 3561 for smoking or possessing matches in prohibited areas, 79 persons were convicted, 11 were dismissed, withdrawn, or adjourned, and 66 were not yet completed.

DESTRUCTION OF EXPLOSIVES

A total of 18,370 pounds of deteriorated explosives and of 3,423 detonators was destroyed.

PUBLICATIONS

Following is a list of reports issued during the year.

MINES AND GEOLOGY BRANCH

English Publications

Report No.

Separate of Annual Report for the Fiscal Year Ended March 31, 1942.

French Translation

Separate of Annual Report for the Fiscal Year Ended March 31, 1941.
Separate of Annual Report for the Fiscal Year Ended March 31, 1942

Geological Survey

2467 Memoir 235. *Snare River and Ingray Lake Map-areas, N.W.T.*—by C. S. Lord.
42–1 *Mansonville Area, Quebec*—by J. W. Ambrose. (Map only.)
42–2 *Manson Creek Area, British Columbia*—by A. H. Lang. (Map only.)
42–3 *Marble Mountain Map-area, Alberta*—by H. H. Beach.
42–4 *Brock River Map-area, Quebec*—by E. D. Kindle.
42–5 *Cypress Lake Area, Saskatchewan*—by G. M. Furnival. (Map only.)
42–6 *Princeton Area, British Columbia*—by H. M. A. Rice. (Map and descriptive notes.)
42–7 *Takla Area, British Columbia*—by J. E. Armstrong. (Map only.)
42–8 *Bassano Area, Alberta*—by J. S. Stewart. (Map and descriptive notes.)
42–10 *Eastmain Area, Quebec*—by G. Shaw. (Map only.)
42–11 *The Pinchi Lake Mercury Belt, British Columbia*—by J. E. Armstrong.
42–12 *Vassan-Dubuisson Area, Quebec*—by G. W. H. Norman. (Map only.)
42–13 *Beresford Lake Area, Manitoba*—by C. H. Stockwell. (Map only.)
42–14 *Gem Lake Area, Manitoba*—by C. H. Stockwell. (Map only.)
42–15 *Rice Lake Area, Manitoba*—by C. H. Stockwell. (Map only.)
42–16 *Athapapuskow Lake Area, Manitoba*—by A. F. Buckham. (Map with descriptive notes.)

French Translations

2469 Memoir 222. *Malartic Area, Quebec*—by H. C. Gunning and J. W. Ambrose.
42–4 *Brock River Map-area, Quebec*—by E. D. Kindle.

National Museum of Canada

None

Bureau of Mines

English Publications

807 *Industrial Waters of Canada*—by H. A. Leverin.
808 *Petroleum Fuels in Canada. Deliveries for Consumption 1927–1940*—by J. M. Casey.
Reprint of *"Prospectors Guide for Strategic Minerals in Canada"*.
Folder *"Petroleum Fuels. Deliveries for Consumption Calendar Year 1941"*.

Explosives Division

None

List of Mines, Mine Operators, Etc.

List No. 1–1, Metallurgical Works in Canada Part II.
List No. 1–2, Milling Plants in Canada Part I.
List No. 4–1, Coal Mines in Canada, January 1943.

LANDS, PARKS AND FORESTS BRANCH

R. A. GIBSON, DIRECTOR

During the year all services essential for the administration, maintenance, and care of national properties and for the government of the Yukon and Northwest Territories were provided at minimum cost. Ordinary revenues showed a decline of approximately twenty per cent due mainly to the falling off in travel as a direct result of war restrictions.

Joint Defence Projects

Pursuant to an exchange of notes between the Governments of Canada and the United States, the United States undertook as a defence project the construction of a military road from Dawson Creek, British Columbia, to Fairbanks, Alaska, to connect the airports established by Canada. Right of way for the road was provided by Canada. The route was opened in December, 1942, but there remains considerable work to be done before it will be a reliable all-weather road fit for travel in all seasons of the year.

Similarly, as a war project, the United States undertook a program for increased production of oil in the Northwest Territories and the construction of a pipeline to convey this oil to Whitehorse, Yukon Territory. Under the terms of the agreement the United States is paying the costs of the project. The Canadian Government is providing the sites for structures and rights of way essential to the project, and is also making oil rights available under appropriate regulations.

These defence construction activities in the Yukon and Northwest Territories have caused many new problems in local government and in natural resources administration, but all questions at issue were solved promptly in the best interests of all concerned.

Resources Developed

Mining activity in the Northwest Territories was featured by the re-opening of the Eldorado Gold Mines Limited property at Great Bear Lake. Both the mine and mill, which were closed temporarily in 1940 as a result of the loss of European markets, are now in full operation. Although several mines in the Yellowknife area were forced to suspend operations temporarily owing to difficulties in obtaining labour, gold production for the region amounted to $3,642,148, an increase of $475,425 over the previous year.

Placer gold production in Yukon Territory also showed a marked increase. Operations produced 105,430 ounces valued at $3,690,081, a gain of 17,988 ounces valued at $629,580. Promising discoveries of scheelite, the tungsten-bearing mineral, were made late in 1942 in the Johnson Creek area.

Fur continued to be an important resource in the Northwest Territories and in some regions both Arctic and coloured foxes appeared to be at their peak of abundance. Good fur prices continued, and as a result the need for indigent relief among the native population has been greatly reduced.

The National Parks continued to fulfil a very important function in war time by providing members of the armed forces, as well as civilians, with convenient and suitable places for rest and recreation.

As a result of war conditions, increased demands on Canada's forest products were made during the year, and notwithstanding a growing shortage of labour, production was maintained almost at the level of the previous year.

Officers of the Dominion Forest Service collaborated with war services as technical advisors in all problems relating to wood. The Forest Products Laboratories were engaged almost exclusively in war work of various types, and very effective assistance was extended to other Government departments in meeting a wide variety of problems.

The use of Alternative Service Workers, including Mennonites and other conscientious objectors to military service, was continued in National Parks and Forest Experiment Stations, and much useful work was accomplished in the field of forest conservation. Supervision of forest protection work undertaken by these workers in British Columbia was also carried out by officers of the Branch.

While the exigencies of war have made serious inroads on the personnel of the Branch, the necessary work has been sustained with a reduced staff. Acknowledgment is made to members of the staff who, despite additional duties and longer hours, have continued to carry out their responsibilities in a loyal, conscientious, and efficient manner; also to those in other Government services who have furnished helpful co-operation. To members of the staff in the armed forces, our best wishes are extended. As this report is written we have learned with deep regret of the death on active service of Dr. H. M. Rogers, one of our brightest young technical men, who was serving as a pilot with the Royal Canadian Air Force.

BUREAU OF NORTHWEST TERRITORIES AND YUKON AFFAIRS

NORTHWEST TERRITORIES

The Northwest Territories comprise that portion of the mainland of Canada lying north of the Provinces of Manitoba, Saskatchewan, Alberta, and British Columbia and east of Yukon Territory, the islands in Hudson and James Bays and in Hudson Strait including Ungava Bay, and the vast Arctic Archipelago. The estimated total of land and fresh-water areas of the Northwest Territories is 1,309,682 square miles. According to the 1941 census, the population of the Territories was 12,028.

The Commissioner of the Northwest Territories in Council has power to make ordinances for the government of the Northwest Territories in relation to such subjects as are designated by the Governor in Council. The seat of Government is at Ottawa.

Council

Commissioner—Charles Camsell.
Deputy Commissioner—R. A. Gibson.
Members of Council—A. L. Cumming, K. R. Daly, H. L. Keenleyside, H. W. McGill, S. T. Wood.
Secretary—D. L. McKeand.

Work of Council

Eleven regular and 10 special sessions of Council were held during the year. Assent was given to ordinances respecting safety precautions in mining, employment agencies, and the control of venereal disease. Amendments were made to the following ordinances: Local Administrative District; Territorial Liquor; Workmen's Compensation and Unemployment Insurance; Motor Vehicle; and Steam Boiler and Pressure Plant.

In addition, matters of policy were discussed in connection with the Eastern Arctic Patrol; Eskimo affairs; appointment of Territorial officers and commissioners; Northwest Game Act and Regulations; transportation systems; hospital

and medical services; extension of educational facilities at Yellowknife; sale of liquor; formation of a committee for a nutritional survey; agricultural survey of Mackenzie District; establishment of meteorological stations on Arctic Islands; expansion of oil drilling program at Norman Wells; and private commercial radio services.

Administration

The Lands, Parks and Forests Branch is responsible for the administration of the various acts, ordinances, and regulations pertaining to the Northwest Territories. To facilitate departmental administration there is a Superintendent for the Eastern Arctic and one for the Mackenzie District. A departmental agent is stationed at Fort Smith, N.W.T. and this officer is also Superintendent of Wood Buffalo National Park, Agent of Dominion Lands, Crown Timber Agent, Mining Recorder, Stipendiary Magistrate and Marriage Commissioner. The Sheriff of the Northwest Territories is also stationed at Fort Smith. The Mining Recorder, Agent of Dominion Lands, and Crown Timber Agent for the Yellowknife Mining District, which includes what was formerly known as the Great Bear Lake Mining District, is stationed at Yellowknife. The Mining Recorder for unorganized districts is located at Ottawa while Sub-Mining Recorders are located at Ottawa, Edmonton, Simpson, Norman, Aklavik, Coppermine, and Port Radium.

Medical Officers

The Northwest Territories has been divided into nine medical districts and two sub-districts over which medical officers of the Department of Mines and Resources have jurisdiction. These officials have their headquarters at Fort Smith, Resolution, Simpson, Norman, Norman Wells, Aklavik, Great Bear Lake (Eldorado Mine), Yellowknife, Chesterfield, and Pangnirtung, and on the vessel carrying the annual Eastern Arctic Patrol.

All doctors have been appointed Coroners and Medical Health Officers under the Public Health Ordinance. Some of the doctors make patrols to outlying areas and all make use of the radio-telegraph service in prescribing for those who are unable to obtain treatment at the medical headquarters. The Department of Pensions and National Health in Ottawa serves as a consulting agency in matters of public health, and has undertaken a nutritional study in the Northwest Territories. All Government medical officers in the Territories have recourse to the medical services of the Department of Pensions and National Health in connection with complicated cases or epidemics, and the desired information is usually transmitted by radio.

A qualified medical officer accompanies the annual Eastern Arctic Patrol. In addition to serving as Ship's Doctor, he examines and treats the natives at each port of call, and submits a report of his activities together with any recommendations necessary for improvement of the medical service.

Hospitals

Eleven hospitals were in operation in the Territories during the year. Ten of these were operated by the Missions of the Roman Catholic Church and Church of England in Canada, and one by the mining interests at Yellowknife. The Mission hospitals are situated at Fort Smith, Resolution, Hay River, Simpson, Norman, Aklavik (2), Rae, Chesterfield, and Pangnirtung. Under a special arrangement the Northwest Territories Administration pays the Mission hospitals $2.50 per diem for the care of indigent whites, Eskimos, and half-breeds who are admitted on the recommendation of the resident Medical Officer. The aged and infirm are cared for in Industrial Homes operated in conjunction with the Mission hospitals at Aklavik, Chesterfield, and Pangnirtung. These inmates are likewise admitted on the recommendation of the

departmental Medical Officers, the Missions receiving $200 per annum for their care and maintenance. During the year the sum of $31,530 was paid for the care of destitute patients in the hospitals, representing approximately 12,612 days of treatment. Twenty-seven patients were accommodated in the Industrial Homes at a total cost of $4,281.65. Thirteen patients were treated in Provincial Mental Institutions at a cost of $4,962.18. The above figures do not include amounts paid by the Indian Affairs Branch for services to Indians only.

Schools

Residential and day schools are operated by the Church of England and Roman Catholic Missions. The residential schools are located at Resolution, Providence, and Aklavik (2), while the Mission day schools are located in the principal settlements. Owing to the nomadic tendencies of the natives some of the day schools in outlying areas are only operated during certain periods of the year when the natives are in the vicinity. During the year 131 children attended the residential schools and 214 pupils attended the day schools.

In addition to the residential and day schools operated by the Missions, public schools are operated at Fort Smith and at Yellowknife. During the year 78 pupils attended these schools. Grants totalling $24,728.33 were paid to the various schools and for the maintenance of indigent children in the residential schools. A quantity of school supplies was also furnished.

The above figures do not include amounts paid by the Indian Affairs Branch for the maintenance and education of Indian children.

Law and Order

Law and order in the Territories are maintained by the Royal Canadian Mounted Police. Detachments have been established at the more important settlements and extensive patrols are made to outlying areas. To facilitate the administration of justice, five Stipendiary Magistrates have been appointed.

Liquor Permits

The Saskatchewan Liquor Board as Territorial Liquor Agent continued the operation of the liquor business in the Northwest Territories under the direction of the Northwest Territories Administration. The principal developments during the year were (*a*) the opening of a liquor store at Fort Smith in June, 1942, as a result of increased activity in the Mackenzie Basin, and (*b*) liquor restrictions imposed as a result of Wartime Alcoholic Beverages Order, 1942.

The net profits from the operation of the Territorial liquor stores amounted to $94,182.68, of which $44,745.67 was derived from the Yellowknife store and $49,437.01 from the Fort Smith store. This amount, in addition to $940 derived from fines under the Territorial Liquor Ordinance, was placed in the special liquor fund for territorial purposes. The balance in this account as of March 31, 1943, was $160,953.20. The revenue from fines for liquor offences under the Northwest Territories Act amounted to $162.50, and $105 was obtained from the sale of liquor permits at Ottawa.

During the fiscal year, 1,086 Class "A" annual permits and 12,065 Class "D" local daily permits authorizing the purchase of liquor were issued in the Northwest Territories. The Class "D" permits were discontinued at the end of March, 1943, because of the necessity of recording on a single permit all purchases made by a permittee during a monthly period. The liquor permits issued at Ottawa included one Class "B" permit to a minister of the gospel authorizing the importation of sacramental wine, and 71 Class "C" permits covering the importation of limited quantities of spirits, wine, or beer. The sales of liquor at the Territorial liquor stores during the fiscal year were approximately 5,450 gallons of spirits, 1,780 gallons of wine, 3,930 gallons of ale and stout, and 19,950 gallons of beer. The importation permits covered 112 gallons of spirits, 4 gallons of wine, and 3 barrels of beer.

Lands and Timber

Surveyed Lands.—A total of 12 lots was sold and patented in settlements as follows: Fort Smith, 4 lots; Hay River, 2 lots; Arctic Red River, 1 lot; and Aklavik, 5 lots. At Port Radium Settlement 9 surface leases are in force and at Yellowknife Settlement 172 such leases have been issued. These leases are for five-year periods.

Unsurveyed Lands.—Small parcels of unsurveyed land suitable for agricultural and fur-farming purposes, as well as tracts with water frontage suitable for transportation and shipping interests, are leased under the provisions of Chapter 113, R.S.C. 1927. The issuing of each lease is authorized by an Order in Council and the number of such leases in force is 35.

Twenty-three permits to occupy land during the pleasure of the Department have been granted. There are 6 grazing leases in force, and, during the year, 2 hay permits were issued under which 70 tons of hay were cut.

During the year 9 assignments affecting lands were registered in the Department.

Timber.—The number of timber permits issued, exclusive of those granted in connection with timber berths, was 161, authorizing the cutting of 24,086 linear feet of timber, 60,000 feet board measure of saw-timber, 300 roof poles, and 15,642 cords of wood. Thirty-six of these permits were issued free of dues to educational, religious, and charitable institutions, to settlers for domestic use and to Government departments. Six timber permit berths were granted.

In addition 7 free permits were granted to contractors on the "Canol Project" authorizing the cutting of 9,000 linear feet of building logs and 813,000 feet board measure of saw-timber in addition to timber for culverts, corduroy, and telephone, telegraph, and electric light poles.

The revenue derived from lands, timber, grazing, and hay was $14,852.95.

Mining

The local administration of mineral resources of the Mackenzie District, Northwest Territories, is conducted through the offices of the Mining Recorders at Fort Smith and Yellowknife, Sub-Recorders being located at Edmonton, Alberta, and at Port Radium, Norman, Aklavik, Coppermine, and Simpson, Northwest Territories.

Mining activity during the year was featured by the re-opening of the Eldorado Gold Mines Limited property at Echo Bay on Great Bear Lake. This development, which has become widely known for its rich veins of radium-bearing and silver ore, was temporarily closed in 1940 mainly as a result of the loss of European markets. Since re-opening the mine in August, the No. 1 shaft has reached a depth of 822 feet and the No. 2 shaft a depth of 140 feet. In all more than 4 miles of lateral work has been done on the seven levels of the mine. The mill, having a capacity of 100 tons in 24 hours, was in full operation, producing between 150 and 200 tons of concentrate monthly. This concentrate is shipped by way of Great Bear Lake and Mackenzie, Slave, and Athabaska Rivers to railhead at McMurray, Alberta, to be transported to the company's refinery at Port Hope, which produces radium and uranium salts. By the end of the year 154 men were employed.

Three gold mines in the Yellowknife area were forced to close temporarily owing to the difficulty experienced in obtaining labour, equipment, and supplies. However, the Con, Rycon, Negus, and Thompson-Lundmark Mines maintained regular production. During the year a total of 94,861 ounces of gold, having a value of $3,642,148 was produced, compared with a production valued at $3,166,723 in the previous year. The silver produced during the year was 21,968 ounces valued at $9,377.

During the year 110 miner's licences, 172 renewal licences, and 185 quartz grants were issued. Representation work was performed on a number of mineral claims for which certificates of work were issued and at the end of March, 3,161 claims were in good standing. Leases have been issued comprising an area of 11,621·05 acres. The total revenue from fees payable under the Quartz Mining Regulations amounted to $10,430.95, including $4,678.15 collected as miner's licence fees.

At the "Con" mine of the Consolidated Mining and Smelting Company of Canada, Limited, the main shaft has a depth of 1,465 feet and 10 levels have been opened up with lateral work of nearly 7 miles. At the end of March the mill was treating about 170 tons of ore daily, the production for the year being 40,338 ounces of gold and 11,104 ounces of silver, compared with 33,140 ounces of gold and 7,986 ounces of silver during the past fiscal year. The Rycon Mines, Limited, property adjacent to the "Con" mine, was operated by the Consolidated Mining and Smelting Company and production for the year amounted to 2,834 ounces of gold and 763 ounces of silver, compared with 4,661 ounces of gold and 1,055 ounces of silver during the past year. A 2,500-foot drive connects the "Rycon" and "Con" mines and ore from the former is hauled along this drive to a separate bin in the "Con" mill.

Production from the "Negus" mine for the year was 19,463 ounces of gold and 3,983 ounces of silver, compared with the previous year's production of 18,496 ounces of gold and 3,381 ounces of silver. The mine has been opened by a three-compartment vertical shaft to a depth of 885·5 feet and more than 14,100 feet of lateral work has been completed on the seven levels. An 80-ton mill is in operation. Production from the 100-ton mill on the Thompson-Lundmark property amounted to 22,534 ounces of gold and 4,408 ounces of silver for the year, compared with 3,956 ounces of gold and 836 ounces of silver for the previous year. The main No. 2 shaft, inclined at 47 degrees, has been sunk to 834 feet on the Fraser vein. The Kim vein, 2,500 feet farther south, has been opened by an inclined shaft to a depth of 694 feet, and about 5,597 feet of lateral work has been done on the five levels of the mine. The first gold brick produced at the Ptarmigan Mines, Limited, property, about 10 miles north of Yellowknife Settlement, was poured on January 4, 1942, and from that date to the temporary closing of the mine in September, 11,920 ounces of gold and 2,526 ounces of silver had been produced. The mill treated 160 tons daily. This property was opened by a three-compartment vertical shaft to a depth of 924 feet. In the Francois Lake area, about 58 miles east of Yellowknife Settlement, the Ruth mine of Consolidated became a producer during the past summer. This mine, however, was closed about the end of August after operating for a brief period. The shaft has a depth of 230 feet with two levels, and the mill has a capacity of 25 tons a day. This property is situated near the Gilmour Lake area where scheelite discoveries were made in 1941. The International Tungsten Mines, Limited, successor to the Slave Lake Gold Mines, Limited, carried on mining and milling operations at its Outpost Island gold-tungsten claims until September, 1942, when the property was again closed. This mine was opened by a two-compartment vertical shaft to a depth of 525 feet with five levels and one sub-level. Approximately 44 tons of ore were treated daily in the amalgamation-flotation mill. About 10,000 ounces of gold were produced from this property in addition to the tungsten and copper concentrates shipped for treatment.

Coal.—Two coal mining leases are in force, comprising an area of 293 acres, the revenue from which amounted to $107 for the year.

Petroleum and Natural Gas.—Petroleum and natural gas leases affecting lands in the Northwest Territories comprise a total area of 3,173·33 acres. Revenue from this source amounted to $480. Rentals satisfied from drilling

credits totalled $1,253.33. One oil and gas permit is in force, comprising an area of 212·10 acres. Petroleum produced from the wells of Imperial Oil, Limited, north of Norman on the Mackenzie River, amounted to 82,000 barrels compared with 23,776 barrels obtained during the previous year. This increase was the result of an extensive exploratory drilling program undertaken in the area with a view to increasing the flow of crude to meet war needs. More than 20 new holes have been drilled. The refinery unit erected on the company's property continued to operate and produced aviation gasoline, aviation base gasoline, motor gasoline, and light and heavy diesel oil.

Dredging.—Two dredging leases are in force in the Northwest Territories, comprising two 5-mile stretches of Grizzly and Bennett Creeks. Revenue from these leases for the year amounted to $107.

The Canol Project

Authorized by an exchange of notes between the Governments of Canada and the United States, the Canol Project is a joint defence undertaking involving: (1) a program of development designed to increase the production of oil in the Northwest Territories to supply the requirements of the armed forces in Canada and Alaska and for use along the Alaska Highway; (2) the construction of a pipeline to convey crude oil from Norman Wells in the lower Mackenzie region to Whitehorse, Yukon Territory; (3) the erection of an oil refinery at Whitehorse.

Under the terms of the agreement between the two Governments, the United States is paying the costs of the project and the Canadian Government is providing sites for structures and rights of way essential to the project, and is also making oil rights available under appropriate regulations. The Canadian Government has also agreed to facilitate the entry into Canada of equipment, labour, and personnel for construction and maintenance of the project, and to waive import duties, taxes, and licence fees. Royalties on oil produced under this project are also waived for the duration of the war.

The United States retains ownership of the pipeline and refinery until the end of the war, at which time they will be offered for sale, with the Canadian Government being given prior right of purchase. Failing a satisfactory sale being made, the disposition of the pipeline and refinery will be referred to the Permanent Joint Board of Defence. Title to the land through which the pipeline runs remains in the Crown in the right of Canada.

The movement of equipment and supplies northward from railhead at Waterways, Alberta, was commenced late in the spring of 1942, and the regular transportation companies operating along the Mackenzie River transport route moved a greatly increased volume of freight to Norman Wells. United States Army engineers also used numerous barges and pontoons for transporting supplies to their destination during the season of navigation. Some equipment and supplies were also transported to Norman Wells over winter roads constructed to link up with existing routes.

The results of drilling operations to date have been encouraging, although it has not been possible to measure production accurately as adequate storage facilities are not yet available. Construction of the pipeline has been commenced.

Northwest Game Act and Regulations

No person except a native-born Indian (or half-breed leading the life of an Indian) or an Eskimo (or half-breed leading the life of an Eskimo) shall engage in hunting or trapping any game protected under the Regulations without first securing a licence to do so.

The following are eligible for hunting and trapping licences:—

(1) Residents of the Northwest Territories, as defined by these Regulations, who on May 3, 1938, held hunting and trapping licences and who continue to reside in the Northwest Territories.

(2) The children of those who have had their domicile in the Northwest Territories for the past four years, provided such children continue to reside in the Northwest Territories.

(3) Such other persons as the Commissioner of the Northwest Territories may decide are equally entitled to licences under these Regulations.

Only British subjects with four years' residence in the Northwest Territories are eligible for licences under Clause 2. A minor under the age of fourteen years shall not be eligible for a licence. A minor assisting his parents or guardians in connection with hunting or trapping operations will not require a licence.

Wood Buffalo Park.—The regular patrols by the warden service were maintained. A winter road which gives access to the northern portion of the park has facilitated patrols in that area.

Fur conservation projects have produced only moderate results because there has been no high water period to flood the conservation area. As soon as this occurs a great increase in the number of muskrats is expected.

Fur and Game.—The catch of white fox was satisfactory in many areas and in the Mackenzie District the number of coloured foxes appeared to be at a peak. There has been no diminution in the muskrat catch although recent studies indicate that they are subject to periodic fluctuations.

Woodland caribou have suffered severely from forest fires which destroyed much of their range. Forest fires in certain wintering areas of the barren ground caribou have also affected this species adversely. At least 25 years is required for the regeneration of caribou range destroyed by fire. Barren ground caribou are reported to be increasing in the areas immediately west of Hudson Bay and north of Great Bear Lake.

Nine fur farms were licensed to operate in the Northwest Territories during the fiscal year.

Beaver continue to thrive on the preserves in James Bay operated by the Hudson's Bay Company.

Comparative figures of the number of big game animals and birds taken during the licence years ended June 30, 1941, and 1942, and the average for the 5 years ended June 30, 1941, follow:—

	Year ended June 30		5-year average 1937–41
	1942[1]	1941[1]	
Big Game—			
Caribou	19,223	18,189	16,849
Deer	71	77	46
Moose	1,417	1,212	992
Sheep	77	51	58
Game Birds—			
Ducks	13,026	11,510	9,870
Geese	835	838	859
Grouse	1,293	535	435
Partridge	1,742	2,602	1,878
Prairie chicken	2,882	1,841	1,383
Ptarmigan	9,252	10,703	6,858

Licences, Permits, and Revenue.—Comparative statement of licences and permits issued, and revenue derived under the Northwest Game Act.

	Licences Year ended June 30		5-year average 1938–42
	1943	1942	
Hunting and Trapping—			
Resident	559	551	516
Non-resident bird licence	28	8	15
Trading and Trafficking—			
Resident	114	117	127
Non-Resident	7	4	6

	Permits Year ended June 30		5-year average 1938–42
	1943[2]	1942[1]	
To establish trading posts	20	13	19
To take mammals	3	4	3
To hunt and trap in Wood Buffalo Park	334	341	343
To take migratory birds	11	17	13
To take scientific specimens	2	4	8
To take quota (15) beaver	770	1,424	1,355

Revenue under Northwest Game Act for fiscal years ended March 31, 1942 and 1943 and average for 5 years 1938-42 is shown hereunder:—

	Fiscal Year		5-year average 1938–42
	1943	1942	
Hunting licences	$ 1,088 07	$ 1,060 01	$ 1,365 02
Trading licences	1,935 00	1,529 29	2,007 66
Bird licences	315 00	155 00	82 60
Fur farm licences	16 00	26 00	21 20
Trading post permits	18 00	15 00	24 00
Sale of furs	1,491 60	700 60	561 98
Fur Export Tax	102,367 16	103,736 39	86,045 28
Fines and forfeitures	425 40	682 56	555 82
Sub Totals	$107,656 32	$107,904 85	
Revenue under the Businesses, Callings, Trades and Occupations Ordinance Fiscal year ended March 31, 1943	5,893 50	5,942 50	
	$113,549 82	$113,847 35	

Infraction of Game Laws.—There were 13 prosecutions for infraction of the game laws. Convictions were secured in all cases.

Reindeer

The reindeer herds in the Mackenzie Delta area continued to make progress. At the annual count of the deer in the summer of 1942 there were 5,607 animals in the main herd on the reserve, 2,473 in Native Herd No. 1 near Anderson River and 1,294 in Native Herd No. 2 near Horton River, a total of 9,374 head, including more than 2,000 fawns.

[1]These figures may differ slightly from those recorded in the Annual Report for 1941–42 because of additional returns received after that report was printed.
[2]Subject to revision as additional returns are received.

The slaughter of surplus stock from the main herd took place in September and November, 1942, and March, 1943, with occasional slaughters from time to time for immediate needs. About 370 deer from this herd were taken for meat during the fiscal year. One hundred carcasses were allotted to the Mission hospitals and residential schools in the district. The revenue from the sale of reindeer products from the main herd amounted to $3,469.70.

In February, 1943, a sale of meat from Native Herd No. 1 to the residents of Aklavik was arranged. The herd was driven to the main station on the reserve and 306 deer of the best meat stock were slaughtered. This was the first large sale of meat from the native herds. The proceeds amounted to $7,475.50.

The number of apprentice herders in training was increased during the year by several young natives from the Coronation Gulf area. Dr. C. H. D. Clarke, Mammalogist of the Department, visited the northern Mackenzie District and investigated conditions pertaining to the development and extension of the reindeer industry.

Eastern Arctic Patrol

The annual Eastern Arctic Patrol sailed from Montreal on the R.M.S. *Nascopie* of the Hudson's Bay Company on July 8, and returned to Port Alfred, Quebec, on November 19. The work of the patrol continued to be heavy, as Government radio stations at Resolution Island, Cape Hopes Advance, Nottingham Island, Port Harrison, P.Q., and Chesterfield were serviced. Owing to the extra duties imposed, the added tonnage of freight handled, and the unfavourable weather encountered, the patrol was unable to reach Fort Ross on Bellot Strait. Nevertheless, a total of 36 calls was made.

D. L. McKeand again was Officer in Charge of the Government party. Dr. Keith F. Rogers served as medical officer from Montreal to Chesterfield. At Chesterfield, Dr. W. N. McKee boarded the *Nascopie* and assumed the duties until reaching Pangnirtung, where he relieved Dr. J. D. Bildfell who was returning to private practice. Dr. Bildfell carried out the duties of medical officer for the remainder of the voyage.

The health of the Eskimos was reported as generally good. Medical examinations were conducted at various ports of call, and natives requiring hospital treatment were taken to Chesterfield or Pangnirtung. A number of Eskimos were transferred from unproductive to more fruitful hunting areas. Relatives of Eskimos transferred the previous year also were moved to the new hunting grounds.

Game was reported as very plentiful, the peak in the Arctic fox cycle of abundancy having been reached in 1941-42. In some areas the catch was an all-time record, and prices for furs rose to new high figures. The stocks held by trading companies for barter consequently were soon exhausted but at many posts merchandise paid for was held for future delivery. At other points substantial cash credits were entered on the books.

The system of identification of Eskimos by means of numbered disks which was inaugurated in 1941 was found to be working in a very satisfactory manner, and disks for recent additions to the population were distributed.

Supplies and mail were delivered at various posts, and medical officers, Royal Canadian Mounted Police, and radio operators were relieved where necessary. The postal service of the patrol continued to show an increase in the volume of mail matter handled. A substantial sale of bonds of the Third Victory Loan was made to white residents stationed at northern posts.

Yellowknife Administrative District

The Local Trustee Board of five members held 15 Board Meetings and passed three by-laws covering respectively the assessment of property, rate of taxation, and establishment of a voluntary fire brigade.

Aids to Navigation

Under the direct supervision of the District Agent, aids to navigation were maintained for the Department of Transport at points on the Mackenzie River between the delta of Athabaska River and Great Bear Lake. During the season of navigation there was a large increase in river traffic due to recent developments, and extra aids were placed on the stretch of river from Fort Smith to Norman Wells.

Public Improvements

To facilitate defence activities the two Fort Smith portage roads were greatly improved, one-way traffic was established, and cut-offs built between the two roads at each mile-post. The road from Fort Smith to Bell Rock was re-aligned and improved. Construction of a winter road from Bell Rock to Hay River, a distance of 193 miles, was undertaken, and with the exception of the last 60 miles, was brought to a good standard. The Grimshaw-Hay River road was improved, and winter roads completed from Alexandra Falls to Providence and Mills Lake, and from Fort Nelson to Simpson. Construction of a winter road from Providence to Norman Wells was also commenced.

A first class airport, equipped for year-round operations, was built at Fort Smith. Landing fields were also constructed at Resolution, Hay River, Providence, Simpson, and Norman Wells. Use of these fields will eliminate the interruption of flying operations formerly experienced by water-based aircraft during the periods of "freeze-up" and "break-up".

YUKON TERRITORY

Yukon Territory has an area of 207,076 square miles. It is bounded on the south by British Columbia and Alaska; on the west by Alaska (longitude 141 degrees west); on the north by the Arctic Ocean; on the east by the Northwest Territories. Most of the Yukon's present population is found in three areas; the northern or Dawson District, the southern or Whitehorse District, and the Upper Stewart River or Mayo District. According to the 1941 census, the population of Yukon Territory was 4,914.

The Yukon was created a separate territory in June, 1898. Provision is made for a local government composed of a Chief Executive, called the Controller, also an Elective Legislative Council of three members, with a three-year tenure of office. The Controller administers Government measures and works under instructions from the Governor General in Council or the Minister of Mines and Resources. The Controller in Council has power to make ordinances dealing with the imposition of local taxes, sale of liquor, preservation of game, establishment of territorial offices, maintenance of prisons and municipal institutions, issue of licences, incorporation of companies, solemnization of marriages, property and civil rights, administration of justice, and generally all matters of local and private nature in the Territory.

Territorial Council

Controller, Yukon Territory—G. A. Jeckell, Dawson

Seat of Government—Dawson, Y.T.

The following is the Yukon Council elected November 25, 1940: Dawson District (vacant); Whitehorse District, Willard Leroy Phelps; Mayo District, Richard Gordon Lee.

Work of Council

The Yukon Council was summoned to meet on April 23, 1942, but was adjourned until July 17. The Council was prorogued on July 21, 1942. The annual supply bill and an ordinance to provide for the maintenance of children

of unmarried parents were passed. Amendments were made to the Gasoline and Fuel Oil Tax, Assessment, Yukon Health, Income Tax, Poll Tax, Motor Vehicle, Yukon Game, Workmen's Compensation, Judicature, and Dogs Ordinances. A number of these amendments were designed to meet conditions created by the construction of the Alaska Military Highway and associated projects.

Administration

The Lands, Parks and Forests Branch of the Department at Ottawa is responsible for the transaction of business arising from the general administration of the Territory under the Yukon Act and Ordinances passed by the Territorial Council; for the disposal of lands under the Dominion Lands Act; for the administration of the Yukon Placer and Quartz Mining Acts; and for the collection of revenue.

For local purposes, the Territorial Government raised $165,812.93. The Dominion grant to the local government was $60,000, in addition to a special grant of $20,000 for construction of a bridge over McQuesten River and a road to Dublin Gulch.

Alaska Military Highway

Pursuant to an exchange of notes between the Governments of Canada and the United States early in 1942, the United States Government was given authority to proceed with the construction of what is known as the Canadian section of the Alaska Military Highway. This project is now defined as a military road from Dawson Creek, British Columbia, to the western boundary of Yukon Territory, a distance of approximately 1,259 miles, with branch roads totalling approximately 200 miles to connect up the airports on the Northwest Staging Route.

The road follows generally the air route through the region, touching Fort St. John and Fort Nelson, B.C., Watson Lake and Whitehorse, Y.T., and connecting with the Richardson Highway in Alaska. The distance from Dawson Creek, B.C., to Fairbanks, Alaska, the northern terminus of the route, is approximately 1,574 miles, of which 1,259 miles are in Canadian Territory and 315 in Alaska.

Under the terms of the agreement between the two governments, the cost of constructing the road and of maintaining it has been assumed by the United States Government. The Canadian Government is providing rights of way free of charge; waiving import duties, sales taxes, and licence fees, facilitating the admission of labour and supplies from the United States; and permitting those in charge of construction of the road to obtain timber, gravel, and rock on Crown lands in the neighbourhood of the right of way. In addition the Canadian Government has undertaken the construction of new landing fields and the improvement of established airports along the highway route.

The United States Government has also undertaken to maintain the road until the termination of the war and for six months thereafter unless the Canadian Government at an earlier date prefers to assume responsibility for the maintenance of that part situated in Canada. At the conclusion of the war that part of the road which lies in Canada shall become an integral part of the Canadian highway system, subject to the understanding that there shall at no time be imposed any discriminatory conditions in relation to the use of the road as between Canadian and United States civilian traffic.

Construction operations were commenced early in March, 1942, and on November 20, 1942, the pioneer road was formally opened for truck traffic, approximately four months ahead of schedule. More than 100 bridges were built along the right of way to carry traffic, the majority constructed of native

timber. Many of these bridges are of a temporary nature, and will be replaced as required by permanent structures. In the construction of the road, the services of a number of Canadian construction companies were utilized by the United States Public Roads Administration. A permanent official of the Lands, Parks and Forests Branch, Department of Mines and Resources, has acted as Canadian liaison officer for the project.

The new road is not available for ordinary civilian travel, and all unalienated lands in Yukon Territory within one mile of the right of way have been reserved from entry or disposal for the present. Bona fide prospectors for minerals of strategic importance, however, may be permitted to use the highway on production of suitable credentials to the Traffic Control Board.

Mining

There was a marked increase in placer gold production during the year. Placer mining operations produced 105,430·90 ounces of gold, the value of which, at $35 an ounce, is $3,690,081. This figure represents an increase of 17,988·30 ounces as compared with the previous year, due mainly to the increased production of Yukon Consolidated Gold Corporation, Limited.

In the Mayo District, the most important placer operations were those conducted on Haggart Creek, Dublin Gulch, and Highet Creek. In addition to the gold produced on Dublin Gulch, scheelite concentrate was recovered and shipped to this Department at Ottawa. Intensive search for this strategic war mineral continued.

Entries were granted for 156 placer and 61 quartz mining claims staked and applied for during the year, and 2,981 such claims were renewed for another year. As no leases of quartz mining claims were granted or cancelled the area held under lease remained the same as last year, namely, 5,310·81 acres.

Gold Royalty.—The total amount collected for royalty on gold obtained from placer deposits up to March 31, 1943, was $5,306,253.63, of which amount $39,536.80 was collected during the fiscal year.

Dredging Leases.—Three leases to dredge for minerals in the beds of rivers in the Territory are in force, and comprise a total river stretch of about 14½ miles. The rental received from this source up to March 31, 1943, amounted to $210,785.47, of which $144.30 was collected during the fiscal year. These leases comprise portions of the bed of the Klondike River. For the purpose of gold recovery 11 dredges engaged in mining in Yukon Territory, many of these dredges are operated by hydro-electric power.

Hydraulic Mining Locations.—The regulations for the disposal of hydraulic mining locations were withdrawn by Order in Council dated February 2, 1904, but the leases then in force were not affected by such withdrawal. Four hydraulic mining locations are still held under lease, comprising a total stretch of approximately 16 linear miles. Rentals amounting to $213,531.50 have been collected on account of such locations, the amount received during the fiscal year being $2,390.

Coal Leases.—Four coal mining leases, comprising in all an area of 107 acres are in good standing. The revenue for the year from this source amounted to $119.66.

Placer Mining Claims

The total number of placer claims in good standing at the close of the year was 2,715, most of which are held by the Yukon Consolidated Gold Corporation, Limited. Ten dredges were operated by this company during the season and these produced 73,530 fine ounces of gold and 15,610 fine ounces of silver. The

company employed an average of 282 men, the peak during the operating season being 471, and expended $975,080.70 for salaries, wages, and power. A further sum of $298,526 was spent for equipment, supplies, and freight.

The greater part of the 105,430·90 ounces of gold produced during the year was from the Dawson District. The Mayo District produced 2,218 ounces and the Whitehorse District, 642·28 ounces.

Lode Mining

Dawson District.—Entries were granted for 11 quartz claims staked during the year and development work was conducted on 109 claims previously staked.

Mayo District.—Fifty quartz claims were located during the year and development work was undertaken on 338 others. Since the closing of the mine formerly operated by Treadwell-Yukon Corporation, Limited, operations in this area have been carried on mainly by individuals. The gross value of the 1,150·65 dry tons of concentrates shipped during the year was $303,688.66, the net value being $207,692.81. These concentrates produced 52·74 ounces of gold, 489,276 ounces of silver, and 1,391,647 pounds of lead. Promising discoveries of scheelite ore were made late in 1942 on Lynx Fork, Cement, and Scheelite Creeks in the Johnson Creek area. Development work on these properties is now being carried out.

Prospecting Leases

Prospecting leases representing a total stretch of 108 miles were issued during the year, comprising locations on several water courses, a decrease of 128 miles as compared with the previous year.

Assay Office

The Assay Office was maintained as usual at Keno by the Territorial Government. A total of 1,777 samples of rock for assay were received from all parts of the Territory, and 1,156 assays or quantitative analyses were made. In addition, numerous qualitative determinations and chemical tests were made in connection with the identification and classification of the various rocks and minerals of which no record was kept. The assays made were gold and silver, 1,156; lead, 574; tungsten, 22; antimony, 8; zinc, 7; copper, 6; iron, 2; and sulphur, 2.

Lands and Timber

Lands.—One agricultural lease, 1 permit to occupy and 2 hay permits were granted; 7 renewal leases were issued and 1 waterfront lease was cancelled. There are now in force 22 homestead entries, 10 agricultural leases, 23 waterfront leases, 2 miscellaneous leases, and 17 permits to occupy. Ten lots were sold for which patents were issued. The revenue derived from lands amounted to $5,739.12.

Timber.—Ninety-eight permits were issued authorizing the cutting of 1,305,000 feet board measure of saw-timber and 13,658 cords of wood. There are fifteen timber berths for which licences were issued. Six timber seizures were made. The total revenue collected from timber was $7,369.23, being an increase of $1,642.65 over last year.

Roads and Bridges

Expenditures on the maintenance of the road system out of Territorial funds amounted to $43,587.13, and were confined almost exclusively to repairs and maintenance of roads in the mining areas. In addition, $18,653.70 of a special grant of $20,000 was expended on the construction of a bridge over McQuesten River and a road from the bridge to mining properties at Dublin Gulch in the Mayo District.

Development of Aircraft Landing Facilities

A total of $1,449 was expended on the maintenance of and improvements to landing fields at Dawson, Mayo, and Carcross.

Agriculture

The summer of 1942 was dry in the early part, and hay crops consequently were poor. Vegetable crops, however, were good.

Fur and Game

Net collections made under the Fur Export Tax Ordinance amounted to $7,190.52. An increase is shown over the previous year in bear, beaver, wolf, and all varieties of fox with the exception of red. Coyote, red fox, lynx, marten, mink, muskrat, weasel, and wolverine show a decrease. The number of coyote pelts presented was 180, and wolf pelts, 375.

Public Welfare

Health conditions in the Territory generally were good, notwithstanding a serious epidemic of measles and whooping cough among Indians at Teslin and Whitehorse. An active campaign of prophylactic inoculations was carried out by the medical health officer at Whitehorse against typhoid, whooping cough, diphtheria, and smallpox.

Registrations under the Vital Statistics Ordinance included 158 births, 36 marriages, and 119 deaths.

Hospitals were operated at Dawson, Whitehorse, and Mayo, the latter being closed on June 30, 1942. Grants for their maintenance were provided by the Territorial Council. The numbers of hospital days of patients for the year were: Dawson, 15,361; Whitehorse, 4,402; Mayo, 443; the numbers of hospital days for indigents were: Dawson, 11,020; Whitehorse, 20; Mayo, 162.

In addition to indigents taken care of exclusively in hospitals, 115 adults and 17 children were given assistance in the form of relief. The total expenditure from Territorial funds for hospitals, relief, and public welfare was $86,588.23.

Education

Schools were maintained during the year at Dawson, Whitehorse, Mayo, and Carcross. The number of pupils enrolled for the year was 270 and the number of teachers employed was 9.

Law and Order

Law and order were maintained throughout the Territory by the Royal Canadian Mounted Police, and the local administration received the co-operation of the police at all times.

LAND REGISTRY

The Land Registry maintains a Central Office of Record of lands under the control of the Dominion; administers Ordnance and Admiralty lands, Dominion-owned public lands, certain Dominion lands on which advances have been made under the Soldier Settlement Act, and timber and grazing on Soldier Settlement charged lands and military reserves; issues Letters Patent and in conjunction with the different western provinces, adjusts Seed Grain, Fodder, and Relief indebtedness.

Central Office of Record

The inventory of lands owned by the Dominion shows the situation and area of each parcel and the name of the controlling department. There are 6,047 parcels listed.

Ordnance and Admiralty Lands

These lands were acquired by the Crown because of their strategic situation for military or naval purposes. When no longer required they were transferred to this Department to administer and they are, whenever possible, made revenue producing, usually by leasing. Investigations of 14 parcels were made in the Provinces of Nova Scotia, Quebec, and Ontario, and one parcel was disposed of by transfer to another department during the year. A survey of Ordnance lands at Chambly, Quebec, was made by departmental surveyors. There were 51 leases and permits issued and 3 sales were effected. The Ordnance lands revenue amounted to $15,510.55.

Public Lands

One parcel of land was transferred to this Department during the year and one taken over by another department by transfer. Investigations of 6 properties were made and the revenue received was $5,347.25.

Soldier Settlement Charged Lands

The unpatented lands against which charges under Soldier Settlement Act are registered remain vested in the Dominion. There are 152 quarter-sections of such lands comprising approximately 19,000 acres spread over the four western provinces. Letters Patent are issued to entrants who have completed the duties in accordance with the terms of the Dominion Lands Act and who have paid their indebtedness to the Soldier Settlement of Canada. In cases where the duties are completed but this indebtedness not repaid, Letters Patent are issued in the name of the Director of Soldier Settlement of Canada under the authority of the provisions of Section 27 of the Soldier Settlement Act, and the amendment of 1931.

Timber and Grazing Within the Provinces

Timber.—Within the boundaries of the National Parks there are 11 licence timber berths covering a total area of 61·41 square miles; 2 of these berths are in the Province of Manitoba and 9 are in British Columbia. During the year, licences, in duplicate, were issued for these berths and the revenue amounted to $2,252.30.

On the Dominion Government Coal Block near Hosmer, B.C., one permit timber berth covering an area of 1,032 acres is in force.

Timber cutting privileges were granted on Ordnance Reserve No. 1 and Naval Reserve "A" on St. Joseph Island in Lake Huron, and up to the end of March, 2,408 railway ties, 1,671 fence posts, 31 cords of pulpwood, and 2,025 feet board measure of hardwood had been cut, producing a revenue of $330.55.

The Ioco Townsite Commission in British Columbia was granted a special permit to cut and remove 300 cords of fuelwood free of dues from the Government Reserve in Township 39 W.C.M. in order to alleviate a local distress situation. The cutting was carried on as a co-operative project by members of the community to provide essential fuelwood for their own use.

Grazing.—During the year, 11,335 acres were covered by 6 annual grazing permits on quarantine reserves along the southern boundary of Saskatchewan and Alberta. This was about the same acreage as covered last year and during the summer grazing season of 1942 there were 253 cattle, 263 horses, and 350 sheep grazing thereon. The revenue, consisting of ground rent, amounted to $226.70.

Seed Grain, Fodder, and Relief Indebtedness

During the fiscal year, the Alberta, Saskatchewan, and Manitoba Adjustment Boards submitted recommendations relating to the adjustment or apportionment of outstanding seed grain, fodder, and relief indebtedness in 1,418 cases.

Their recommendations were ratified by Orders in Council and 1,316 discharges and releases of liens were issued, resulting in writing off the amount of $116,375.12. There were 2,362 inquiries received from the provinces for statements of indebtedness outstanding relative to the issue of land grants, and 287 certificates of indebtedness were issued to be attached to title. There were also 5,268 inquiries received from the different Debt Adjustment Boards in the western provinces. Gross collections for the fiscal year amounted to $24,450.80, which represents an increase of $7,460.22 over the previous year. The sum of $729.75 was refunded leaving a net revenue of $23,721.05.

As the staff engaged on this work has other responsibilities as well, it is impossible to give a definite figure for the cost of administration but the total amount including office expenses and field investigations is approximately $6,000.

The following summary shows the financial operations for the year ended March 31, 1943:—

	Principal	Interest	Total
Debits—			
Balance outstanding March 31, 1942	$2,758,500 39	$3,479,139 53	$6,237,639 92
Accrued interest April 1, 1942, to March 31, 1943	.....	162,006 47	162,006 47
Total debits	$2,758,500 39	$3,641,146 00	$6,399,646 39
Credits—			
Net revenue April 1, 1942, to March 31, 1943	$ 15,312 47	$ 8,408 58	$ 23,721 05
Amount written off as loss by Orders in Council (Sec. 1, Chap. 51, 17 George V)	42,058 24	74,316 88	116,375 12
Amount collected and retained by Province of Saskatchewan as Commission Clause 18, Natural Resources Agreement with Province of Saskatchewan	.....	25 05	25 05
Total credits	$ 57,370 71	$ 82,750 51	$ 140,121 22
Amount outstanding March 31, 1943	$2,701,129 68	$3,558,395 49	$6,259,525 17

SUMMARY

Province of Manitoba

	Principal	Interest	Total
Debits—			
Amount outstanding March 31, 1942	$ 13,915 57	$ 19,642 70	$ 33,558 27
Accrued interest April 1, 1942, to March 31, 1943	.....	730 23	730 23
Total debits	$ 13,915 57	$ 20,372 93	$ 34,288 50
Credits—			
Net revenue April 1, 1942, to March 31, 1943	$ 674 26	$ 481 70	$ 1,155 96
Amount written off as loss by Orders in Council	187 07	929 36	1,116 43
Total credits	$ 861 33	$ 1,411 06	$ 2,272 39
Amount outstanding March 31, 1943	$ 13,054 24	$ 18,961 87	$ 32,016 11

Province of Saskatchewan

Debits—			
Amount outstanding March 31, 1942	$1,756,358 40	$2,162,663 10	$3,919,021 50
Accrued interest April 1, 1942, to March 31, 1943	.....	102,363 16	102,363 16
Total debits	$1,756,358 40	$2,265,026 26	$4,021,384 66
Credits—			
Net revenue April 1, 1942, to March 31, 1943	$ 9,728 18	$ 6,899 38	$ 16,627 56
Amount written off as loss by Orders in Council	11,554 82	25,078 05	36,632 87
Amount collected and retained as commission	.....	25 05	25 05
Total credits	$ 21,283 00	$ 32,002 48	$ 53,285 48
Amount outstanding March 31, 1943	$1,735,075 40	$2,233,023 78	$3,968,099 18

Province of Alberta			
Debits—			
Amount outstanding March 31, 1942	$ 988,201 42	$1,296,799 98	$2,285,001 40
Accrued interest April 1, 1942, to March 31, 1943	.....	58,911 83	58,911 83
Total debits	$ 988,201 42	$1,355,711 81	$2,343,913 23
Credits—			
Net revenue April 1, 1942, to March 31, 1943..	$ 4,910 03	$ 1,027 50	$ 5,937 53
Amount written off as loss by Orders in Council	30,316 35	48,309 47	78,625 82
Total credits	$ 35,226 38	$ 49,336 97	$ 84,563 35
Amount outstanding March 31, 1943	$ 952,975 04	$1,306,374 84	$2,259,349 88
Province of British Columbia			
Amount outstanding March 31, 1943	$ 25 00	$ 35 00	$ 60 00

Letters Patent

During the year 22 patents, covering an area of 883 acres, were issued for lands in Manitoba, Saskatchewan, Alberta, Northwest Territories, and Yukon Territory. One hundred and thirty-eight certified copies of Letters Patent were issued for which $425 was received.

NATIONAL PARKS BUREAU

During the fiscal year the National Parks continued to contribute to the well-being and morale of our people, and to the enjoyment of members of the armed forces temporarily in this country, by providing convenient and well-equipped places for rest and relaxation. Although restrictions on the use of gasoline and motor tires, rendered inevitable by the war, had the effect of reducing the number of persons visiting the parks, this was offset to some extent by a notable disposition, on the part of those who came, to stay for longer periods. The need of recreation in a period of great national and personal strain is even greater than in normal times, and in meeting that need the parks provided a service of national importance.

The importance of maintaining the parks in war time, however, cannot be measured only by their immediate service to the civilian population and the armed forces, great as these may be. The people of Canada have a large financial investment in their National Parks, which must be protected by proper care and maintenance. Public expenditures on the National Parks since their inception up to this date exceed $42,000,000. This figure takes no account of the value of the land dedicated to parks purposes. Such a substantial investment in public properties constitutes a trust which must be protected and cared for, in war time even more than in peace. Roads, trails, bridges, fire prevention towers and other equipment, recreational facilities, and last, but not least, public buildings—all these call for continuous care and maintenance if investments made in years of peace are not to deteriorate or disappear. Moreover, permanent populations live in some of the parks, requiring all kinds of municipal services—electric light, water, street cleaning, and management. Seven towns, five of which are occupied the year round, are dependent upon the National Parks Administration for these services, also the large investment made by the railway companies and others in hotels, chalets, bungalow camps, and private residences. It should not be forgotten that forests, which could not be replaced in generations, must be protected from fire and insect infestation. Animals which find sanctuary in the parks must be preserved if their species is not to disappear.

The National Parks Bureau, conscious of its responsibilities to the public, both in the expenditure of public funds and in the maintenance of public property, has reduced its outlay to the lowest point consistent with prudent management.

Administration

The National Parks Act prescribes the general purposes of the National Parks as follows:

> "The Parks are hereby dedicated to the people of Canada for their benefit, education and enjoyment, subject to the Provisions of this Act and Regulations, and such Parks shall be maintained and made use of so as to leave them unimpaired for the enjoyment of future generations."

Of the townsites the largest in the National Parks are Banff, which has a permanent population of about 2,000, and Jasper, with about 1,500. The park administration is designed to administer the park areas outside the townsites, or subdivisions, as natural museums. In these areas all the natural resources, including the flora and fauna, are protected, and so far as possible under the policy laid down in the Act, the parks are open to the use of the public. Anyone who so desires can therefore enjoy their unspoiled beauty, either in studying any particular feature such as the flowers, forests, mountains, lakes and streams, or animal life, or can reap the benefits of a holiday in the great outdoors in the midst of the finest natural scenery in the country.

EVENTS OF INTEREST

An event of importance was the formal opening of the Queen Elizabeth Sea Cadet Camp at Beausoleil Island, Georgian Bay Islands National Park, on July 16, 1942, by Hon. Angus L. Macdonald, Minister of National Defence for Naval Services, and Vice-Admiral Percy W. Nelles, Chief of the Naval Staff. The camp consists of some 14 buildings erected by the Navy League of Canada for use as a training base for sea cadets.

A number of organizations which conduct outdoor tours were able to carry on their programs. The annual outing of the Trail Riders of the Canadian Rockies was held in Banff National Park from July 24 to 28. The route chosen from the starting point near Castle Mountain followed trails passing Shadow, Egypt, and Larix Lakes to Sunshine Lodge, and thence via Healy Creek to the town of Banff. The annual Sky Line Trail Hikers' meet was also held in Banff Park early in August. The hikers assembled at Sunshine Lodge, from which point a number of excursions were made.

The annual convention of the Canadian Medical Association held at Jasper Park Lodge in Jasper National Park in June was attended by 835 persons.

An interesting event was the opening of a Red Shield Hut at Banff in July. This building is operated by the Canadian War Services Auxiliary of the Salvation Army for the benefit of members of the armed forces.

Golf courses in the National Parks continued to be a source of attraction to visitors, and tournaments staged under the auspices of local committees were successfully concluded on the Government-owned courses in Prince Albert, Riding Mountain, and Waterton Lakes Parks. The annual tournament held at the Banff Springs Hotel course in Banff Park attracted a record entry.

Bath-houses and swimming pools operated at the hot mineral springs in the National Parks were generously patronized. The bathing establishment at the Upper Hot Springs, Banff, was used by 43,324 persons, and at the Cave and Basin Springs, also at Banff, 48,448 persons were registered. A total of 21,977 persons used the pool at Radium Hot Springs in Kootenay Park.

Although the number of persons making use of camp-grounds in the National Parks was less than the previous year, the average individual stay was longer in many parks. A total of 10,414 persons made use of camping and picnic facilities at Tunnel Mountain camp-ground in Banff National Park, in addition to 26,333 persons using the picnic grounds in Central Park in the townsite of Banff. Public camp-grounds in Elk Island, Waterton Lakes, Kootenay, Yoho, Prince Albert, Riding Mountain, and Point Pelee National Parks were also popular with visitors.

Visitors at the park museum at Banff numbered 23,248 compared with 33,482 for the previous year. Exhibits on display at the museums in Prince Albert and Riding Mountain Parks also attracted considerable attention.

Travel to the Parks

Visitors to the National Parks and National Historic Parks numbered 466,245, a decrease of approximately 53 per cent. Details respecting the attendance at individual parks are given in the accompanying table, which, for purposes of comparison, contains figures for 1941-42 as well.

ATTENDANCE AT NATIONAL PARKS

	1942-43	1941-42
Banff	126,590	278,286
Cape Breton Highlands	10,189	23,694
Elk Island	12,916	36,606
Georgian Bay Islands	4,528	4,061
Glacier	211	320
Jasper	11,757	24,761
Kootenay	11,602	33,812
Mount Revelstoke	2,977	5,783
Nemiskam	13	11
Point Pelee	55,580	104,442
Prince Albert	12,789	28,833
Prince Edward Island	24,826	40,470
Riding Mountain	95,628	176,161
St. Lawrence Islands	9,305	16,396
Waterton Lakes	40,433	135,774
Yoho	6,859	34,975
National Historic Parks		
Fort Anne	2,938	7,595
Fort Beausejour	3,020	6,379
Fort Chambly	10,244	5,835
Fortress of Louisbourg	2,666	6,690
Fort Malden	14,709	11,821
Fort Wellington	4,826	8,771
Port Royal	1,639	9,087
	466,245	1,000,563

DIRECT REVENUE

The gross revenue from the National Parks and from administration of the Migratory Birds Convention Act for the fiscal year 1942-43 amounted to $522,643.08 and $443.80 respectively, or a total of $523,086.88. This amount included the sum of $248,755.14 received from the sale of the Department's hydro-electric plant in Banff Park to the Calgary Power Company and from the sale of salvaged equipment and supplies. Compared with figures of $470,572 and $941.36 respectively or a total of $471,513.36 for 1941-42, the decrease in ordinary revenue was $197,181.62.

MAINTENANCE AND IMPROVEMENTS

Maintenance of motor highways, secondary and fire roads, trails, bridges, buildings, and recreational facilities in the parks was continued as economically as possible. Provision of municipal services in the parks also continued, these being paid for on a fair basis by those benefiting therefrom.

Roads and Bridges

Construction of new roads was limited to 2½ miles of secondary road in Riding Mountain Park running from Mile 8 on the Norgate Road to the new picnic grounds at Whirlpool Lake. General maintenance was carried out on existing motor roads in all parks, and additional road direction signs and guard rails were constructed. In addition, considerable improvement work was carried out on secondary roads in Glacier Park which had previously been in poor condition. A new 40-foot bridge was built across the Illecillewaet River in Glacier Park, and in Jasper Park a new 40-foot timber bridge was built across Rocky Canyon Creek at Mile 11·7 on the Medicine Lake Road.

Trails

Considerable new trail construction was completed in order to make accessible some of the more remote areas in case of fire. A total of 40·8 miles of new trail was constructed during the year, including 17 miles in Banff Park, 12·7 miles in Jasper Park, 4·5 miles in Yoho Park, 2·7 miles in Mount Revelstoke Park, 2·4 miles in Cape Breton Highlands Park, and 1·5 miles in Riding Mountain Park. In addition 96 miles of existing trails were improved.

Communication Systems

A total of 41·8 miles of forest telephone lines was constructed, of which 18 miles was reconstruction of existing lines in Banff Park. New construction included 11 miles in Banff Park, 5·8 miles in Jasper Park, 4·5 miles in Yoho Park, and 2·5 miles in Elk Island Park.

Portable and stationary trans-receiver radio sets which are now installed in Banff, Jasper, Prince Albert, Riding Mountain, and Cape Breton Parks continued to give good service throughout the year. These radio sets have proved highly satisfactory, and in periods of high fire-hazard have been most useful in supplementing the forest telephone system.

The following table shows the mileage of roads, trails, and telephone lines within the National Parks as of March 31, 1943:—

National Park	Roads				Trails	Telephone Lines
	Motor	Secondary	Fire	Total		
Banff	173·7	11·6	77·0	262·3	722·3	267·7
Cape Breton Highlands	50·8	1·6	.....	52·4	21·0	.....
Elk Island	16·0	.....	.....	16·0	14·0	16·0
Glacier	.....	.....	13·5	13·5	98·0	1·5
Jasper	144·0	16·5	34·7	195·2	587·1	414·2
Kootenay	61·1	.....	9·5	70·6	155·2	60·0
Mount Revelstoke	18·0	.....	.....	18·0	32·0	10·7
Point Pelee	6·5	2·8	.....	9·3	.....	.....
Prince Albert	69·0	43·0	160·0	272·0	236·5	134·0
Prince Edward	7·1	2·5	.....	9·6	.....	.....
Riding Mountain	51·6	46·9	.....	98·5	119·0	146·0
Waterton Lakes	47·8	13·5	12·0	73·3	159·4	60·2
Yoho	46·0	6·5	23·5	76·0	180·0	55·5
Total	691·6	144·9	330·2	1,166·7	2,324·5	1,165·8

Buildings and New Construction

Among the more important projects or buildings completed were a new breakwater in Prince Albert Park, construction of which was commenced the previous year; fire lookout stations in Banff, Jasper, and Yoho Parks; and a new fish hatchery near the mouth of Maligne River in Jasper Park. Other buildings completed in Banff Park included a warden's cabin at Egypt Lake, living quarters at the Tunnel Mountain lookout, two kitchen shelters at Johnson

Canyon, two shelters and a wharf at Lake Minnewanka, a barn at Ya-ha-tinda Ranch, and a hay shed and storage shed at Banff. In Cape Breton Highlands Park a camp-ground shelter designed in Scottish "sheiling" type of architecture was completed adjacent to the Cabot Trail near Crawley's Brook. A warehouse was also constructed at the park headquarters at Ingonish Beach.

Six temporary buildings were added to each of the Alternative Service work camps at Miles 16 and 21 on the Banff-Windermere Highway in Kootenay Park, and a small addition was made to the gateway building at Radium Hot Springs. In Jasper Park a small building was constructed near the Devona fire tower as living quarters. Four small granaries were constructed in Elk Island Park and a small blacksmith shop was built in Mount Revelstoke Park. A storage shed was erected on the golf course in Waterton Lakes Park, and three new patrol cabins were built in Prince Albert Park to take the place of those destroyed by fire early in 1942. An annex to the pump-house and equipment shed was constructed at the park headquarters in Prince Edward Island Park.

New construction under private enterprise included 10 new cabins at the Hillcrest Bungalow Camp in Prince Albert Park, 12 new buildings at auto bungalow camps in Banff Park, and 3 new cottages in Riding Mountain Park.

General Improvements

A small tree nursery, half an acre in size, was established within the golf course enclosure at Elk Island Park. About 1,000 small spruce trees were planted along the road allowance south of the main gateway to Riding Mountain Park, and all dead and fallen timber was cleared from Wasagaming Townsite. Concrete floors were laid in the shelters in Tunnel Mountain camp-ground in Banff Park. Cultivation of the black walnut plantation in Point Pelee Park was continued and arrangements completed for interplanting with black locust.

Lake Minnewanka Power Development

Under authority of the War Measures Act, permission was granted in 1941 to the Calgary Power Company to construct a hydro-electric development at Anthracite in Banff National Park.

Work on this project was commenced that year and is now nearing completion. During the year under review the power-house, steel penstock, surge tank, control dam, spillway at main dam, main feeder line, concrete bridge over pipeline, and a new wharf at Lake Minnewanka were completed. The paving of the Trans-Canada Highway where it crosses the tail-race, riprapping of tail-race and upper face of the main dam, construction of a fence along the tail-race for protection of the public, and building the sub-grade of a new scenic drive between Lake Minnewanka and Anthracite were also substantially carried out.

Work still to be completed includes preparation of an area for tourist use at the western end of the lake, general landscape work around the lake, clearing of timber above the 4,825-foot level, construction of a trail from the campsite to the site of a bridge in Stewart Canyon, and completion of the drive between Lake Minnewanka and Anthracite.

On November 18 the Calgary Power Company took over the electric distribution system in Banff, and on December 1 the power-house at Anthracite commenced full-time operation. The high level of the lake before the draw-off started on October 28, 1942, was 4,836·86 feet above sea-level. The maximum supply level is 4,840 feet.

Owing to shortage of labour the Calgary Power Company has not been able to carry out some of the works and undertakings in connection with the clean-up of the site after development and for the general improvement of the affected area as provided for in the interim licence issued to the company. However, this work is to be completed as soon as conditions permit.

Use of Alternative Service Workers

Under authority of the National War Services Regulations, 1940 (Recruits)—(Consolidation 1941), Mennonites and other conscientious objectors exempted from military service were required to carry out alternative service for the duration of the war. The administration of National War Services Regulations originally was carried out by the Department of National War Services, but on December 1, 1942, this authority was transferred to the Department of Labour, which now supplies alternative service workers as they become available.

Camps which were established in 1941 in Banff, Jasper, Kootenay, Riding Mountain, and Prince Albert National Parks continued to operate throughout the year. In addition, a small temporary camp was established in Glacier National Park and operated from June to October. Supervisory and key positions were kept to a minimum and amounted to eight per cent of the total alternative service work man-days. During the period April 1, 1942, to March 31, 1943, a total of 872 men in the 19-to-40-year class of July 1, 1940, reported for work. Of these 128 were discharged for various reasons, and 18 enlisted for active service. In addition 267 were transferred to British Columbia to assist in the protection and conservation of provincial forests.

Projects carried out during the year included construction of 28·4 miles of fire trails, 10·7 miles of forest telephone line, 3 bridges, 147 rods of fence, 210 feet of guard rail, and completion of a breakwater in Prince Albert National Park. Improvements also were carried out on 34 miles of fire trails, 13 miles of pony trails, and 37 miles of telephone line. Work on forest insect control was continued in Banff and Kootenay Parks, and in the latter 961,000 board feet of saw-timber and 67,712 linear feet of mine props were salvaged. In addition, some work was carried out on the improvement of public camp-grounds, and a few small buildings were constructed. During the fire-hazard season alternative service workers formed the nucleus of crews maintained for the detection and suppression of forest fires and the conservation of forest resources.

Infractions of rules and regulations were dealt with by the Royal Canadian Mounted Police. The return of work per man-day from alternative service workers was very satisfactory, and compared favourably with that performed by regular park labour paid at prevailing rates.

Health and Medical Services

Constant supervision was maintained over all matters relating to public health in the National Parks during the year. The Bureau continued to receive assistance and advice from the Department of Pensions and National Health in connection with health and sanitation. Through the co-operation of the latter Department, medical supplies were obtained for use in the parks, and medical services were also provided for alternative service work camps.

NATIONAL HISTORIC PARKS AND SITES

The National Parks Bureau is entrusted with the restoration, preservation, and administration of National Historic Parks and Sites, and the commemoration of the public services of outstanding Canadians. The Bureau is advised in this phase of its work by the Historic Sites and Monuments Board of Canada, an honorary body composed of recognized historians representing the various parts of the Dominion. Since the inception of this work it has been customary for the Board to meet in Ottawa each year. Because of war conditions these meetings have been deferred during the past three years.

The personnel of the Board is as follows: Chairman, His Honour F. W. Howay, New Westminster, B.C.; Dr. J. Clarence Webster, Shediac, N.B.; Professor Fred Landon, London, Ont.; Professor D. C. Harvey, Halifax, N.S.;

Hon. E. Fabre-Surveyer, Montreal, P.Q.; J. A. Gregory, M.P., North Battleford, Sask.; Rev. Antoine d'Eschambault, St. Boniface, Man.; Major G. Lanctot, Dominion Archivist, Ottawa, Ont.; W. D. Cromarty, National Parks Bureau, Ottawa, Ont.

National Historic Parks

Maintenance of buildings, memorials, features of interest, and grounds within National Historic Parks was continued. Property at Fort Malden Park, Amherstburg, Ontario, was improved by placing considerable fill at the rear of the protection wall and along portions of the river bank. A concrete base also was constructed to receive the windlass from the schooner *West*, presented by United States Engineers. A rack was made and fitted into position to display the sword collection in the museum. Four plate-glass exhibit cases were donated to the museum by the Amherstburg Public Library Board.

Renovation of the museum at Fort Wellington Park, Prescott, Ontario, was effected, and new tables and cases obtained to display the exhibits. The interior of the caretaker's residence was improved by painting, and the guard-house and the palisades surrounding the fort were repaired. Bronze tablets bearing historical data relating to the fort were removed from a cairn at Fort Beausejour Park, Aulac, New Brunswick, and placed on a stone curtain-wall which was recently restored. The cairn was subsequently dismantled.

An old French anchor raised from the bottom of Louisbourg Harbour was placed on a stone base adjacent to the Museum Building at Fortress of Louisbourg Park, Louisburg, Nova Scotia. The entrance roadway was graded, and loose stone removed from the foundation of the Citadel.

An old farm-house and outbuildings which stood near the "Habitation" at Port Royal Park, Lower Granville, Nova Scotia, were dismantled and the grounds cleared and levelled. The exterior wood work of the "Habitation" was given an application of weather-proofing and preserving liquid. Portions of the interior and exterior of the museum building at Fort Anne Park, Annapolis Royal, Nova Scotia, were painted.

A number of interesting exhibits were obtained during the year, including a drum used by the Patriot forces during the invasion of Windsor in 1839 which has been placed in the Museum at Fort Malden Park.

National Historic Sites

On the advice of the Historic Sites and Monuments Board of Canada more than 300 sites of national importance have been marked and are now being suitably maintained. These include Indian earthworks, forts, and villages; French forts, trading posts, and mission enterprises; sites connected with British exploration and naval and military operations in the long struggle for the possession of Canada; posts of the Hudson's Bay Company; and sites related to the social, economic, and industrial development of the country. Owing to war conditions no new sites were marked during the year.

CONSERVATION SERVICES

Forest Protection

The fire season of 1942 generally was favourable in National Parks. Although the total area burned was greater than in 1941, the total number of fires was considerably less, and 97 per cent of the total area burned was in Prince Albert Park where several years of drought had created a serious fire-hazard. A total of 37 fires occurred and burned over an area of 83,968 acres inside the National Parks, as compared with a total of 64 fires and a burned area of 60,487 acres in 1941.

An analysis of the cause of these fires showed that lightning and carelessness of settlers were responsible for 16 per cent of the total and campers and smokers for 13·5 per cent. Unknown causes accounted for 27 per cent of the fires, and the remainder, 43·5 per cent, were attributed to incendiary and other sources. Classified according to size, 19 per cent of the fires burned less than one-quarter of an acre, 19 per cent between one-half and 10 acres, 43 per cent from 10 to 500 acres, and 19 per cent more than 500 acres. The loss of merchantable timber was considerably less than in 1941.

Following is a summary of fires for the fiscal year compared with the previous year:—

FIRE LOSSES IN THE NATIONAL PARKS

Park	Number of Fires	Area Burned Acres		Cost of Suppression	
		1941	1942	1941	1942
Banff	3	68	½	$ 610 56	$ 3 46
Elk Island	2	650	710	195 29	14 75
Glacier	2	1	35	61 25	283 61
Georgian Bay Islands	1	0	Spot	0 00	0 00
Jasper	.....	33	0	271 51	0 00
Mount Revelstoke	5	7	243½	266 32	3,204 67
Point Pelee	2	500	1,200	20 00	0 00
Prince Albert	19	59,056	81,773	10,777 02	9,894 99
Prince Edward Island	1	0	1	0 00	0 90
Riding Mountain	1	10	5	18 60	20 20
St. Lawrence Islands	1	0	Spot	0 00	0 00
Yoho	.....	162	0	532 16	0 00
Total	37	60,487	83,968	$12,752 71	$13,422 58

IMPROVEMENT IN FIRE PREVENTION EQUIPMENT

At the close of the 1941 season a total of 14 primary fire lookouts had been erected in National Parks. During the year one standard cabin was completed on Castle Mountain, and material was obtained for a tower on Mount Sarbach in Banff Park. In Yoho Park a 22-foot wooden tower was completed on Mount Hunter. Material is available in Jasper Park for the construction of a standard cabin on The Palisades, and in Waterton Lakes Park a standard cabin on Sofa Mountain is 75 per cent complete. In addition to the foregoing, living quarters for lookout men were constructed at Devona tower in Jasper Park, Tunnel Mountain tower in Banff Park, and Mount Hunter tower in Yoho Park.

Acquisition of new fire-fighting equipment was limited to repair parts and accessories necessary to maintain the efficiency of the fire-fighting organization.

FIRE HAZARD STUDIES

The 17 fire-weather stations which were established during 1940 and 1941 in Banff, Jasper, Yoho, Waterton Lakes, Prince Albert, and Riding Mountain National Parks continued to operate throughout the season. No new stations were established during the year.

INSECT CONTROL

Measures for the control of the mountain pine bark-beetle (Dendroctonus monticolae) were continued in Banff and Kootenay Parks under the supervision of a trained entomologist. In Banff Park areas that had not been worked in 1941 were surveyed and all infested trees were marked. These trees were later cut and burned to destroy the beetle broods that winter under the bark. During the period under review a total of 9,605·7 acres were cruised, and 17,975 dead and infested trees destroyed.

The operations in Kootenay Park were a continuation of the salvage of beetle-killed pine, and destruction by cutting and burning of infested green trees. Work was confined to strips adjacent to the Banff-Windermere Highway in the vicinity of Miles 16 and 21. Two sawmills operated by the Department produced 962,370 board feet of lumber. In addition 9,650 mine props were produced.

The Bureau continued to co-operate with the Division of Entomology, Department of Agriculture, in connection with the annual "Forest Insect Survey".

Wild Life Management

The National Parks fulfil a vital function in the conservation of wild life in Canada, in preserving entire animal and plant communities, with all species, great and small, in their proper places. The parks thus permit observation of many rare and notable animals in the wild state but without fear of man. They also afford an opportunity to observe how the common birds and mammals of prairie, garden, and woodlot fit into a wilderness environment.

The winter of 1942-43 was more trying for wild life than any winter in recent years. In areas where overgrazing of game ranges has been in evidence there was a shortage of natural forage. Indications are that losses will be slight. Where investigation discloses that the increase of any species is so great that the food supply is threatened, steps are taken to remove a sufficient number to reduce the danger. During the year it was necessary to slaughter surplus elk in Banff and Jasper National Parks.

Scientific investigations of wild life were carried out in Point Pelee and Glacier National Parks by qualified officers of the Department, and previous investigations in St. Lawrence Islands, Riding Mountain, Prince Albert, and Elk Island National Parks were supplemented by additional work. A party from the United States Fish and Wildlife Service visited Cape Breton Highlands National Park. Specimens of buffalo, wolf, wolverine, lynx, and magpie were obtained for zoological gardens during the year.

Wild Animal Parks

Canada was a pioneer in the establishment of large fenced enclosures for the preservation of wild animals threatened with extinction on the open range. The most important of these animal parks is Elk Island National Park, containing a herd of more than 1,200 buffalo. A much larger herd of buffalo, exceeding 12,000 head, roams at large in Wood Buffalo Park in northern Alberta and the Northwest Territories.

Following is a census of wild animals in fenced enclosures in National Parks as of March 31, 1943:—

Animals in Fenced Areas

Species	Banff Park Paddock	Elk Island Park	Nemiskam Park	Prince Albert Park Paddock	Riding Mountain Park Paddock	Total
Antelope			110			110
Buffalo	14	1,226		7	60	1,307
Elk	1	631			135	767
Moose		190				190
Mule deer		22			1	23
White-tailed deer					11	11
Rocky Mountain goat	1					1
Rocky Mountain sheep	5					5
Total	21	2,069	110	7	207	2,414

Wild Life Conservation

Conservation activities necessary to prevent the depletion of Canada's wild life resources were continued by the Bureau. A conference of Provincial and Dominion game officials met at Ottawa on April 6-7, 1942. It is believed that this conference between Provincial and Dominion Departments concerned with wild life conservation accomplished a great deal in promoting mutual understanding of wild life problems. As a result of such conferences at two-year intervals, important advances have been made in the development of a national wild life policy for Canada.

Resolutions relating to various conservation items were adopted as follows:—

1. Amendment of the Export Act with respect to restrictions on export of certain game.
2. Additional protection for Wilson's snipe.
3. Prohibition of the use of a motor car to drive birds towards hunters.
4. Publication and distribution of suitable literature on wild life conservation.
5. Consideration of conservation of wild life in connection with all developments for national defence.
6. Disapproval of the distribution of unfair price lists of furs.

Although proceedings of the conference are not available to the public, copies of the resolutions adopted are supplied on request.

The Advisory Board on Wild Life Protection, an interdepartmental committee organized December 28, 1916, held two meetings during the year. The Board recommended that an area of approximately 10,130 square miles in the southwestern part of Yukon Territory be reserved from entry or other disposal so that it might be available for examination with a view to establishment as a national park. The Board also recommended that Nemiskam National Park should continue to be maintained for the present, and expressed approval of recent action taken to conserve wild life in Point Pelee National Park

The Bureau was represented at the following conservation and scientific conferences relating to wild life:—

The Seventh North American Wildlife Conference, Toronto, Ontario, April 8-10, 1942. This was the first time that this conference met in Canada.

The Eighth North American Wildlife Conference, Denver, Colorado, February 15-17, 1943.

Second Annual Meeting of the Canadian Conservation Association, Montreal, P.Q., April 13, 1942.

The Sixtieth Stated Meeting of the American Ornithologists' Union, Philadelphia, Pennsylvania, October 12-16, 1942.

Fishing and Fish Culture

Although war-time restrictions on travel have greatly reduced the number of anglers visiting the National Parks, fish cultural activities have been continued so that good sport fishing may be available when general travel is resumed.

The new Jasper Park Fish Hatchery, with a capacity of 25 troughs, was brought into operation early in the autumn. The collection of rainbow, speckled, and great lake trout eggs from local waters was undertaken, and investigations and surveys made of a number of lakes in the park produced much useful data.

The Banff Hatchery again furnished assistance to the Province of Alberta in the hatching of rainbow trout eggs and the distribution of fry. Rainbow and cutthroat trout fry from this hatchery were distributed in Yoho, Kootenay, Mount Revelstoke, and Glacier Parks. Good catches in the various park waters were reported by anglers.

In Waterton Lakes National Park, Cameron and Bertha Lakes maintained their reputation as good angling waters. Bertha Lake in particular produced some fine specimens of rainbow trout. Waters stocked with cutthroat trout also produced satisfactory results, Crypt Lake yielding some fine catches.

Fifteen thousand perch were donated by the Province of Alberta for use in stocking Oster Lake, Elk Island National Park.

Another shipment of small-mouthed black bass from Ontario, containing approximately 300 adult fish, was planted in Waskesiu Lake in Prince Albert National Park. An investigation to determine the growth and numbers of black bass in Waskesiu and Hanging Heart Lakes was conducted with satisfactory results.

Commerial fishing for whitefish was permitted in the northern lakes of the park in the winter months.

An examination of Clear Lake in Riding Mountain National Park was made by a qualified biologist to determine the success of the rainbow trout stocking experiment, and as a result of the investigation the planting of this species has been discontinued. Commercial fishing for whitefish, perch, and suckers in Clear Lake was permitted during the winter.

Improved trout fishing in Clyburn Brook, Cape Breton Highlands Park, was reported. Good catches were also made in Warren and Corney Brooks and Aspy, Grande Anse, Cheticamp, and Mackenzie Rivers. The salmon fishing in the Cheticamp River was about average. Officers of the Dominion fish hatchery at Margaree planted 250,000 salmon fry in the Cheticamp River. Commercial sea fishing generally was better than average.

The creel census was continued in the National Parks in Western Canada, and, considering the drop in tourist registrations, returns for the fishing season under review showed improvement. A total of 1,852 cards was received from 2,769 fishing excursions.

The following statement shows the number of fry, fingerlings, and adult fish distributed in park waters during the year:—

Park	Rainbow Trout	Cutthroat	Speckled Trout	Brown Trout	Perch	Salmon	Small-Mouthed Black Bass	Total
Banff	450,000	123,000	87,000	.....	.....	.....	.....	660,000
Cape Breton Highlands	.....	.....	.....	.....	.....	250,000	.....	250,000
Elk Island	.....	.....	.....	.....	15,000	.....	.....	15,000
Jasper	198,778	.....	12,500	4,890	.....	.....	.....	216,168
Kootenay	20,000	40,000	.....	.....	.....	.....	.....	60,000
Mount Revelstoke	.....	20,000	.....	.....	.....	.....	.....	20,000
Prince Albert	.....	.....	.....	.....	.....	.....	(Adult) 3,000	3,000
							(Fry) 38,200	38,200
Waterton Lakes	61,190	361,765	.....	.....	.....	.....	.....	422,955
Yoho	20,000	.....	.....	.....	.....	.....	.....	20,000
Riding Mountain	11,813	.....	.....	.....	.....	.....	.....	11,813
Glacier	.....	20,000	.....	.....	.....	.....	.....	20,000
	761,781	564,765	99,500	4,890	15,000	250,000	41,200	1,737,136

MIGRATORY BIRDS CONVENTION ACT

The Migratory Birds Treaty, which was signed in Washington, D.C., on August 16, 1916, and made effective by Act of Parliament of Canada 1917 (Chapter 131, Revised Statutes of Canada, 1927, and Amendments), was designed for the better protection of certain birds that migrate between Canada and the United States. In this conservation measure the Dominion and the Provinces co-operate. Regulations in accordance with the Statute are agreed upon and are made effective by both the Dominion and the provinces.

The responsibility for the police work in connection with the enforcement of the provisions of the Migratory Birds Convention Act and Regulations thereunder throughout Canada was transferred to the Royal Canadian Mounted Police in 1932.

In British Columbia, the waterfowl nesting season in 1942 was somewhat later than usual, but there was no marked change in the numbers of either pond ducks or diving ducks. Owing to improved precipitation, there was a marked betterment in water conditions for ducks in the Prairie Provinces. In Manitoba this improvement began early enough to attract many nesting ducks, and as a result this Province showed a large increase in waterfowl production as compared to 1941. In Saskatchewan and Alberta the heavy precipitation was not received until after ducks had begun to nest and it was therefore of less immediate benefit. Conditions varied in different districts, but in general the duck population showed improvement, particularly in respect to canvas-back and redhead ducks.

The principal sporting duck in Eastern Canada is the black duck. In 1942 this species was exceptionally abundant in northern Ontario and Quebec and maintained a high numerical average in southern Quebec and the Maritime Provinces. In southern Ontario it appeared to be less abundant than usual. The numbers of Wilson's snipe continue to be so low as to give cause for concern. Although several thousand eider ducks were killed by floating oil off the southern coasts of Nova Scotia and New Brunswick, the species was observed in its usual abundance along the north shore of the Gulf of St. Lawrence later in the summer. In general, the waterfowl situation in Canada in 1942 was satisfactory.

As a result of improvement in the supply of waterfowl the usual hunting season for these birds was extended in some areas. Special measures were continued for the protection of the few remaining trumpeter swans in British Columbia, the numbers of which are estimated at approximately 500 birds. Successful co-operation was continued with provincial governments, game conservation societies, and other organizations interested in bird conservation.

A total of 749 Honorary Game Officers has been appointed throughout the Dominion. Of these 14 are officers of the Dominion Forest Service, 102 are officers of the Department of Fisheries, and 105 are members of the Canadian Pacific Railway Police. In addition, the Game and Fishery Officers of the Provinces of New Brunswick, Quebec, Ontario, Manitoba, and British Columbia, are ex-officio Game Officers under the Migratory Birds Convention Act, as are also the members of the New Brunswick Provincial Police. These officers gave the usual valuable assistance.

Field administration of the Act was continued under the supervision of four District Migratory Bird Officers. This work included preparation and publication of waterfowl life histories, general waterfowl investigations, the study of the relation to waterfowl of the water restoration projects undertaken by authority of the Prairie Farm Rehabilitation Act, and, in conjunction with the National Parks Bureau, wild life surveys of several of the parks. Radio addresses and lectures were given by officers of the Bureau, and lecture material, including motion pictures and lantern slides, was lent to voluntary assistants.

Altogether 61 bird sanctuaries comprising an area of approximately 1,300 square miles are now reserved under the Migratory Birds Convention Act in Canada. One new sanctuary, Ile aux Tourtes, in the Province of Quebec, was established during the year, and one cancellation, Mystery Island, Quebec, was effected.

The banding of native wild birds continued in Canada with the aid of some 200 voluntary co-operators who serve without remuneration, furnish their own equipment, and bear other incidental expenses. These conservation-minded citizens operate under Dominion permits and furnish the National Parks Bureau with full details of their banding activities. Permits to band birds are issued only to persons possessing definite ornithological knowledge.

Bird banding in North America is conducted in full co-operation between the National Parks Bureau of Canada and the Fish and Wildlife Service of the United States Department of the Interior. Since 1923, administration of bird-banding investigations in Canada has been carried out by the National Parks Bureau. Official bands are furnished free of charge by the United States Fish and Wildlife Service, and are used universally on the continent.

Much new and useful scientific information is gathered and made available through banding, and the results of studies made are published in current ornithological literature. During the calendar year 1942, details of 30,642 banded birds that were recovered were added to the official Canadian records, bringing to 421,480 the number of banded birds for which records are now available.

During the year 1,147 permits and licences were issued. Printed material distributed comprised 6,494 copies of the Migratory Birds Convention Act and Regulations, 17,175 Abstracts of the Regulations, 42,366 posters, and 8,859 educational pamphlets.

General

In connection with national post-war reconstruction, officers of the Wild Life Division prepared material for submission to the Sub-Committee on Conservation and Development of Natural Resources and gave evidence to that Sub-Committee on wild life conservation work which could be conducted beneficially and which would furnish useful employment.

PUBLIC RELATIONS

Publicity activities during the year were adjusted to war-time conditions. No attempt was made to encourage pleasure travel, but the Publicity and Information Office continued to supply information, booklets, and folders to those who indicated, by correspondence, a direct interest in the subject. Many of these inquirers intimated their intention to visit the National Parks after the war; in fact, there is every indication that with the return of peace the facilities provided by the parks will be taxed to the utmost. For that reason it is necessary to maintain public interest in the parks, even in war time. This is being done, partly by judicious and restricted distribution of literature, partly by means of motion pictures, which are still in very great demand, and, to a large extent, by placing special articles, usually illustrated, in newspapers and magazines both in Canada and elsewhere. The widespread acceptance of these articles by editors indicates that even in war time there is a keen interest in such peaceful subjects as holidays in the National Parks, wild life conservation, and the part the parks are playing in the maintenance of the morale of the people. Co-operation was also extended to the Department of National War Services, the Department of Trade and Commerce, transportation companies, advertising services, provincial travel bureaus, and other agencies engaged in making better known the recreational attractions of Canada as a whole.

Parks Literature

Requests for illustrated booklets and general information folders descriptive of National Parks and National Historic Parks continued, but to a lesser extent than during the previous fiscal year. Distribution was reduced to responses to direct requests. The total number of publications distributed during the year was 132,651 copies. The distribution of the Canada Descriptive Atlas in French numbered 1,780 copies, 1,421 of which were sold at a nominal charge of ten cents per copy. The English edition was already exhausted, and the French edition went out of print during the year.

A new map folder descriptive of Cape Breton Highlands National Park was produced, and new editions of several other park folders were issued. A policy of strict economy in the production of parks publications resulted in expenditures in this respect being kept at a minimum.

A list of publications printed for general distribution follows:—

Banff National Park (general information folder)	51,100
Cape Breton Highlands National Park (general information folder)	25,600
Hot Springs in Canada's National Parks (leaflet)	5,000
Jasper National Park—A Brief Historical Sketch (leaflet)	5,000
Jasper National Park (general information folder)	51,100
Prince Albert National Park (general information folder)	25,000
Port Royal National Historic Park (leaflet)	10,000
Prince Edward Island National Park (general information folder)	25,000
Riding Mountain National Park (general information folder)	26,200
Catalogue of Motion Picture Films	1,014
Total	225,014

Films and Lantern Slides

Although there was a considerable decrease in the circulation of national parks films compared with that of the previous fiscal year, the popularity of this medium of publicity and education was evidenced by a total distribution of 1,899 films. These films were screened by travel organizations, educational institutions, conservation societies, filed officers, lecturers, and service clubs in widely distributed points in Canada, the United States, Newfoundland, Greenland, the West Indies, Great Britain, South America, South Africa, New Zealand, and Australia. A number of Trade Commissioners and Canadian Ministers abroad were provided with parks films on loan, which they are using in their respective areas. The reported total attendance at showings of national parks films in Canada and elsewhere was 756,732. The actual attendance is known to be much greater, as many exhibitors fail to give this information.

A total of 28 new prints was added to the film library during the year and a number of prints, outworn or out-of-date, was withdrawn from circulation. A new colour subject "Health Springs Eternal", featuring the hot springs in Canada's National Parks, was produced, and a number of other prints re-edited.

The demand for coloured lantern slides as a publicity and educational medium continued. A total of 2,121 slides were lent to lecturers and various educational institutions. No new slides were added to the library stock.

Illustration Material

A steady demand by editors, publishers, advertising services, lithographers, and writers for photographs of the scenery, wild life, and recreational facilities of the parks was met by the distribution of 1,480 photographic prints and enlargements. Additions to the photographic library included a number of new negatives and 2,244 glossy prints. The library now contains approximately 2,400 subjects.

The Bureau co-operated with the Designing and Decorating Division, Department of Trade and Commerce, by supplying 45 mounted enlargements of national parks pictures for display at exhibitions held in a number of the largest cities in the United States and elsewhere. The Malton Air Port was supplied with 12 excellent transparencies for display purposes.

Information Service

Requests for information from various organizations and individuals were dealt with, and text matter, maps, and captions for illustrations in encyclopedias, almanacs, year books, and tourist guides, were checked and revised as required. Inquiries for detailed travel information were given individual attention, form letters and booklets being supplemented by individually-dictated replies whenever necessary.

DOMINION FOREST SERVICE

The war continued to make increasing demands on Canada's forests and forest industries during the year 1942. While exports to Great Britain fell somewhat below last year's level, increased shipments to the United States more than made up for the decrease; domestic consumption also showed a great increase.

The situation was complicated by a growing labour shortage, by difficulties in securing replacements of equipment, and a consequent drop in production. Despite these factors, the decrease was remarkably small.

Toward the summer of 1942 it became apparent that a serious fuelwood shortage was developing. In view of the widespread reliance on this type of fuel, and the difficult coal situation, a Deputy Administrator (Wood Fuel), under the Coal Administration, was appointed to deal particularly with this problem. The Dominion Forester was appointed to this position and several senior technical officers of the Dominion Forest Service were assigned to assist him in wood fuel administration.

Silvicultural research on forest experiment stations was further restricted, and consisted largely of studies which could be prosecuted in connection with the extensive cutting operations designed to provide timber for the war effort. As in the past year, much valuable work, in both cuttings and improvements, was performed by alternative service workers, internees, and prisoners of war.

In view of the importance of wood and wood products to the war effort, the responsibility of the general public with regard to forest fires is even greater than in times of peace. Protection organizations throughout Canada found their work increasingly hampered by difficulties in obtaining labour, and by losses of trained key men to the armed forces. Despite periods of unusually hot, dry weather in certain provinces, the fire season as a whole was favourable, the number of fires reported being the lowest since 1928. The area burned and damage done were well below the average for the ten-year period 1932-41.

Practically the entire time of the Forest Products Laboratories was devoted to war work of various descriptions. This effort was carried on in close collaboration with the armed services, with other Government departments, and with industry generally. The existence of a large staff of wood specialists, and the possession of special equipment not found elsewhere in the Dominion, made it possible to give effective assistance in a wide variety of problems.

In the work of the Forest Service, close liaison was maintained with Timber Control and with the various departments and industries chiefly concerned with prosecuting the war. During the year the Chief of the Forest Economics Division of the Dominion Forest Service was assigned to head the Statistics Division of Timber Control.

The Dominion Forester continued to function on the Sub-Committee on the Conservation and Development of Natural Resources of the Committee on Reconstruction. Towards the end of the fiscal year, the Assistant Dominion Forester was loaned to the Sub-Committee as technical officer to consult with the provinces in the preparation of plans for forestry undertakings during the post-war period.

The operation of prisoner of war, internee, and alternative service work camps on forest experiment stations was continued, and work programs were prepared and operations supervised by technical officers of the Dominion Forest Service.

The Dominion Forest Service also acted as technical adviser to the Dominion Department of Labour in the approval of plans and supervision of operations of forestry work conducted by alternative service workers under special agreement between the Department of Labour and the Province of British Columbia.

FOREST ECONOMICS

Although vast construction projects were completed during the earlier years of the war, the demand for Canadian forest products during 1942 continued to increase. Domestic consumption of lumber for war purposes continued at a high level and, though exports to the United Kingdom were somewhat lower than in previous years, increased exports to the United States more than counterbalanced that reduction. Difficulties of the situation were increased by reduced production. Shortages of labour appeared both in the woods and in the mills and operations were further hampered by difficulties in securing equipment, supplies, and repair parts. In the face of all these hindrances, the fall in output as compared with the record performance of the previous year was remarkably small.

The lumber industry continued to operate under the direction of the Timber Controller of the Department of Munitions and Supply. At the beginning of the year it was found necessary to extend the control to cover the production and distribution of pulpwood, and later on all exports of lumber to non-Empire countries were made subject to a system of export permits. Further restrictions on the use of lumber for non-war purposes, including both new construction and maintenance projects, came into effect.

All branches of the pulp and paper industry were placed under administrators of the Wartime Prices and Trade Board: shortages of hydro-electric power necessitated curtailment of newsprint production at many of the mills in Eastern Canada.

Two Crown companies, Aero Timber Products, Ltd., and Veneer Log Supply, Ltd., were incorporated to expedite production of specially-needed forest products. The former is engaged in logging Sitka spruce in the Queen Charlotte Islands, and the latter deals in high-grade veneer logs in Eastern Canada.

In the latter half of the year serious shortages of fuelwood appeared to threaten many localities and a Deputy to the Coal Controller was appointed to deal with this situation. Normal annual consumption of fuelwood in Canada is between 9 million and 10 million cords and the developing shortages in supply are a matter of very serious concern to many thousands of families whose homes are not equipped to burn coal.

The average annual rate of consumption and wastage of Canada's reserves of merchantable timber for the ten-year period, 1932-41, totalled 3,825 million cubic feet of standing timber. Distribution of total depletion between use and waste is shown in the following table.

Average Annual Depletion, 1932-41

	Millions of Cubic Feet
Volume used	2,653
Merchantable timber burned	472
Destroyed by insects, tree diseases, etc.	700
Total	3,825

Approximately 69 per cent of the total depletion was used and 31 per cent wasted. Replacement of this depletion requires an average annual growth of 14 cubic feet per acre over the whole accessible and productive forested area of the country. Since the accessible stand of merchantable timber is estimated at 211,656 million cubic feet, average depletion during the decade amounts to 1·8 per cent of the total volume annually. This does not seem excessive but the rate of depletion during the war years has been considerably higher than the average for the decade, being equivalent to 18½ cubic feet per acre in 1941. It is not likely that so high a rate could be maintained with safety under the rudimentary systems of forest management that have so far obtained in this country.

The relative importance of the principal branches of forest industry in 1941 is indicated in the following table:—

FOREST INDUSTRIES

Summary of Principal Statistics, 1941

	Capital Invested	Employment	Salaries and Wages	Net Value of Products
	$	Man-years[1]	$	$
Woods operations	189,000,000	108,000	105,000,000	170,000,000
Lumber industry	100,982,006	45,104	41,465,433	76,660,254
Pulp and paper industry	678,937,841	37,154	63,677,818	174,872,065
Wood-using industries	113,088,898	41,810	44,411,756	72,025,008
Paper-using industries[2]	66,816,308	16,032	20,152,266	43,436,177
Totals	1,148,825,053	248,100	274,707,273	536,993,504

(1) 300 working days.
(2) Not including printing trades.

The net value of products of the forest industries in 1941 exceeded that of the previous year by 17·1 per cent.

Operations in the woods and the wood-using industries together constitute one of the chief sources of employment in Canada. Furthermore, such operations are widely dispersed throughout the country rather than concentrated in a few large centres. In addition to logging and manufacturing processes ordinarily carried on, there is urgent need for a great deal of new work aimed at improving the productivity and accessibility of the forests themselves. Consideration is being given already to the possibilities of employing during the post-war period considerable numbers of men who will be demobilized from the armed services, and former workers in war industries.

AERIAL FOREST SURVEYS

Work of the aerial surveys section has been heavily curtailed, in comparison with that of previous years, because of the enlistment of a large proportion of the specially-trained staff. Nevertheless, a very considerable amount of valuable information has been made available.

In connection with forest inventory work, five map sheets showing forest cover in Nova Scotia were published in co-operation with the Economic Council of that Province. The southwest quarter of the Green Lake sheet in Saskatchewan was revised, and new work has been done on the southeast quarter of the same sheet, and on the map of Prince Albert National Park. The compilation of areas and quantities of timber on the Petawawa Forest Experiment Station was continued. Two articles were published on the subject of classification of forest sites from aerial photographs. This is a new development and the articles have been the subject of favourable comment. The search for improved methods of estimating volumes of wood from aerial photographs was continued.

As is usual, the section was visited during the year by officials of provincial forest services and pulp and paper companies who desired to familiarize themselves with the methods developed by the Forest Service for classifying and mapping forests and estimating timber volumes from aerial photographs.

SILVICULTURAL RESEARCH

Botany and Ecology

Notable progress has been made in tree-breeding investigations, both in development of technique, and in selection of high-quality strains and species adapted to Canadian soil and climatic conditions.

Improved technique in cross-pollination, hybridization, vegetative propagation, and seed-bed treatment has been developed. Numerous strains, particularly of pines and spruces, that appear to be resistant to fungus and insect attacks have been selected. Many of these studies have been conducted by the Sub-Committee on Tree-Breeding of the Associate Committee on Forestry, National Research Council, composed of representatives of the Council, of the Entomological and Pathological Divisions of the Department of Agriculture, and of the Dominion Forest Service, at nurseries, the arboretum and testing gardens at the Petawawa Forest Experiment Station, and at the National Research Council and Forest Products Laboratories in Ottawa.

The transect sample plot system of sampling growth and regeneration conditions following cutting of pulpwood stands has been improved. Assistance has been given to various outside organizations in initiating studies of such lands.

A series of sample plots to study yellow birch-maple cut-over lands, established in 1937, and showing the development for the 5-year interval, was remeasured.

Silviculture

Extensive cutting operations were conducted at all forest experiment stations to provide wood products for war requirements. These were conducted in accordance with the working-plan requirements and form the basis for studies of various silvicultural cutting methods designed to improve stand composition and growth.

All permanent sample plots in studies of thinning and improvement cuttings at the several stations, due for remeasurement, were remeasured. These include six series of plots in farm woodlots, established in Nova Scotia in 1928.

Mensuration

A practical method of measuring the density of any stand, based on the number of trees per acre in the stand and their average diameter, has been developed. The possibilities of this method as a means of measuring the growth of stands are far-reaching.

Progress has been made on the preparation of a series of hemlock volume tables, which will soon be ready for distribution.

Yield tables for red and white pine stands at Petawawa have been developed.

Protection

Studies of the rate of spread of mistletoe in lodgepole pine, and of heart-rot in poplar, were continued.

FOREST PROTECTION

The total number of fires, 4,791, which occurred in 1942 was the lowest since 1928 when 4,243 fires were reported: the average annual number of fires for the 10-year period 1932-41 was 5,985. The total damage and cost was $3,550,181, as against an average for the decade 1932-41 of $5,378,122. The total area burned over was 1,838,471 acres as against an annual average of 2,428,659 acres for the period 1932-41.

The number of fires was less than the average for the previous decade in all provinces, but in spite of this the area burned and total cost plus damage was above the average in British Columbia, Saskatchewan, and Nova Scotia. A statistical analysis will be found in Tables 1 to 4.

A short description of the fire season by provinces follows:—

British Columbia.—Serious fire conditions occurred in the Prince George district from June to September, and many fires were set by lightning. The Vancouver district experienced very dry weather from the middle of July to the end of September, and high winds rendered fire control difficult.

Alberta.—The season of 1942 proved a more favourable one than the series of bad fire seasons in previous years. The number of fires, area burned, and costs were much below the average of the previous decade.

Saskatchewan.—A short but extremely severe spring fire period taxed to the limit the fire-fighting facilities of the province. The fires were widespread and labour was scarce. Ninety-eight per cent of the fire damage occurred in the month of May. In succeeding months the precipitation was frequent and heavy.

Manitoba.—A bad early spring fire season developed in the northwest, and many fires spread beyond control before effective action could be taken. Good rains occurred throughout the summer in all regions.

Ontario.—The fire season was a favourable one, and fire losses were well below the average for the previous 10 years.

Quebec.—Weather conditions varied greatly in different regions. August was the driest month, but a dry spring period also prevailed except in the western region. Losses were much below normal.

New Brunswick.—Dry weather prevailed throughout the greater part of the season, but fire losses were fortunately confined to less than normal.

Nova Scotia.—Unusually hot, dry weather prevailed throughout the summer, and fires were difficult to control owing to lack of water and shortage of manpower. July was the worst month, when 85 per cent of the area damage occurred.

Dominion-Protected Lands.—These comprise National Parks, Indian reserves, and Dominion Forest Experiment Stations. The fire season was favourable in all National Parks except Prince Albert Park which experienced a bad spring fire season and accounted for a large proportion of the total area burned over in National Parks. Indian lands experienced a favourable season with low losses. No fires occurred on Dominion Forest Experiment Stations.

Forest-Fire Research

Work in this field was greatly curtailed owing to a reduction of staff arising from the war effort. Eighteen forest weather stations were operated on western National Parks to compute the daily index of fire-hazard in each region for administrative purposes. An analytical study of fire behaviour in various fuel types in relation to the daily index of fire-hazard and wind velocity was begun in certain parks where four years' records of fire and hazard conditions were available. Routine studies on basic principles of fire-hazard measurement were continued at the Petawawa Forest Experiment Station.

A bulletin was prepared on methods for protecting forest lookout structures from lightning.

In the Rocky Mountain parks, surveys were continued to determine the most economical and effective locations for lookout points for forest-fire detection.

TABLE 1

Forest Fire Losses in Canada, 1942, Compared with 10-Year Average 1932-41

Item		Annual Averages 1932–41	Year 1942
Fires under 10 acres, number		.....	3,437
Fires 10 acres and over, number		.....	1,354
Total number of fires		5,985	4,791
Area burned—			
Merchantable timber	acres	587,112	318,435
Young growth	"	670,947	470,022
Cut-over lands	"	440,203	126,414
Non-forested lands	"	730,397	923,600
Total area burned	"	2,428,659	1,838,471
Merchantable timber burned—			
Saw timber	M ft. b.m.	784,925	253,420
Small material	cords	2,567,294	906,600
Estimated values destroyed—			
Merchantable timber	$	2,954,811	1,169,923
Young growth	$	920,041	1,011,038
Cut-over lands	$	320,786	118,737
Other property burned	$	326,698	617,035
Total damage	$	4,522,336	2,916,733
Actual cost of fire-fighting	$	855,786	633,448
Total damage and cost	$	5,378,122	3,550,181

TABLE 2

Forest Fires in Canada by Causes, 1942, Compared with 10-Year Average 1932-41

Cause	Average 1932–41		Year 1942	
	No.	%	No.	%
Camp-fires	1,130	19	745	15
Smokers	939	16	884	18
Settlers	1,015	17	602	13
Railways	236	4	379	8
Lightning	999	17	996	21
Industrial operations	139	2	147	3
Incendiary	450	7	147	3
Public Works	58	1	53	1
Miscellaneous known	417	7	465	10
Unknown	602	10	373	8
Totals	5,985	100	4,791	100

TABLE 3
Statistics of Forest Fires by Regions, 1942
(Averages given are those for 10-year period 1932-41)

Item	British Columbia		Alberta		Saskatchewan		Manitoba		Ontario	
	Average	1942	Average	1942	Average	1942	Average	1942	Average	1942
Fires—										
Total number	1,580	1,414	341	215	256	218	405	174	1,512	1,224
Caused by lightning ... %	33	50	4	1	6	1	10	1	21	16
Areas burned—										
Merchantable timber ... acres	53,815	41,791	146,171	63,727	51,219	91,634	35,027	47,949	175,037	52,586
Young growth ... "	58,254	126,888	181,832	78,892	239,879	115,322	33,306	48,377	82,005	16,484
Cut-over lands ... "	173,835	36,466	17,558	988	14,388	49,495	4,140	3,778	34,358	8,993
Non-forested lands ... "	56,615	241,399	189,633	182,208	157,958	329,671	148,996	110,121	100,894	35,653
Total ... "	342,519	446,544	535,194	325,815	463,444	586,122	221,469	210,225	392,294	113,716
Damage ... $	748,049	1,334,604	895,747	357,922	197,937	378,987	132,900	216,371	1 228,917	333,545
Cost of fire-fighting ... $	171,398	236,662	80,901	37,362	65,500	56,773	33,005	22,559	256 523	120,394
Total damage and costs ... $	919,447	1,571,266	976,648	395,284	263,437	435,760	165,905	238,930	1,485,440	453,93

Item	Quebec		New Brunswick		Nova Scotia		Dominion Lands					
							National Parks		Indian Lands		For. Expt. Stations	
	Average	1942	Average	1942	Average	1942	Average	1942	Average	1942	Average	1942
Fires—												
Total number	1,156	930	254	252	348	292	74	37	53	35	7	0
Caused by lightning ... %	5	7	4	6	0	2	11	16	14	0	6	0
Areas burned—												
Merchantable timber ... acres	107,938	2,461	7,481	4,213	1,362	3,240	5,277	9,621	3,382	1,213	449	0
Young growth ... "	45,899	3,841	6,552	2,455	4,575	19,008	15,418	58,600	2,440	155	875	0
Cut-over lands ... "	180,420	14,934	10,193	4,838	1,146	552	3,459	6,350	666	20	45	0
Non-forested lands ... "	29,592	5,588	24,391	3,626	8,978	5,319	9,510	9,396	3,215	619	706	0
Total ... "	363,849	26,824	48,617	15,132	16,061	28,119	33,664	83,967	9,703	2,007	2,075	0
Damage ... $	1,143,375	79,416	80,756	74,140	20,797	70,587	55,180	68,486	13,114	2,675	6,182	0
Cost of fire-fighting ... $	178,798	101,525	26,066	20,317	22,276	23,400	16,290	12,322	4,567	2,134	590	0
Total damage and costs ... $	1,322,173	180,941	106,822	94,457	43,073	93,987	71,470	80,808	17,681	4,809	6,772	0

TABLE 4

Fire Season, 1942—Comparative Statement by Regions

Region	Increase or Decrease in Relation to Average for Period 1932-41			Proceedings Under Provincial Fire Laws		Deaths
	Number of Fires	Area Burned, Acres	Cost Plus Damage	Prosecutions	Convictions	
	%	%	%			
British Columbia..	− 11	+ 30	+ 71	18	18	1
Alberta.....	− 37	− 39	− 60	48	41	0
Saskatchewan.....	− 15	+ 26	+ 65	23	21	0
Manitoba.....	− 57	− 5	+ 44	0	0	0
Ontario.....	− 19	− 71	− 70	29	27	0
Quebec.....	− 20	− 93	− 86	18	18	0
New Brunswick....	− 1	− 69	− 12	49	47	0
Nova Scotia.....	− 16	+ 75	+118	6	6	0
Canada.....	− 20	− 24	− 34	192*	179*	1

*Including one prosecution and one conviction in National Parks.

ALTERNATIVE SERVICE WORK

DOMINION FOREST EXPERIMENT STATIONS

Under the authority of the National War Services Regulations as administered by the Department of National War Services and later by the Department of Labour, conscientious objectors were required to perform alternative service in lieu of military service. Utilizing the services of workers supplied by these departments, alternative service work camps have been operated at the Kananaskis Forest Experiment Station since the autumn of 1941, and at the Petawawa Forest Experiment Station since the spring of 1942, under the direction of technical officers of the Dominion Forest Service.

During the year, the number of men in camp at Kananaskis Station varied from 15 to 56, and at Petawawa Station from 18 to 41. At both stations, these men performed an important service during the fire season in providing manpower for the protection against fire of the forests and investments in forest research on these valuable experimental areas, at a time when local help was not available.

In addition to providing a first line of defence against forest fires, the services of these workers were employed in other useful work resulting in the production of 4,080 cords of fuelwood for Government use and for sale, 467,681 linear feet of coal-mine props, 25,800 linear feet of fence posts for military use, and 243,354 feet board measure of sawlogs. Construction of 12 miles of new road and improvement or maintenance of 37 miles of existing road were also carried out, as well as forest nursery work, tree-planting, and station maintenance. Projects in which alternative service workers were used involved a total of 24,325 man-days of work.

BRITISH COLUMBIA

By agreement, the Dominion Government through the Department of National War Services, undertook to furnish the Provincial Government of British Columbia with the services of alternative service workers (conscientious objectors) to assist in the protection of the provincial forests against fires arising from possible enemy action or sabotage. In all matters relating to

the location of work camps, assignment of men thereto, certification of accounts for payment, and inspection of operations, the Dominion Forest Service was delegated to act on behalf of the Ministers of National War Services and of Labour.

The largest number of men engaged in work camps at any one time was 675 during the month of August. They were distributed in 22 camps established at strategic points on the east side of Vancouver Island and the lower mainland coast in regions of greatest fire-hazard and highest timber values. The men were given training in fire-fighting methods and fire drills, and they assisted in the suppression of 149 forest fires. While sabotage was not apparent, there is no doubt that the presence of these well-organized camps of trained fire-fighters greatly reduced fire losses in an exceptionally dry season.

A valuable work performed by these men when not engaged in actual fire-fighting was the felling of dead trees ("snags") left from logging operations of past years. In the event of fire, these standing dead "snags" burn freely and disperse sparks and flaming particles which, carried long distances by the wind, often start fresh fires and thus make fire control exceedingly difficult. These dangerous sources of fire hazard were removed on areas totalling over 26,000 acres.

In order to provide rapid access for fire-fighters to the logged-over areas, and also for purposes of tree-planting and administration, 100 miles of new roads and trails were built, and more than 150 miles of existing roads and trails improved. Other useful work carried out included the construction of permanent fire-guards, buildings, forest lookouts, and 36 miles of telephone line; the preparation of areas for reforestation, the planting of more than 5,500,000 Douglas fir seedlings on areas totalling over 7,000 acres, forest nursery work, and the cutting of fuelwood for domestic use. Approximately 174,500 man-days were expended on all classes of work.

FOREST PRODUCTS LABORATORIES

During the year the Forest Products Laboratories at Ottawa, Vancouver, and Montreal have been engaged principally on problems connected with the prosecution of the war. Peace-time programs were almost entirely set aside in order that members of the staff might undertake work of immediate importance in connection with timber, plywood, pulp and paper, and various minor wood products for construction, munitions, and other war uses. A good deal of the work was carried out in direct collaboration with the armed forces and much attention was devoted to improving practices in war industries. Time was given to long-term civil projects only where complete discontinuance would have resulted in rendering records of long years of research valueless.

Following is a brief reference to some of the more important matters which have received attention during the year.

Main Laboratories—Ottawa

Division of Timber Mechanics

Developments in the use of wood for military aircraft have increased the demand for strength data of species formerly considered of minor value for this purpose. Investigation of the properties of a number of such species has resulted in their acceptance, and also provided data required in aeronautical design.

Plywood from certain species not previously so used was prepared and tested with satisfactory results, thus making available a greater supply of raw material.

A large number of new adhesives of the urea, phenol, and melamine types have been investigated at the request of the armed forces and industry, to determine their suitability for use in aircraft and other construction. The Laboratories have also carried out tests on various casein glues used in aircraft construction to check results obtained by manufacturers.

An investigation into the water resistance of casein glues was undertaken at the request of the Royal Canadian Air Force, to determine whether glues of the jelling type are more water-resistant than those of the non-jelling type. This investigation was of considerable importance, since the necessity of aircraft dispersal frequently exposes glued-up assemblies to high humidities over prolonged periods.

An investigation into the physical properties of eastern spruce for aircraft was completed. The results obtained proved that eastern spruce is excellent aircraft material.

Considerable attention was given to the laminating of paper impregnated with synthetic resins, as an alternative to plywood in the construction of aeroplanes and gliders. Some of the earlier objections to its use for such purpose were overcome by the use of plasticizers. Consideration has also been given to its use for a number of other industrial purposes.

The sources of jute for sand-bags have to a large extent been cut off. In co-operation with the Department of National Defence, the Pulp and Paper Research Institute, and manufacturers of paper bags, tests were carried out and a paper sand-bag capable of withstanding the rough handling of service conditions was developed.

Further testing of telephone cross-arms removed after varying periods of service was carried out to determine whether the effect of weathering was as serious as generally supposed. The results indicate that the effects of weathering are generally of a superficial nature and that the actual reduction in strength with time is not very serious even after twenty-five years' service.

The design, testing, and drafting of specifications for munitions containers of lumber, plywood, corrugated board, and fibreboard, and modifications of old designs carried out at the request of the Department of Munitions and Supply and the Inspection Board of the United Kingdom and Canada, continued to require a great deal of attention. Assistance was also rendered to industry in testing and designing egg-crates, cheese boxes, packages for powdered eggs, and other such commodities.

At the request of various Government departments, much minor testing was carried out on war materials such as field telephone and telegraph poles, gun capstan bars, scarfed joints for assault boat parts, telegraph cable-drums, and aircraft fairings.

Assistance, to which more specific reference cannot be made, was rendered to war departments in the development of munitions.

DIVISION OF WOOD PRESERVATION

Tests were carried out to determine the fire resistance of paints for use on wooden military buildings.

Work was continued on the recording of data on tests to determine the service life of treated and untreated timber of various species used for different purposes throughout Canada.

Further to last year's report on the ground-line treatment of standing telephone poles, one additional type of ground-line treatment was tested during the year.

The creosote distilled from tar produced as a by-product in the carbonization of Saskatchewan lignite coal contains over 40 per cent of tar acids and other material soluble in caustic soda solution. This was examined in order to

determine whether a fraction of the tar acids might prove useful in adhesives or plastics. Indications are that certain of the lower boiling fractions might be used for such purposes. Samples of creosote submitted by the Inspection Board of the United Kingdom and Canada were analysed.

In work carried out to develop a suitable end-coating for use in reducing the checking of timbers during air-seasoning it was found that a plastic casein product could be prepared.

Tests were carried out on the relative toxicities of a creosote from which all tar acids had been removed, water-gas tar, water-gas tar-creosote, and 70/30 creosote-water-gas tar.

In recent years waterproof glues have been developed and are being used extensively in plywood exposed to the weather. This has led to a demand for preservatives to prevent decay which are not harmful to the glues used. Work on the problem was started.

The moulding of veneers on surfaces of double curvature is an important problem in wooden aircraft construction and for other similar purposes. Experimental work was carried out in an effort to improve present procedure and at the same time conserve critical materials, particularly rubber. Very encouraging results were obtained.

DIVISION OF WOOD CHEMISTRY

Commercial distillations of resinous sawmill waste of Douglas fir and white pine were carried out at a commercial hardwood distillation plant and the crude tar separated from the pyroligneous acid. Part of the crude Douglas fir tar was refined by removing some of the low-boiling fractions to yield a tar of low viscosity. By arrangement with the Commercial Intelligence Service, this was shipped to Australia for commercial testing in rubber tire manufacture. The remainder of the crude Douglas fir tar was refined by the removal of some of the low-boiling fractions to yield a tar of medium viscosity which was submitted to a Canadian tire manufacturer.

On the refined white pine tar of medium viscosity one Canadian firm has reported that both commercial and laboratory tests indicate that this tar compared favourably with the American pine tar in regular use. This firm also reported that it would be willing to use white pine tar of the quality submitted in place of American pine tar.

The low-boiling constituents from the crude Douglas fir tar were examined for ore-flotation properties. The general conclusion reached was that most of these oils can satisfactorily replace steam-distilled pine oil as frothers but that more of these oils than pine oil are required to produce the same volume of froth.

A member of the staff was appointed to a sub-committee formed by the National Research Council to study the use of producer gas as a substitute fuel for gasoline in Canada. This committee inspected various types of gas producers and decided to carry out tests on all units available in order to be able to recommend the manufacture of the most satisfactory type when and if an urgent need for a substitute fuel for gasoline should arise.

Particular attention was given to: (1) Drawing up a set of specifications for charcoal to be used in gas producers; (2) providing standard grade charcoal for carrying out road and engine-bench tests on gasoline engines equipped with gas producers; (3) finding producers of charcoal and the quantity produced in each province; also to testing charcoals from various sources to determine their suitability for use in gas producers. Experimental work was started on the preparation of charcoal from various Canadian species. Attention was also given to wood-using gas producers, the Laboratories being asked to prepare wood suitable for such tests.

Experimental work was carried out on the staining of maple and birch rifle furnishings so as to give them a dark finish approaching that of black walnut furnishings.

On account of increased demand for charcoal in connection with the manufacture of certain metal alloys, consideration was given to methods of production, standards, and price. This matter was also studied in relation to prices of wood fuel for domestic heating.

DIVISION OF LUMBER SEASONING

During the year wooden bodies replaced steel bodies for army trucks. The Laboratories collaborated with organizations and manufacturers concerned in the selection of suitable grades and species of material, in the drying of such material, and in details of storage, manufacture, assembly, and finish of the wood used in these bodies.

During the early part of the year the Laboratories supervised the kiln-drying of a large quantity of maple blanks for rifle furniture. The kiln-drying of these blanks, despite the numerous difficulties encountered through having such a product custom-dried in various types of dry-kilns, was successful, but maple was eventually largely displaced by walnut, principally because of the necessity of staining maple and the greater difficulty of working fine parts of maple.

The Laboratories carried out the kiln-drying of material required by war services for very exacting uses and used the laboratory kilns in demonstrating to inspectors of wooden material used in aircraft the methods of obtaining satisfactorily-dried material for such purposes.

DIVISION OF WOOD UTILIZATION

The preparation of rules for the grading of spruce lumber was completed, and later these rules were adopted by one of the lumber trade organizations, preliminary steps being taken to implement them. In the evolution of these rules a great deal of information on defects in spruce lumber was acquired. The new grades were applied to a large number of spruce joists and beams which had been tested for strength, and their reliability as a means of segregating lumber for structural purposes was investigated.

Much time was devoted to the study of additional sources of spruce for the construction of aircraft. A sample shipment of eastern spruce of aircraft quality was inspected before being shipped to the United Kingdom. Information was compiled that would be useful to potential producers of aircraft-quality spruce who are not now familiar with its production.

Assistance was rendered in connection with specifications for various items of war equipment, information relative to the establishment of ceiling prices on wood fuels, the training of aircraft inspectors, and other similar war-time activities. Manufacturers of war supplies were also assisted on numerous occasions in connection with the use of wood in their work.

Progress was made in a study of the relative costs of sawing spruce logs of different sizes. It is expected that the information resulting from this study will promote more careful manufacture and may support the case for the closer integration of wood-using industries as a means of reducing operating costs and curtailing waste.

DIVISION OF TIMBER PATHOLOGY

Timbers in a gold mine in northern Ontario were examined to determine why rapid decay occurred at upper levels while at a depth of 5,450 feet timbers had remained sound for seven or eight years in an abandoned drift in which work was resumed. It was found that *Merulius lacrymans* (Wulf.) Fr., a fungus which grows at low temperatures and which can attack quite dry wood, was

growing vigorously down to a depth of 3,600 feet, but was absent at 5,450 feet; the temperature at this low level (76° to 80°F.) was too high for active growth. Fungi capable of causing decay at this temperature were prevented from growing by the dryness of the wood, since water is introduced into the workings only when work is in progress.

Incipient decay showing up as purple streaks in Douglas fir was found to be due to attack by *Poria microspora*. It is thought that this fungus is responsible for much of the decay in Douglas fir previously ascribed to *Fomes pini*.

Inquiries relating to many fungal defects in wood have been dealt with during the year. These had reference to defects in birch, control of stain in pulpwood and softwood lumber, red stain in jack pine, deterioration of pulpwood in storage, rot in stored poplar and basswood logs, and decay in pit props.

DIVISION OF TIMBER PHYSICS

In co-operation with the Royal Canadian Air Force, investigations were undertaken to decide the best methods of determining the basic density of wood in the form of thin veneers. A method of testing that gives the required information more accurately than methods previously in use was evolved. Application of this method of testing veneers showed that much of the yellow poplar supplied for use in aeroplane plywood was excessively heavy. Remedial measures were suggested and approved, among them the substitution of red pine for the heavier type of wood previously used.

Implementing preliminary investigation by the Laboratories of the use of sawdust and planer-mill shavings for insulation of houses, a committee of the Canadian Engineering Standards Association was appointed to prepare acceptable standards for sawdust and shavings for insulation. It is believed that the establishment of such standards for sawdust and shavings for house insulation will tend to facilitate the salvage of much useful material that is now wasted.

The economic importance of wood fuel is again to the fore and information on this subject with reports of the Laboratories on heating value of wood fuels have been provided to various Government departments and to users of wood fuel.

Aeroplane propellers of laminated wood construction which developed defects in service were examined on various occasions on request of the Royal Canadian Air Force in order to determine the cause of failure and to suggest remedial measures.

The increasing use of photographic records in science and industry as well as for military uses suggested that sufficiently critical measurements might be made from small-scale photographs to be of assistance in scaling and tallying logs. Photographs made on both vest-pocket film in black and white and on 35mm. film in colour, confirmed the opinion that accurate measurement of the diameters of logs uniformly piled can be made with low-power microscope either from these small contact prints or from the original colour films.

VANCOUVER LABORATORY

The Vancouver Laboratory is operated as a branch of the Ottawa Laboratories, in co-operation with the University of British Columbia, the work chiefly having to do with the utilization of British Columbia wood products. During the year, this work was centred on problems concerned with more efficient production, manufacture, and use of timber for war requirements.

DIVISION OF TIMBER MECHANICS

Standard tests were carried out on yellow cedar and amabilis fir, and special tests were made on Sitka spruce, western hemlock, and Douglas fir for specific war uses.

In order to meet the demand for immediate information by the British Ministry of Supply, tests were carried out on western hemlock graded in accordance with aircraft specifications and selected from mills in several producing areas.

Tests were made on glued-up Anson spar laminae of Sitka spruce, in both the rough and surfaced condition, as a result of which methods were developed for gluing unsurfaced material with entirely satisfactory results and the saving of considerable material.

At the request of the British Columbia Lumber and Shingle Manufacturers' Association, tests were carried out on structural timbers of Douglas fir and western hemlock.

Tests were made on built-up laminated sections of Sitka spruce cut from low-grade logs, in order to determine the possibility of increasing the recovery of Sitka spruce of aeroplane quality. The results showed high strength and led to the approval of Sitka spruce plywood as a substitute for wing covers made up of a mahogany face on a yellow poplar core.

Western white pine plywood, from both peeled and sliced veneers, was tested under varying conditions and, as a result, has received approval of the Royal Canadian Air Force as a substitute for Sitka spruce plywood.

An investigation into serious compression failures in spruce laminae of a tail spar under manufacture at a local factory determined the cause of the injury and resulted in its correction.

At the request of the Royal Canadian Air Force, inspections were made of certain aircraft woods prior to shipment to Eastern Canada.

An inspection of a carload of commercial clears in white spruce from central British Columbia indicated that, by selection of such material, a fairly large additional volume of lumber of aeroplane quality might be obtained.

Considerable time was devoted to co-operation with the Timber Control, Royal Canadian Air Force, British Ministry of Supply, Inspection Boards, and producers, in the applications of specifications, in studying means for increasing production, and in testing the merits of substitute materials.

DIVISION OF TIMBER PRODUCTS

Seasoning studies to determine a satisfactory kiln-drying schedule for western hemlock of aircraft quality were carried out.

A charge of veneer in various thicknesses and including Sitka spruce, western white pine, western birch, and mahogany was dried to establish proper methods for stacking to prevent warping and checking.

Studies of the tendency of urea to cause staining in Douglas fir and western hemlock, when used as a preventive for checking in kiln-drying, showed negligible surface staining, and the addition of other chemicals did little to improve the condition.

An investigation, extending over 12 years, into the incidence of rot in western red cedar shingle roofs of various types and laid under different conditions, was completed. A great deal of information was obtained regarding treatments for shingles and methods of nailing.

Information was assembled for the Regional Wood Fuel Officer on the use of woods other than Douglas fir for fuel.

The possible volume of hardwood waste, including birch, maple, and alder, and possible field sources of supply of these species which might be directed to the manufacture of charcoal for producer-gas units, were investigated.

Microscopic examinations of samples of western hemlock showing numerous fine white streaks showed that these streaks were not due to decay. The study resulted in the release of a large volume of previously rejected high-quality hemlock for aircraft manufacture in British Columbia and Washington.

Recommendations were made for methods of treating a large volume of western hemlock to be used for culverts along the Alaska Highway. Tests showed excellent results with deep penetration and a good retention of creosote.

A study was undertaken in co-operation with the Federal Department of Agriculture and British Columbia Sitka spruce producers to determine the extent of typical and of incipient decay of various kinds in logs cut up for aircraft lumber, and whether the rot-producing fungi in this wood are important as casual agents for the decay of Sitka spruce in service.

Many minor problems were dealt with, including the microscopic identification of wood samples; the use of a urea paste for end-coating timbers for seasoning; and storage methods for western birch veneer logs in the unseasoned condition.

Assistance was extended regarding the properties of certain British Columbia woods and their suitability for storage cases and boxes for naval use, resulting in these woods being accepted as substitutes for foreign species not now available.

Pulp and Paper Research Institute of Canada, Montreal

The Montreal Laboratory of the Forest Products Laboratories now forms a part of the Pulp and Paper Research Institute of Canada. The Dominion Government, the Canadian Pulp and Paper Association, and McGill University jointly support this Institute, the research work being under a General Director who is responsible to a Joint Administrative Committee consisting of representatives of the three constituent bodies.

Both fundamental and applied research is carried on at the Institute.

Fundamental Research Studies

Work done during the year simplified considerably the question of the probable structure of lignin and will thus help in leading to new developments regarding its utilization, and a better understanding of the mechanism of chemical pulp manufacture. The difficulties inherent in developing or improving present methods of pulp manufacture arise as a consequence of (a) the necessity of first separating the cellulose and the lignin, and (b) the extreme sensitiveness of the liberated lignin units towards chemical reagents. Future developments will lie in effecting such a separation, without calling into effect the changes which so readily take place in the lignin building units.

Applied Research Studies

The development of an electrical conductivity method for measuring the consistency of a pulp suspension reached a stage where a test installation of semi-commercial size for more extended trials was warranted. To do this under present conditions would be difficult and expensive, if not impossible, owing to the prior use of the necessary instruments and materials in war work. The study was therefore suspended until conditions improve.

A new and more promising optical method of measuring printing smoothness was developed in which the paper is pressed between a smooth glass surface and a backing having resilience comparable with that on a printing press. The amount of actual contact area is determined by means of light reflected from the paper-glass surface and is a measure of the smoothness of the paper. The Weymouth method of trial printing was also studied. In this method a proof press prints a sample and a standard paper at the same time under standardized conditions. Visual grading of the results on newsprint samples by different observers showed fairly good agreement and reproducibility. Fair agreement was also obtained between this grading and that obtained by means of a typical reflectometer.

The development of an instrument for measuring the foldability of boxboard has become dependent on knowledge of the behaviour of board on being creased. To obtain this basic knowledge requires the construction of accurate

tools specially designed for the purpose of exploring variations in conditions. It is difficult to have such tools made under present conditions. Nevertheless the study has progressed within these limitations, and interviews with commercial boxmakers have been encouraging in regard to the applicability of results so far obtained.

A study was begun with the object of measuring the rate of diffusion of solutions of certain chemicals into wood. This is important in connection with the cooking of wood chips in the manufacture of sulphite pulp.

To determine the effect of the moisture content of wood and its age after being cut on the conditions of grinding and on pulp quality, tests are being made on samples from four species of trees which are used for making pulp.

A study of the efficiency of skidding technique in pulpwood operations, aimed to reduce waste effort in transporting pulpwood from stump to hauling road by horses, was completed. The results show that considerable economy can be achieved by changing present practice. A similar study of the efficiency of hauling technique is being undertaken.

Miscellaneous investigations covered more tests on building papers, to provide data for setting up specifications; further series of tests of pulp sheets, before and after certain treatments; an investigation of the degree of reliability of certain normal pulp testing methods; a study of dirt removal methods in sulphite pulp manufacture; and determining the cause of variations in the action of screen plates used in testing the freeness of pulp.

To assist in conserving chlorine, a maximum brightness in terms of the G.E. reflection meter was set for pulp. One of these instruments was obtained and is being used for pulp brightness tests.

Assistance was given to industry by dealing with a few hundred technical problems involving altogether some thousands of individual tests.

War Work

Owing to available equipment, or special qualifications of personnel placed at the disposal of the Government, the Institute was able to render valuable assistance in problems connected with the war. In addition, much testing was done on pulp and paper products used with munitions.

SURVEYS AND ENGINEERING BRANCH

J. M. WARDLE, DIRECTOR

During the year the activities of the Surveys and Engineering Branch were increasingly directed to work arising from the war. While some of this work is along different lines to that normally undertaken, it is interesting to find how great a part of the regular functions of the Branch can contribute usefully to the prosecution of a global war

The regular programs of the Dominion Observatory, Ottawa, for obtaining magnetic information and of the Geodetic Service in determining precise latitude and longitude of points on the earth's surface, have been essential features in the preparation of air navigation maps of Northern Canada. Hydrometric data of the Dominion Water and Power Bureau and its hydro-electric power records have been invaluable in planning the development and distribution of power for war industries. The construction experience of the Engineering and Construction Service has been applied to projects related to the war, and in the very important field of map production, the Hydrographic and Map Service has made invaluable contributions through the issue of air maps and marine charts. The effect of the war on this Service has been greatly increased work and the transfer of field and office activities from a normal planned program to problems and areas dictated by war needs.

In the past year the Hydrographic and Map Service reached a new high figure of 1,830,000 in the number of copies of maps, charts, and plans printed. Mapping work done by this Service, for both land and sea areas, has been expanded through necessity to include areas outside Canadian territory. Maps have been issued of areas in Newfoundland, including Labrador, and a large number of maps and charts have been printed of European areas for the British authorities.

The Dominion Observatories at Ottawa and Victoria are making useful contributions in various fields of Canada's war effort. At Ottawa, the Observatory staff has concentrated on making accurate time more generally available for military operations, for radio requirements, and for the use of survey parties in northern regions. Instructions have been given from time to time to Royal Canadian Air Force groups on air navigation and time problems. The staff of the Astrophysical Observatory in Victoria has, in addition to regular duties, engaged in work related to the war, such as air raid precaution work and lectures to various groups of the Armed Forces. The past year saw the completion and successful operation in the Victoria Observatory of aluminizing apparatus large enough to treat the 72-inch mirror.

The Dominion Water and Power Bureau continued the efficient regulation of water levels of the Lake of the Woods in the interests of power development and co-operated with Ontario in the regulation of the Lac Seul storage reservoir. Essential construction features of the Lake Minnewanka storage and power project in the vicinity of Banff, Alberta, were completed by the Calgary Power Company Limited during the year under review and the power plant put in operation. Dominion Water and Power Bureau officers announce that, of all power generated in Canada for sale, 98½ per cent is hydro-electric.

The Engineering and Construction Service continued its supervision and operation of work camps for conscientious objectors and for male Japanese evacuated from Pacific Coast areas. A substantial reduction in the number of

Japanese in various camps resulted in the summer of 1942 through the policy of uniting married Japanese with their families in community settlements established by the British Columbia Security Commission in interior points of British Columbia.

The construction of the highway for national defence purposes from Prince Rupert towards Hazelton, B.C., was the main construction item undertaken by this Service. In spite of serious labour shortages and the difficulties in securing machine parts and materials promptly, the contractors on this project did splendid work. At the end of the year under review this project was 50 per cent completed.

The International Boundary Commission staff (Canadian Section) continued Canada's share of the effective demarcation and maintenance of the boundary between Canada and the United States, and Canada and Alaska, the total length of these boundaries being 5,527 miles. The detailed surveys made by the Boundary Commission staff along the International Boundary line have been of great assistance to the Dominion organizations responsible for patrol and have made available useful information as to the character of roads and bridges along the International Boundary from coast to coast.

This Branch misses greatly the services of its technical men who have enlisted. In many cases where replacements were secured, these men in turn enlisted and suitable replacements are now practically impossible to obtain. The services of the trained experienced employees who are now in the Armed Forces were never more needed than at the present time and it is frequently very difficult to decide in what field our technical officers can best serve their country.

The work of the Surveys and Engineering Branch is provided for through its own Votes and through funds made available by other Government Branches or Departments for work done in their interests. In the case of projects related to the war the Branch secures the necessary funds from the War Appropriation Vote. The following tables give the total expenditures made under the various headings:—

Regular Votes	$1,129,148 86
Special Votes	849 26
War Appropriation Votes—Alternative Service Work Camps	41,256 62
Prince Rupert-Terrace-Cedarvale Highway	2,964,770 92
Japanese Nationals	1,685,806 24
Triangulation work in Yukon	4,276 09
	$5,826,107 99

Expenditures of moneys made available by other Branches and Departments as follows:

	Regular Votes	Special Votes	Trust Funds	Total
To Engineering and Construction Service from—				
Lands, Parks and Forests	.....	$36,015 27	.....	$ 36,015 27
Indian Affairs	$21,159 59	.....	$ 7,651 14	28,810 73
National Research Council	.....	13,324 91	.....	13,324 91
National Defence (Air)	.....	4,437 02	.....	4,437 02
				$ 82,587 93
To Legal Surveys and Map Service from—				
National Defence (Air)	.....	59,347 61	.....	$ 59,347 61
To Geodetic Service from—				
Mines and Geology	.....	7,325 77	.....	7,325 77
National Defence (Naval Service)	.....	720 88	.....	720 88
(Air)	.....	3,487 99	.....	3,487 99
				$ 11,534 64
Total expenditure				$5,979,578 17

DOMINION OBSERVATORIES

The Dominion Observatories at Ottawa and Victoria continued work on various programs, and as in the previous year special attention was given to geophysical and astronomical research that had a bearing on current war problems.

DOMINION OBSERVATORY, OTTAWA

The Dominion Observatory at Ottawa, with a view to war requirements, devoted particular attention to the refinement of the national time service and the reduction of observed and theoretical magnetic data. Further improvements were applied toward raising the standard of precision in foreign time reception and comparison, broadcasting of time signals, and the control of radio frequencies. The magnetic field surveys conducted were restricted to the obtaining of observations for navigational data and the construction of charts for aerial use. Instruction on air navigation, time problems, and general phases of astronomy, continued to be given as required for groups of members of the R.C.A.F.

Observing conditions below normal interfered with several special programs, but satisfactory results were obtained for time and other normal activities.

Several members of the staff attended the May, 1942, meetings of the Royal Society of Canada in Toronto, at which papers on astronomy and geophysics were presented, and the Dominion Astronomer, President of Section III, delivered the presidential address on "Time and Its Measurement".

The Observatory was, as usual, open to visitors each Saturday evening and the equatorial telescope was made available when the sky was clear. Numerous groups, including several school classes, were given instruction in the use of astronomical and geophysical equipment. A few lectures on general scientific subjects were given on request, including one on "Life in the Universe" before the Montreal Centre of the Royal Astronomical Society of Canada. Nine meetings of the Junior Astronomical Club were held at the Observatory.

Position Astronomy and Time Service.—With the meridian circle, 1,201 fundamental observations were made for right ascension and declination. Instrumental constants were determined, and computations carried out.

With the reversible transit, observations were made on 140 nights for the determination of correct time. The sidereal clock Shortt 29, which continued to be used throughout the year as the primary reference standard, maintained a satisfactory rate and continued to synchronize the two signal clocks controlling all mean time circuits, including the various time signals, circuits operating chronographs, minute and seconds dials, seismograph shutters, and the Government and outside clock systems.

Time signals were sent continuously by wire to the Canadian National Telegraph Company, the Canadian Broadcasting Corporation, the Monitoring Station of the Department of Transport, and the National Research Laboratories. Wireless time signals were transmitted directly from the Observatory station CHU on 3330, 7335, and 14670 kc. continuously; also through station VAA on 11990 kc. daily except Sundays and holidays, and through the Canadian Broadcasting Corporation chain of stations daily. From the middle of June until the end of September, special time signals were sent out hourly from 8 p.m. to 3 a.m., E.S.T., through station VAA, for the use of survey parties engaged in field work. Wireless time signals were received daily from Arlington, Bordeaux, Monte Grande, Nauen, Rio de Janeiro, and Rugby. The times of reception of these signals for each month were forwarded to other co-operating observatories. Changes were made in transmitting and receiving sets to improve the quality of the signals.

The synchronized time service in the various Government buildings in Ottawa was maintained with few interruptions. The total number of electrically operated clocks is now 750.

The crystal controlled Primary Frequency Standard, which was installed last year, has given satisfactory rates over short periods, but is not so reliable over long periods. Adjustments to coils and condensers are being made, in an effort to secure a more uniform long-period rate.

Experimental work was begun on the remote control of synchronous electric clocks. A Riefler secondary master clock was overhauled and fitted with additional electrical contacts and shipped to Saskatoon, Saskatchewan, to provide more accurate time for the seismographs there. Clocks, chronometers, watches, and other timing mechanisms were cleaned, repaired, and rated for various Government departments.

The usual tables of sunrise and sunset and moonrise and moonset, phases of the moon, eclipses, and differences of standard time, were prepared and distributed.

Terrestrial Magnetism.—Field observations were restricted to five reoccupations of repeat stations, namely, one in British Columbia, two in Alberta, one in Manitoba, and the base station Ottawa B. Field instruments were compared in July with Dominion Observatory standards at Long Island, the Ottawa B station. The index correction for the Hydrographic and Map Service standard Cooke Transit T.S. 1576 compass was determined.

At the request of the Department of National Defence, several months were devoted to the compilation and reduction of data, and to the making of magnetic charts, for certain regions not covered by the regular observation program.

A chart showing lines of equal vertical intensity for the foothills region of Alberta was constructed for the use of engineers engaged in geophysical prospecting for oil.

Further progress was made in the study of peculiarities relative to the daily variation in declination in Northern Canada, preparatory to furnishing information to magnetic observers operating in sub-Arctic and Arctic regions during the 1943 field season. An investigation into the correlation of magnetic disturbances registered at the Meanook observatory and observed at Dominion Observatory stations in the far north in previous years was begun.

All 1942 field observations were reduced and final values obtained. In order to provide more precise secular change data, it has been found advisable to apply corrections for daily variation and disturbance to horizontal force and inclination values. With the exception of 1941, these corrections have hitherto been applied only to declinations. Disturbance and daily variation corrections were therefore computed and applied to all observations made in the years 1942 and 1940.

Request information was supplied to the National Research Council, the Department of National Defence, the Department of Mines and Resources, the United States Navy Department, the United States Coast and Geodetic Survey, as well as to commercial and scientific organizations and to surveyors.

The magnetic observatories at Agincourt, Ontario, and Meanook, Alberta, provided continuous photographic records of the magnetic elements, with a minimum of loss due to driving mechanism failure. During the summer of 1942 tests were carried out at both observatories to ensure continued accuracy of mounting of the variometers, and all instruments were re-calibrated. The earth inductor at Meanook was brought to Ottawa for overhauling, and to be fitted with modern agate bearings and a flexible drive shaft; these could not be obtained commercially, and were supplied through the courtesy of the Carnegie Institution of Washington, D.C.

Preliminary computations of the records have been completed to the end of 1942, and preparation of results for post-war publication was continued. Regular quarterly reports on the co-operative research program were prepared and sent to the international commission.

The magnetic instruments of the geophysics department of the University of Toronto were standardized at the Agincourt observatory, and vertical force records, with necessary interpretation data, were supplied to the University for use in geophysical research surveys in southwestern Ontario.

Vertical force data were supplied from Meanook records to oil prospectors for research investigations in Alberta.

Seismology.—The teleseismic seismographs at Victoria, Saskatoon, Ottawa, Seven Falls, and Halifax, and the short-period seismographs at Kirkland Lake, Ottawa, Shawinigan Falls, and Seven Falls, in connection with mine rockburst research and the special program study of earthquakes originating in Eastern Canada and the New England States, were maintained in continuous operation, and the interpretation of records was kept up to date. The obsolete Mainka seismograph of the Saskatoon station was replaced by a modern reconstructed Milne-Shaw instrument.

Five hundred and eighty-two earthquakes were recorded in Canada, including eight major shocks which were reported to the Press and to Science Service, Washington. Monthly bulletin exchanges on all registrations were continued with the principal world seismic stations still available. Monthly reports on local disturbances registered on short-period instruments were made to the co-operating agencies and to the central Northeastern Seismological Association at Weston, Mass., and periodic reports on rockburst research were prepared for distribution to various research organizations.

The rockburst research program has been carried forward by the Seismologist, dividing his time through the year between Ottawa and Kirkland Lake, and new methods of detection of preburst disturbances were instituted. The method of attack now in use is that of instrumental determination of the distribution and frequency per minute of subaudible strain-snaps occurring in rock under pressure. It has been definitely established that this method localizes pressure areas with considerable precision. It clearly offers some measure of protection for the miners and progress is being made toward the ultimate prediction of rock bursts.

Gravity.—The astronomer in charge of this work returned to the Observatory in November from war duty with the National Research Council, where he had been employed on loan in the Gauge Laboratory since June, 1940. During the remainder of the fiscal year, a report was prepared for future publication on nine gravity field stations occupied in Eastern Canada in 1939. In connection with this report, considerable work was done and investigation made with a view to improving and simplifying existing methods for the reduction of gravity observations.

Solar Physics.—Observing conditions were too poor for the high latitude rotation observations desired. Sunspots declined in numbers to about the average value for the third year before minimum. In reply to inquiries, information concerning the sunspot cycle and its effects was supplied to correspondents. It may be remarked that, if the linear velocity of solar rotation is proportional to $\cos^{n+1}\phi$, it follows immediately that the kinetic energy of rotation changes most rapidly with latitude when $\cot^2\phi = 2n+1$; since $n = \cdot 3$ approximately, the resulting value of ϕ is about 38°, which is near the highest latitude at which spots are observed. Preparation for publication of the 1911-1915 solar rotation results was continued. A tree section of 200 years from Lake Aishihik, Y.T., was measured, showing minimum growth at sunspot maximum. The records of cloudiness and visibility were maintained.

Fifteen-inch Equatorial, and Photographic Photometry.—Due to other requirements, no regular observing program was undertaken, but the instrumental equipment was periodically overhauled to guard against deterioration.

Publications, Reports, and Bulletins.—Two numbers of the regular series of Publications of the Dominion Observatory were issued: Vol. XIII, Bibliography of Seismology, Nos. 11 and 12. Dominion Observatory Reprint No. 36, Velocity of Elastic Waves and Structure of the Crust in the Vicinity of Ottawa, was distributed to a restricted list of collaborators. The report, Record of Observations at the Magnetic Observatories, Agincourt and Meanook, for 1936-37, was prepared for post-war publication by the Observatory. Quarterly reports on the magnetic character of the day for 1942 were sent to the International Association of Terrestrial Magnetism and Electricity at Lausanne, Switzerland, and the Department of Terrestrial Magnetism, Carnegie Institution, Washington, D.C. The following bulletins, pamphlets, and brochures were issued and distributed: Wireless Time Signals (monthly); Seismological Bulletin (monthly); Northeastern Seismological Association Bulletin (Nos. 87 to 108); The Rockburst Research at Lake Shore Mines (Nos. 8, 9, 10); Saturday Evening Program (quarterly; suspended as from January, 1943); tables of sunrise and sunset, moonrise and moonset, phases of the moon, eclipses; and numerous questions were answered by special pamphlets or correspondence, relative to questions on standard time and time zones, local, standard, and daylight saving time differences, the sunspot cycle influence, and general astronomy.

DOMINION ASTROPHYSICAL OBSERVATORY, VICTORIA, B.C.

Important results were obtained in several fields of advanced astrophysical problems, and an appreciable contribution was made to the war effort, chiefly in air raid precautionary measures. Dr. Andrew McKellar of the Observatory staff returned on May 1 from the University of British Columbia, where he had been on replacement loan at the request of the National Research Council. Dr. McKellar attended an important conference on spectroscopy at the University of Chicago, at which he took part in discussion of current investigations and presented a paper on "Intensity Measurements of Cometary Spectra". About 4,000 daytime visitors registered during the year. Entertainment of the public on Saturday evenings was necessarily discontinued due to the discontinuance of public transportation from the city; however, many groups of members of the armed services were accommodated as occasion permitted. Dr. C. S. Beals was appointed Provincial Gas Officer, and spent some time organizing personnel units, setting up decontamination centres, and instructing police, air wardens, teachers, and students in the use of respirators and in first aid procedure. Dr. R. M. Petrie carried on experiments with specially constructed gas masks and respirators, and continued his weekly lectures on practical astronomy to officers at the Gordon Head training school from April to December. Exact time was supplied daily as required to the Air Force Station at Patricia Bay.

Instrumental Equipment.—The aluminizing equipment was completed, and the two and one-half ton 72-inch mirror and the secondary mirror were successfully coated. A photoelectric reflectometer was designed and constructed locally for measuring the reflectivity of mirrors. New platinum thermometers for the spectrograph were made in the Observatory workshop. A new heating unit and blower were installed for thermostatic control of the large mirror. A mercury vapour tank was constructed for increasing photographic plate emulsion sensitivity. Modification of the three-prism spectrograph from the Universal to the Littrow form, mentioned in last year's report, is expected to be completed shortly. This will provide effective seven-prism dispersion, and considerably widens the possible field of research. With the above improvements,

especially those to the mirror and the spectrograph, the increased efficiency of the telescope will provide for investigation of stars nearly one magnitude fainter than previously.

Observations.—The observing conditions were some 15 per cent below normal. The dome was opened, and spectrographic and photometric observations undertaken, on 169 nights. In all, 873 spectrograms were secured in 1,065 observing hours. Satisfactory progress was made on the extensive program of the Class B stars north of the equator and fainter than the 7th magnitude. The program of 150 A- and B-type stars, previously studied at Victoria but requiring further observation, was completed. The investigations of the Wolf-Rayet and emission-line stars, the studies of the solar-type, R- and N-type stars, and the determination of the physical properties and dimensions of spectrographic and eclipsing systems, were continued.

Spectroscopic and Spectrophotometric Research.—Measurements: Nine hundred and twenty spectrograms were measured for radial velocity; the number of unmeasured spectrograms at present approximates two thousand and is steadily increasing. *Binaries:* A new spectrophotometric method was devised for the study of composite spectra and was applied to H.D. 144208-9 to obtain the spectral class and magnitude of its fainter component. Investigations were continued on double-line spectra to obtain the magnitude differences of the components and hence the absolute dimensions of the systems; this information is important for determination of the mass-luminosity relation for spectroscopic binaries. A new massive 8th magnitude binary (H.D. 34333) was recently discovered by Dr. J. A. Pearce, and its orbital elements were deduced from 31 spectrograms; its distance, 3,500 light years, was derived from the measured intensity of the interstellar K-line of ionized calcium; the mass of the system is 46 times that of the sun, and is the fourth most massive known; the star is not known to be an eclipsing variable, but the orbital inclination and the dimensions of the components indicate the probability of a 0·05 magnitude eclipse. New orbital elements for the brighter component of the eclipsing binary RS Vulpeculae were derived from 29 single-prism spectrograms; the magnitude difference of the components was determined spectrophotometrically, and the absolute dimensions of the system computed. Definitive elements were deduced for lambda Andromedae from the Lick Observatory three-prism observations, and a revised value of the period from seven high dispersion spectrograms recently taken at Victoria; after an interval of thirty-six years; the definitive elements indicate that this binary is a simple two-body system. Orbital elements were derived for the massive binary H.D. 191201 from 20 recent spectrograms; the minimum masses are 14·5 and 11·6 times the sun, and the eccentricity is 0·25, unusually high for an O-type star. Orbital elements for the 8th magnitude eclipsing binary H.D. 227696 were determined from 25 spectrograms; the elements represent the only published photometric minimum of this recently discovered variable; the magnitude difference of the components was deduced by Petrie's spectrophotometric method, and the absolute dimensions obtained; the system has a mass of 30 times the sun and is the seventh most massive known; Sterne's theory predicts an apsidal rotation in 10 years. *The Pulsating B-Cephei Star H.D. 199140:* The central absorptions and equivalent widths of the hydrogen and helium lines of this star were measured on 44 single-prism spectrograms distributed over the cycle of light and radial-velocity variations; all lines showed a periodic variation in central depth, and were deepest and sharpest at the time of maximum atmospheric expansion; the lines of H and Mg II show a variation in total absorption, strongest at the time of maximum expansion; no well established variation is found in the intensities of the helium lines. *Cometary Spectra:* The spectra of Comets Whipple No. 2 and Cunningham 1940c were studied and several hitherto unknown lines were identified. *Emission-Line Stars:* Analysis of the hydrogen line profiles of the star M.W.C. 374 indicated that the P Cygni

absorption takes place at a higher level than the ordinary emission, as in H.D. 190073. Intensities of emission and absorption lines in the unique binary system H.D. 193576—a Wolf-Rayet star classified as WN 5·5 with an O-type companion —were measured and compared with typical stars of the classes concerned, and the apparent magnitudes of the components deduced. *Solar-Type Stars:* Studies of line intensities in spectra of the sun, *gamma Cygni, alpha Persei,* and *alpha Canis Majoris* were concluded; analysis of 638 spectral lines in the region λ4028-λ6752 was completed, and revised values were obtained for turbulent velocities, excitation temperatures, electron pressures, and ionization levels.

Seismograph Service.—The seismographs were maintained in operation, and 260 earthquakes were recorded.

Publications, Papers, and Addresses.—One number of the regular series of Publications, Vol. VII, No. 15, "Molecular Lines from the Lowest States of Diatomic Molecules Composed of Atoms Probably Present in Interstellar Space", was printed and distributed. Four manuscripts of the regular series were completed, but printing was deferred for the present. Fourteen technical papers were presented before scientific societies, and four articles published in scientific journals. Eighteen illustrated addresses on popular astronomy were delivered to audiences in Victoria and Vancouver, and sixteen staff seminars held.

DOMINION WATER AND POWER BUREAU

The need of more power for war industry increased the demands upon the Dominion Water and Power Bureau for authentic water supply data and required the establishment of new hydrometric stations in several areas where steps are being taken to initiate new hydro-electric developments. These, together with those already in existence, brought the number of stations throughout Canada at which gauge readings are taken continuously or at regular intervals to 650; in addition to gauge readings, about 2,100 flow measurements were made by the field staff during the year.

WATER AND POWER

Lake of the Woods Regulation.—During the year the run-off throughout Lake of the Woods watershed averaged slightly above normal, being below normal to the end of July and well above normal in August and September. Lake level rose from elevation 1060·15 on April 1, 1942, to elevation 1061·0 on September 4, at which point the regulation became subject to the approval of the International Lake of the Woods Control Board. The facilities were so operated that lake level crested at elevation 1061·14 on September 12 and was brought down to elevation 1061·0 on September 21 when the regulation again became the responsibility of the Canadian Lake of the Woods Control Board. The outflow was continued at above normal rates throughout the winter months and lake level was drawn down to elevation 1059·40 on March 31, 1943.

Lac Seul Regulation.—The actual regulation of Lac Seul remained under the control of the Hydro-Electric Power Commission of Ontario acting in co-operation with the Lake of the Woods Control Board. The run-off during the year was slightly below normal, being below normal to the end of July and well above normal in September. Lake level rose from elevation 1166·82 on April 1, 1942, to elevation 1170·62 in mid-October. Commencing early in September and continuing throughout the winter, the storage was freely drawn upon and by March 31, 1943, the lake level was down to elevation 1167·95.

Snow Survey.—The fifteenth annual snow survey in the Lake of the Woods and Lac Seul watersheds was carried out during the first week of March in co-operation with the United States Engineer Office at Duluth, Minnesota, and the Hydro-Electric Power Commission of Ontario. The results show that the water content of the snow was 113 per cent of the average for the 15-year period.

Water Power Administration

A final water-power licence was granted by the Minister to the Consolidated Mining and Smelting Company of Canada Limited on December 24, 1942, for the power development on the Yellowknife River in the Northwest Territories. This plant has an installed capacity of 4,700 h.p. and has been operated at a high load factor. During the last calendar year it produced 21,733,000 kw. hrs. of electricity which was supplied to local mines and to the Yellowknife Electric and Power Company Limited for distribution in the Administrative District of Yellowknife. During the summer a storage dam was built at the outlet of Duncan Lake to impound about 100,000 acre-feet of water.

The combined storage and power development in the Lake Minnewanka area, Banff National Park, constructed by the Calgary Power Company Limited and described in previous annual reports has now been completed in so far as essential engineering features are concerned. There still remains to be done the clearing of the foreshores in the upper limits of the storage reservoir, the restoration of certain park facilities, and the general clean-up of the area including the treatment of borrow-pits and other evidences of construction. The storage in Lake Minnewanka amounts to about 200,000 acre-feet and the installed capacity of the power-house at Anthracite is 23,000 h.p. The plant came into service in the middle of October and has produced during its first season of operation about 55,000,000 kw. hrs. The plant is intended to be operated during the low-water half of the year, and its output, together with the benefit of the stored water passing through the power plants on the Bow River, has substantially increased the power supply of southern Alberta.

Owing to the necessity for providing additional power in this area for war purposes, this development was begun under authority of the War Measures Act, subsequently confirmed by agreement between the Dominion and Alberta which provided that the undertaking should be completed and operated by licence under the Dominion Water Power Act. An interim licence adequately protecting the interests of the Department was accordingly issued to the Calgary Power Company Limited on November 7, 1942. At the same time the company was granted a franchise to supply electricity to Banff, replacing the supply formerly provided by this Department from its own power plant which was absorbed in the new development.

Technical Assistance to Indian Affairs Branch

In pursuance of applications filed under the British Columbia Water Act for water rights appurtenant to Indian reserves in the Province, three conditional water licences were obtained for irrigation and domestic purposes, one each in Kamloops, Lytton, and Stikine Agencies. For the same purposes, eighteen final licences were issued, five in Kamloops Agency, ten in Lytton Agency, two in Okanagan Agency, and one in Williams Lake Agency.

In connection with conditional water licences the terms of which require completion of works or putting the water to beneficial use by December 31, 1941, representations were made to the Provincial Comptroller of Water Rights with respect to fifteen licences. Extensions of time were granted in eight cases, final licence surveys to cover the works then in use were ordered in five, one case was left for further consideration, and one licence cancelled for non-use.

The Water-Power Resources of Canada

Canada's total hydraulic installation at January 1, 1943, was 9,225,838 h.p. Construction in progress at that date is expected to provide one million horsepower additional by the middle of 1944.

Census of the Central Electric Station Industry

Since the introduction of the long distance transmission of electricity in the last decade of the nineteenth century, Canada's central electric station industry has expanded until at the beginning of the present year 8,224,425 h.p. or 89·2 per cent of the total hydraulic installation is installed for the generation of electricity for sale. More than 98½ per cent of all electricity produced for sale in Canada or for export to the United States is generated from water power, the 1942 production being an all-time record of 36,364,672,000 kw. hrs. It is not possible to state definitely what part of this was used for munitions production but as industry in Ontario and Quebec, where a very large proportion of the munitions industry is established, depends almost entirely upon hydro-electric power it follows that a very large proportion was so used.

DOMINION HYDROMETRIC SERVICE

The Dominion Water and Power Bureau carries on the work of securing and compiling stream measurement records throughout Canada under co-operative arrangements with the various provinces.

Run-off Conditions in Canada.—The run-off for the year was fairly uniform throughout Canada and on the average was about normal. New minimum rates of run-off were recorded in the North Maganatawan River near Burk's Falls, Ontario, in August and in the St. Mary River at Stillwater, Nova Scotia, in September. A new maximum rate of run-off was recorded in the Highwood River near Aldersyde, Alberta, in May.

In the Pacific drainage, typical stations showed a range in run-off from 74 per cent of the long term mean in the Campbell River near Campbell River to 110 per cent of the long term mean in the Kootenay River at Wardner. In the Arctic and Western Hudson Bay drainage, typical stations showed a range in run-off from 86 per cent of the long term mean in the English River at Sioux Lookout, Ontario, to 179 per cent of the long term mean in the Red River at Emerson, Manitoba. In the St. Lawrence and Southern Hudson Bay drainage, typical stations showed a range in run-off from 81 per cent of the long term mean in the Harricanaw River near Amos, Quebec, to 130 per cent of the long term mean in the Saugeen River near Port Elgin, Ontario. In the Atlantic drainage, typical stations showed a range in run-off from 72 per cent of the long term mean in the Lepreau River in southern New Brunswick to 106 per cent of the long term mean in the Lahave River in southwestern Nova Scotia.

Power and Special Investigations

In British Columbia special investigations were undertaken largely on streams crossing the International Boundary where there are problems of importance to Canadian interests. These problems include the effect of the regulation of Kootenay Lake upon reclaimed bottomlands in the Kootenay Flats area of British Columbia and Idaho; backwater effects on the Columbia and Pend d'Oreille Rivers in Canada from the operation of the Grand Coulee development in the State of Washington, and similar effects, existing or in prospect, on Okanagan and Skagit Rivers from works or obstructions in United States territory; and the supply of water from Phillips Creek for irrigation purposes in British Columbia and Montana. Engineering studies of importance were made for various Federal Departments and for other Branches of this Department including hydrometric data on Vancouver Island streams for the Pacific Biological Station; irrigation problems of the Department of Agriculture at Kamloops; hydraulic problems of the Department of Public Works involving the development and maintenance of permanent ship channels in the Fraser River, from the City of New Westminster to the sea; and administrative problems of the Lands, Parks and Forests Branch of this Department on various reserves and properties including the construction of monuments for the Historic Sites Board.

In Alberta and southwestern Saskatchewan, extensive studies were continued in the Milk and St. Mary Rivers basins for the purpose of determining the natural flow of the St. Mary and Frenchman Rivers at the point where each river crosses the International Boundary. The Twenty-First Annual International Snow Survey on the Upper St. Mary River in Glacier National Park, Montana, was carried out early in May, 1942, in co-operation with the United States Geological Survey and at the end of March, 1943, the Seventh Annual Bow River Snow Survey was made in the vicinity of Lake Louise, Alberta. Studies were continued of water storage and power possibilities on the upper reaches of the Bow River and its tributaries in co-operation with the Calgary Power Company.

In southeastern Saskatchewan and Manitoba investigations of the water supply situation in the Souris River watershed were continued in connection with the reference now before the International Joint Commission. Special attention was given to the amount of flow from Saskatchewan into North Dakota, the flow from North Dakota into Manitoba and the effect of this flow upon the Souris River in Manitoba. Special investigations were involved in the re-establishment of hydrometric stations on many of the minor rivers in Manitoba and on important northern rivers and lakes in accordance with a co-operative arrangement with the Provincial Department of Mines and Natural Resources.

In Ontario the most noteworthy investigations were made in connection with the construction of a submerged weir in the Niagara River above the Falls jointly undertaken by the Governments of Canada and the United States for the primary purpose of improving war-time power production from power plants on both sides of the river. Associated with this project, intensive hydraulic studies were necessitated both before and during the construction of the weir to determine its effect upon water levels in the river. Special studies of the Niagara River were also continued with respect to river slopes and the discharge of the river referred to the Morrison Street gauge. In co-operation with the Hydro-Electric Power Commission of Ontario special investigations were made again of the discharge from the control dam in the diversion channel delivering water from Long Lake to Lake Superior, also of discharge of the Ottawa River at various points and of the Madawaska River below the new Bark Lake reservoir. Snow surveys were again undertaken for the Commission in the watersheds of Wanapitei, Sturgeon, South, and Muskoka Rivers, and a snow survey was inaugurated in the Madawaska River watershed. At the request of the Department of Public Works investigations of hydraulic conditions on South Nation River were repeated during the freshet season of 1942. Special attention was also given to the Thames River during the freshet season in connection with the flood problem in that watershed. Upon a request from the Deputy Power Controller a series of thirty-three measurements were made at the various power plants on the Ottawa River at Chaudiere Falls.

In Quebec special investigations were made of drainage conditions on the Caughnawaga and Oka Indian Reserves. Special gauges were maintained on Richelieu and Magog Rivers in connection with international problems and other special studies included investigations of backwater effect, metering and rating outflow of storage reservoirs, and checking of power station rating in co-operation with various power organizations.

In New Brunswick an inspection was made of the international reach of the St. Croix River in September and a report was prepared for the International St. Croix Board of Control covering conditions in 1942.

In Nova Scotia special investigations included: a study of water supply, head, and power for the Eel Lake power development of the Nova Scotia Power Commission; co-operation with the Nova Scotia Power Commission in a revision of the power census of Nova Scotia; a field and office investigation of the Half-

way River and the pumping and piping system of the Hantsport pulp-mill; an investigation of a long dyke and abateaux at Walton to ascertain what remedial measures should be adopted to prevent a recurrence of damage by floods; recommendations for sluicing and unwatering the site of a dam now under construction for the City of Halifax water supply; and an inspection and progress estimate for the Hydrographic Service of a vessel under construction at Chester.

Water Resources Review—United States and Canada.—An important example of international collaboration was inaugurated during the year in the publication and distribution early each month of a Water Resources Review dealing with water conditions for the preceding month in Canada and the United States. This Review is jointly prepared by the Bureau in collaboration with the United States Geological Survey, is printed in Washington, and copies are distributed from Washington and Ottawa to those in both countries interested in the utilization of water resources.

St. Mary and Milk Rivers Water Development Committee.—This Committee, under the chairmanship of the Controller of the Bureau, was established by authority of Order in Council P.C. 682, dated February 17, 1941, to make a thorough study of the additional works required to utilize fully the share of St. Mary and Milk Rivers apportioned to Canada by the International Joint Commission in its order of October 4, 1921.

Following numerous meetings in Alberta where much information was obtained the Committee completed its report in February, 1942, and submitted the same to the Government. Later in the year the report was printed and made available for consideration by the Committee on Reconstruction. Distribution of the report was made also to those interested in the utilization of these waters.

INTERNATIONAL WATERWAY MATTERS

Among the more important matters dealt with during the year were the following:—

Based on prior studies submissions were made at hearings held by the International Joint Commission in connection with applications of the Creston Reclamation Company Limited for permission to reclaim further bottomlands in the Kootenay Flats area of British Columbia and of the West Kootenay Power and Light Company for permission to hold additional storage on Kootenay Lake for the purpose of increasing war-time production of power in the Company's plants on Kootenay River.

Attention was given to an international problem which has arisen at Osoyoos Lake on Okanagan River, and Bureau and United States engineers continued joint studies of hydraulic conditions of the Columbia and Kootenay Rivers.

The International Columbia River Board of Control, which was appointed in December, 1941, with the Controller of the Bureau as the Canadian member, commenced its duties in conducting studies as to the effect of the operation of the Grand Coulee dam and reservoir at and above the International Boundary.

The water supply situation in the Souris River basin was reviewed in preparation for a hearing to be held in May, 1943, by the International Joint Commission in connection with the further consideration of this international problem.

The collection of hydrometric records in connection with the international problem of the Roseau River and its tributaries was continued.

Arising from the Convention between Canada and the United States providing for the emergency regulation of Rainy Lake and other boundary waters in the Rainy Lake watershed, Bureau engineers accompanied the International Joint Commission on an inspection of these waters to observe the effects of the flood which occurred in the autumn of 1941.

An engineer of the Bureau was a member of the Engineering Sub-Committee charged with the responsibility of designing and supervising the construction of the submerged weir in the Niagara River above the Falls, jointly undertaken by the Governments of Canada and the United States.

The International Boards of Control which functioned during the year were those relating to Columbia River, Kootenay Lake, St. Mary and Milk Rivers, Souris River, Rainy Lake, Lake of the Woods, Prairie Portage, Lake Superior, Niagara, Massena, Lake Champlain, and St. Croix River.

REVENUE

During the year sums aggregating $30,340 were received from the various provinces in support of the co-operative resources studies; $89,722 was received from the Province of Manitoba in connection with the capital and operating costs of the Lake of the Woods and Lac Seul storages as provided by the Natural Resources Transfer Agreement, and $12,513 was collected as revenue from water-power licences. In addition, $3,500 was received in connection with a water-power development on the Bow River on behalf of, and was remitted to, the Indian Affairs Branch.

PUBLICATIONS

During the year Water Resources Paper No. 79 dealing with the surface water supply of Ontario and Quebec from October 1, 1935 to September 30, 1937, and No. 83 for New Brunswick, Nova Scotia and Prince Edward Island from October 1, 1936 to September 30, 1938, were published. Water Resources Paper No. 86 for British Columbia and the Yukon Territory from October 1, 1936 to September 30, 1938, was in press at the end of the year. The annual mimeographed bulletins on "Hydro-Electric Progress in Canada" and "Water Power Resources of Canada" were issued as usual. In addition to these the report of the St. Mary and Milk Rivers Water Development Committee was distributed as already mentioned.

ENGINEERING AND CONSTRUCTION SERVICE

The Engineering and Construction Service continued its functions as a general engineering agency of the Department, and also undertook engineering work for other departments of the Government or acted in an advisory capacity. The work included the organization and supervision of construction operations for the larger projects, as well as preparation of plans, estimates, specifications, and designs for such activities, and also inspections, reports, technical advice, and supervision as required on numerous smaller projects for various Government Services. During the year under review, work of major importance was undertaken for the Department of National Defence (Army and Air), the Department of National War Services, and the National Research Council.

In connection with war-time activities, technical officers have been loaned for temporary work, and others seconded for required periods or for the duration.

Operation of a highway construction camp at Montreal River, north of Sault Ste. Marie, was continued, employing alternative service workers (conscientious objectors). This camp was established in the spring of 1941, at the request of the Department of National War Services, and work on the Trans-Canada Highway was selected as the most suitable form of labour to be undertaken. The camp was continued to July, 1942, when the workers were transferred to British Columbia on forestry conservation projects. Subsequently, in December, 1942, the camp was re-opened with some 200 men, and operated during the remainder of the period. Expenditures for the operation of this camp are made from War Appropriations, such expenditures including any

necessary capital outlay, rental of equipment, medical care, food, and other supplies, as well as remuneration of trainees (basic rate 50 cents per day), office staff, and other employees.

Following the decision made early in 1942, that certain Japanese in British Columbia should be removed from restricted areas, this Service was instructed to establish camps for some 2,000 Japanese workers, from which construction operations would be carried out along the highway route between Jasper, Alta., and Blue River, B.C. By the beginning of April, 1942, sufficient accommodation had been provided on this project for some 1,700 men. Camps consisted of frame bunkhouses, kitchens, dining-rooms, office, storehouses, washhouses and stables. Camp equipment was obtained from stores on various projects of this Service, by purchase and through the Department of National Defence and the Province of British Columbia. A field hospital was established and equipped with hospital kit furnished by the Department of National Defence.

Subsequently, on representations being made by the Province of British Columbia, camps were opened up in that Province along the route of the Hope-Princeton Highway and on the Trans-Canada Highway between Revelstoke and Sicamous, to accommodate Japanese workers.

Later still, camps were opened up east of Schreiber, Ontario, for work on the Schreiber-Jackfish section of the Trans-Provincial Highway. Many of the workers from these camps were afterwards transferred to sugar beet farms and other industries in the East.

Early in 1942 the Dominion Government decided, as a war measure, to construct a highway between Prince Rupert and Cedarvale, B.C., involving some 97 miles of new road, and the Department of Mines and Resources was charged with the responsibility of building the road. The work has been handled by the Engineering and Construction Service.

In view of the lack of time for preparing detailed estimates of quantities, it was decided to let contracts on a unit price basis after an inspection on the ground by prospective contractors. The route was divided into eight contract sections of approximately equal length. Immediately following the letting of contracts, contractors moved equipment to the project and established camps. First operations were started in May, 1942, and continued through to the end of the period. A twenty-foot, gravelled, surfaced road is being provided for. Truss bridges are designed for a wheelway of 16 feet, in accordance with the specifications of the Province of British Columbia for this type of highway. All bridges are of timber, in view of the restriction on the use of steel for such purposes. Work has been carried on under considerable handicap, such as shortage of labour and keymen, priority difficulties, climatic conditions, and scarcity of materials. A summary of work done on this project is given later in this report.

Funds were provided under special estimates for bridge construction and seal-coating certain sections of paved highways in National Parks.

Architectural work performed included the preparation of plans, specifications, and estimates for buildings and certain other structures to be undertaken by Government departments, the drawing up of contracts, calls for tenders, the examination of tenders and recommendations in this connection, the checking of reports and returns made in regard to the construction of such buildings, as well as the examination and approval or revision of plans of buildings proposed to be erected by private individuals on lands under the control of the Dominion. Inspections of certain buildings were made during and after erection, and inspections were made of structures damaged through various causes and requiring repair. Architectural advice is furnished as required to Government Services.

A description of the more important operations undertaken by this Service in the year under review is given hereunder:—

HIGHWAYS

Alternative Service Work Camp

Montreal River Camp (Ontario).—Trainee strength at April 1, 1942, was 60, and continued at approximately this figure until camp was closed on July 11. When the camp was re-opened for the winter of 1942-43, it was enlarged to accommodate 200 men. General highway construction work was undertaken on a section of the Trans-Canada Highway north from Montreal River. The work accomplished for the period is as follows:—tote road, 7,300 feet; clearing and grubbing, 0·42 acre; riprap, 101 cu. yds.; solid rock excavation, 11,366 cu. yds.; other material excavation, 21,005 cu. yds.; culverts, round logs, 10,885 lin. ft.; iron, 1,822 lbs.

Prince Rupert-Terrace-Cedarvale Highway

This project, as mentioned earlier in this report, was divided into eight sections, and contracts were awarded as follows after competitive bids on a unit price basis:—

Section No. 1—E. J. Ryan Construction Company Ltd.
Section No. 2—Rayner Construction Limited.
Section No. 3—Tomlinson Construction Company Ltd.
Section No. 4—Standard Paving Limited.
Section No. 5—McNamara Construction Company Ltd.
Section No. 6—Dufferin Paving Company Ltd.
Section No. 7—General Construction Company Ltd.
Section No. 8—E. J. Ryan Construction Company Ltd.

Subsequently, owing to the lack of progress made on Section No. 1, the Rayner Construction Limited contract was extended to take over some four and one-third miles of this Section, and later the Northern Construction Company and J. W. Stewart Limited, Vancouver, took over the contract for constructing the remainder. Later still, it developed that the E. J. Ryan Construction Company Limited was unable to continue work on Section No. 8, and assigned this contract to the Highway Construction Company Limited of Vancouver.

Engineering headquarters was established in Prince Rupert, and resident engineering parties were organized for each section.

In order to provide an improved highway easterly to Kitwanga, an additional 13½ miles of road was let by contract after competitive bids. This section (Cedarvale-Kitwanga) was designated "Section 9", and was awarded to the R. Campbell Contracting Company, Vancouver, B.C., in March, 1943.

The following work was done on Sections 1 to 8 inclusive during the fiscal year:—cutting and clearing, 346·034 acres; stumping and grubbing, 208·726 acres; excavation, 1,427,891 cu. yds.; round logs, cribs and culverts, 27,715 lin. ft.; hewn logs, cribs and culverts, 34,152 lin. ft.; iron in bridges and culverts, 63,660 lbs.; sawn timber in bridges, 974·996 M. f.b.m.; piling in place, 44,050 lin. ft.

ENGINEERING WORK IN NATIONAL PARKS

Banff Park

Trans-Canada Highway (Lake Louise East Section).—Some 7·86 miles of bituminous pavement laid in 1941 was seal-coated. This work had been postponed owing to unfavourable weather conditions.

The approaches to the new steel and concrete bridge over the Pipestone River were completed, and final brush coat applied to the concrete surfaces of the bridge.

Banff Water Supply.—Investigations were made, covered by reports and plans, with estimates of cost of improvements to the system, including a chlorinating plant.

Lake Minnewanka Power Project.—An engineer of the Engineering and Construction Service acted as departmental field representative in connection with the project of the Calgary Power Company for raising the level of Lake Minnewanka for storage and power purposes, and comprising the construction of a power-house at Anthracite, complete with power canal, penstock, surge tank, roads, and other accessories. Inspections of work in progress were made daily, or oftener if required; weekly and monthly reports were prepared for departmental information, and special reports furnished on phases of the work as required; plans were examined and such changes made as departmental interests warranted; conferences and discussions were held with Company and National Parks officials and representatives from time to time.

Jasper Park

Jasper to Jasper Park Lodge Road.—Repairs were carried out on rough sections of pavement laid in 1941.

Athabaska River Bridge.—Painting of the new 225-foot steel span was completed by contract. Daily inspections of the four timber spans at this crossing were made during high water.

Fish Hatchery.—Drawings were prepared for a proposed residence for the operator. Supervision was provided for the erection of the fish hatchery under contract.

Jasper-Edmonton Highway.—The faulty trestle at Mile 16·2 was replaced by an earth fill with a five-foot treated timber culvert for drainage.

Inspections and Reports.—The form of agreement covering the proposed Diesel lighting plant installation was examined and report prepared covering same. Working drawings were prepared for a new incinerator. An inspection of work in progress on the new bridge at Mile 11·7, Medicine Lake Road, was made and report prepared.

Kootenay Park

Sinclair Creek Bridges.—Plans, specifications, and bills of material were prepared for the proposed steel and concrete bridge over Sinclair Creek at Mile 5·2. However, as release of enough steel for the whole structure could not be secured, construction of only one reinforced concrete abutment and footings for the second was completed. An inspection was made of three timber truss bridges on the Banff-Windermere road over Sinclair Creek, and report prepared on their condition.

Yoho Park

Kicking Horse River Bridge.—Plans, specifications, and bills of material were prepared and two reinforced concrete abutments were constructed for the new steel and concrete bridge over a branch of the Kicking Horse River near Leanchoil. Erection of the superstructure was deferred until such time as steel for same can be made available. Fills for both approaches to the bridge were 90 per cent completed.

Waterton Lakes Park

Pass Creek Bridge.—Instructions were issued covering work necessary to complete this project, and an inspection was made of the completed work.

Prince Edward Island Park

Pump operating conditions at Dalvay House were investigated and suggestions made as to remedial measures to be taken.

Cape Breton Highlands Park

Sketch plans were prepared for a new warehouse building.

Historic Sites

A sketch was prepared, with bill of material, for a storage space addition to the caretaker's garage at Fort Beausejour.

Plans were prepared for the new layout of the museum at Fort Wellington, Prescott, Ont.

Miscellaneous

Drawings were completed for an alternative type of lookout tower for National Parks.

Gander Lake-Bishop's Falls Highway, Newfoundland

A survey party carried out location for the section of the above highway between Norris Arm and Bishop's Falls, a total of 22 miles of line being run, of which 11·5 miles were adopted as the final location. Following the closing down of field-work, the plotting of survey notes and preparation of plans, profiles, and estimates of cost were undertaken. This work was undertaken at the request of the Royal Canadian Air Force, which organization was furnished with all the information obtained.

Tourist Highways

King George VI (Peace Arch) Highway, B.C.—Payment was made of a claim submitted by the Province of British Columbia for shoulder consolidation work done prior to March 31, 1942, on the above road, under an agreement with the Province whereby the Dominion contributed 50 per cent of the total expenditures on certain approved projects.

ENGINEERING WORK FOR OTHER BRANCHES

Indian Affairs

A large number of engineering matters were handled in various Indian reserves for the Indian Affairs Branch, and these are summarized as follows:—

Inspections of works were made at the following places, and reports prepared:—

British Columbia.—Nanaimo I.R No. 1; Kitsegukla I.R. No. 1; Port Simpson Indian Village; Bella Bella Indian Village; Cook's Ferry I.R. No. 9; Spahomin Creek I.R. No. 4; Mamit Lake storage; Coqualeetza Indian Hospital; Pemberton I. R. No. 8; Okanagan I. R. No. 1; Osoyoos I.R. No. 1; Penticton I.R. No. 1; Kootenay I.R. No. 1; Columbia Lake I.R.; Canim I.R. No. 1; Alkali Lake I.R. No. 1

Alberta.—Athabaska Agency; Lesser Slave Agency; Crowfoot Indian Residential School.

Saskatchewan.—Crooked Lake Agency; Carlton Agency; Lac La Ronge Indian Residential School.

Manitoba.—Portage la Prairie Indian Residential School; Portage la Prairie Agency; Norway House Agency

Ontario.—Six Nations Superintendency; Kenora Agency; Walpole Island Agency.

Quebec.—Caughnawaga Agency; Huron Village of Lorette; Restigouche Agency.

The following engineering work was undertaken:

British Columbia.—Port Simpson Indian Village, improvements to water supply; Lower Nicola I. R. No. 1, diversion ditch weir reconstructed; Musqueam I. R. No. 2, domestic water supply system constructed; Kamloops I. R. No. 1 work undertaken on pipeline extensions; Kamloops Indian Residential School,

fire protection system repaired and improved; improvements effected to the irrigation pump intake; Niskonlith I. R. No. 1, flumes were constructed; Okanagan I. R. No. 7, irrigation distribution work carried out.

Alberta.—Crowfoot Indian Residential School, repairs carried out to roof.

Ontario.—Six Nations Superintendency, Medical Officer's residence at Oshweken was reconstructed; McIntosh Indian Residential School, repairs to the roof were carried out; Kenora Indian Residential School, repairs undertaken to retaining wall.

Maritime Provinces.—An inspection was made covering suggested sites in Nova Scotia in connection with the proposed centralization of agencies. The scheme provided for the erection of four buildings at each of two sites, including residential school, teachers' residence, principal's residence, and office warehouse building. Sketches of several types for each of these buildings were prepared. Topographical surveys were made of the sites and plans drafted.

Immigration Branch

Investigations were made of possible sites at Saint John, N.B., for a proposed Detention Building for merchant seamen, and sketch plans drawn of the suggested building.

GEODETIC SERVICE OF CANADA

During the year the Geodetic Service staff, reduced by enlistments, was strained to carry out operations required as a result of war demands. A large part of the field work was requested by the Royal Canadian Air Force and consisted of determining astronomical positions at a large number of points in Northern Canada. These points will provide control for the mapping of large areas through aerial photography undertaken by the U.S. Army Air Force on a joint defence program. Solution of a special problem in aerial navigation was completed for the Royal Canadian Air Force.

At the request of the Newfoundland Government primary triangulation along the northwest coast, discontinued in 1940 as an economy measure, was resumed as it was found that the data secured were required for war activities. In spite of the stress of other work and the lateness of the request the measurement of a baseline and observations of one astronomic station were undertaken in 1942, and plans were made to complete the work in 1943.

Primary triangulation on the north shore of the Gulf of St. Lawrence and in Yukon Territory, and secondary triangulation on the Pacific Coast, were extended.

Field inspection of precise level bench marks was carried out in northern Ontario and Quebec.

Special publications of this Service on triangulation and levelling were sent out in response to many requests, particularly for use by Canadian and United States Armed Services.

Triangulation adjustments and various research problems were handled.

TRIANGULATION

Gulf of St. Lawrence.—Primary triangulation was continued in 1942 along the north shore of the Gulf of St. Lawrence under the direction of J. W. Menzies, assisted by J. H. Kihl and temporary assistants, the various operations being continued from where they were left off in 1941. Reconnaissance for the selection of stations was completed to the southwesterly end of the Strait of Belle Isle, where a connection was made with the primary triangulation of the Geodetic Survey of Newfoundland. Reconnaissance was also done at the mouth of St. Augustine River so that secondary triangulation may be carried up that river to the Quebec-Labrador boundary.

Station preparation followed behind the reconnaissance, and angular measurements, following the station preparation, were carried on from Kegashka eastward to a point near Mutton Bay. A total of 26 stations were occupied for angular measurements during the season.

British Columbia Coast.—Secondary triangulation was carried on during the season by W. M. Dennis and temporary assistants in two districts in which the Hydrographic Service required further control points for charting important defence areas. One was in the neighbourhood of Dean Channel and the other much farther south in the vicinity of Jervis Inlet.

Southampton Island, N.W.T.—During the winter of 1942-43 Lieutenant T. H. Manning, R.C.N.V.R., carried on for the Geodetic Service a tertiary triangulation some 100 miles long across portions of Southampton Island from Coral Harbour to points on the easterly coast. The stations were established at the instance of the Royal Canadian Air Force and provide necessary control for aerial photography by the U.S. Army Air Force. Transportation was by dog teams and sleds, and this trying operation was capably carried out by Lieutenant Manning who has the technical ability together with experience in winter conditions in the far north.

Yukon.—In March, 1943, an aerial reconnaissance was undertaken by J. L. Rannie and S/L F. P. Steers of the R.C.A.F. for the selection of stations of a 400-mile net of triangulation connecting stations on the International Boundary a few miles north of Skagway, Alaska, through Yukon Territory along the Alaska Highway as far as the 141st Meridian boundary between Alaska and Yukon Territory. When this net is completed in 1943 as expected by the co-operative efforts of the Geodetic Service of Canada and of the U.S. Coast and Geodetic Survey, all triangulation in Alaska will be placed on the North American Datum which governs all other main triangulation of North America.

LEVELLING

No levelling operations were carried on in the field during the fiscal year, field activities being confined to bench mark inspection in northern Ontario and Quebec by F. B. Reid.

The inspection of precise level bench marks in northern Ontario, which was inaugurated in 1940, was carried to completion by a trip by railway motor car extending from Port Arthur to Franz, Hearst, Sault Ste. Marie, and Sudbury. Following this, all precise level bench marks in northern Quebec, i.e., the area to the north of the St. Lawrence River, were inspected, the season's work in the two provinces including some 1,270 bench marks, of which it was found that slightly less than 10 per cent had been destroyed since their establishment. Revised or new descriptions of a large number of bench marks were made, thereby enabling the manuscript to be prepared for new editions of Precise Levelling Publications Nos. 18 and 20.

No publications dealing with levelling information were issued during the year. Three manuscripts were completed but not printed: namely, "Precise Levelling in Northern Ontario" (a revision), "Altitudes in Southern Alberta", and "Altitudes in Northern Alberta". Considerable work has been done on the revision of manuscript, "Precise Levelling in Quebec, North of the St. Lawrence River", and the preparation of material to be included in the two manuscripts covering altitudes in British Columbia.

GEODETIC ASTRONOMY AND ISOSTASY

The activities of this division consisted of latitude and longitude determinations to furnish control for aerial maps being produced by the Royal Canadian Air Force in conjunction with the United States Army Force of portions of

Yukon Territory, British Columbia, Alberta, Northwest Territories including those adjacent to Hudson Bay, of latitude and longitude observations of the highest precision for the Naval Service, Department of National Defence, at four stations along the Atlantic Coast, of Laplace determinations (longitude, latitude, and azimuth) at two geodetic stations, and of the measuring of two geodetic base lines. Also an intensive research into the problem of polar navigation by air was carried on, and reports on weather and magnetic conditions with respect to navigation in these regions were made.

Latitude and Longitude.—Two field parties in charge of C. H. Ney and L. O. R. Dozois operated in the Yukon and British Columbia. J. E. R. Ross and Vincent Bruce co-operated in the field work. The following stations were occupied: Aishihik Lake, Burwash Landing, on Kluane Lake, Old Crow, Porcupine, Hungry Lake, Bonnet Plume Lake, Frances Lake, and Bruce Lake, near the junction of the Pelly and Ross Rivers, all in the Yukon, and Atlin Lake, Prairie Lake, and Chuckachida Lake, in northern British Columbia.

One party in charge of C. B. C. Donnelly worked in Alberta, British Columbia, and the Northwest Territories, and occupied the following stations:—Charlie Lake, Euphemia Lake, and Liard River Crossing at the 60th parallel in British Columbia; Bistcho Lake, Rainbow Lake, and the 28th meridian at crossing of Chinchaga River in Alberta; and Many Beaver Lake, Dal Lake, Glacier Lake, Carmack Lake, and Tathline Lake at 6th principal meridian in the Northwest Territories.

One party in charge of J. L. Rannie, with B. J. Woodruff as assistant, observed six stations in the Hudson Bay area, namely, Cape Low, Bear Cove Point, Coral Harbour, and Junction Bay along the coast of Southampton Island, and Cape Pembroke and Cape Southampton on Coats Island.

All these stations were permanently marked on the ground either by copper bolts leaded into rock, surrounded by cairn of stones, or by large wooden posts planted in the earth and by large pits or stone cairns. Surveys were made tying the observation points to prominent topographic features of the localities. Aerial photographs were also taken to enable the points of observation to be definitely identified on the aerial photographs made by the R.C.A.F. and the United States Army Air Force. The astrolabe method of fixed altitudes was used in the astronomical observations.

In addition to the above, several points of the Geodetic triangulation, and also of that of the Department of Lands of British Columbia, in central British Columbia, were identified and photographed for the purpose of furnishing control for the aerial maps made of that district. J. L. Rannie was in charge, and the following points were located: Prince George, Quesnel, Fraser, Williams Lake, Meridian, Tatla Hill, Anahim Hill, Eutsuk Lake, and Mt. Swannell.

Precise Latitude and Longitude.—At the request of the Naval Service, Department of National Defence, determinations of latitude and longitude of the highest precision were made at four points along the Atlantic Coast, namely:—Baccaro Point and Whitehead, Nova Scotia; Bonavista, Newfoundland; and Loran Point, near Battle Harbour, Labrador. Corrections for deflection of the vertical at these stations were applied to reduce them to the North American Datum. T. C. Dennis observed at Bonavista and Loran Point, and C. H. Ney at Baccaro Point and Whitehead.

Laplace Determinations.—Laplace determinations (longitude, latitude, and azimuth) were made at two points, one at Bay in the Newfoundland triangulation, and the other at Lower Post, B.C., in the British Columbia Department of Lands triangulation. These furnish control for the directions of these triangulation nets. The British Columbia triangulation of the Department of Lands is tied to triangulation points of the Geodetic Service of Canada near Prince George, B.C. T. C. Dennis made the observations at Bay, and C. H. Ney those at Lower Post.

Base Lines.—Two base lines, one near Parson's Pond, Newfoundland, to control the length of the Newfoundland triangulation, and a second at Lower Post, B.C., to control the British Columbia net were measured. K. H. Robb, assisted by C. R. Westland and G. S. Raley measured the Parson's Pond base, and C. H. Ney, J. E. R. Ross, and L. O. R. Dozois the Lower Post base.

Research Work on Transpolar Aerial Navigation.—At the request of the Royal Canadian Air Force, a special investigation was carried on by the Geodetic Service of Canada in connection with aerial navigation in polar areas. The purpose of the investigation was to collect and compile in report form, for use on high latitude flights, all available meteorological and magnetic data pertaining to Canadian polar areas. More especially, it was desired that a quick method of astronomical position determination be developed suitable for the navigation of planes through polar regions, where the ordinary methods and map projections cannot be used.

C. H. Ney, who was assigned to this work, has completed the following three confidential reports which have been submitted to the R.C.A.F.:—(1) A report on the weather and climatic conditions in the Arctic and sub-Arctic areas of Canada. (2) In co-operation with the Dominion Observatory a report on terrestrial magnetism with relation to aviation in north polar regions. (3) Celestial navigation in polar regions.

The execution of this work involved a great deal of correspondence, computation, and draughting. In connection with the report on celestial navigation, an extensive research resulted in the development of new ideas and systems of solving astronomical fixations by short graphical methods. For use with the stars, a series of star-altitude position-finding curves were computed and drawn. For use with the sun, moon, or planets a template method of solution was developed. Accompanying maps of the polar areas north of latitude 65 degrees were also developed and drawn on a suitable projection.

By means of this system of aerial navigation, it will be possible to navigate planes across any part of the north polar region. Fixations from celestial bodies may be made by these methods in two or three minutes, giving an accuracy in position well within the necessary requirements.

GEODETIC RESEARCH

During the past year, the problem which received the most study was that relating to the determination of the latitude and longitude of a point when its distance and direction from another previously determined point are known, and when the distance is great or as the problem is usually described, to the direct solution of long lines on the surface of the earth. In the course of ordinary geodetic work the direct problem of geodetic lines occurs with great frequency, but the usual formulae employed do not give the required degree of accuracy when the length of line much exceeds one degree of arc. For the direct solution of long geodetic lines, the methods arrived at are quite similar to those used in the indirect solution, several of the expressions being identical in both problems. No easy means of solving the direct problem has yet been discovered, the determination of longitude presenting the greatest difficulty.

TRIANGULATION ADJUSTMENTS

This Division is steadily advancing the transformation of the triangulation data in Eastern Canada from the North American datum to that of the 1927 North American datum. The necessity of this occurred through the revision of the United States triangulation upon the new basis, which in turn has assigned more accurate values to the basic points at or near the International Boundary to which the Canadian work is attached. The object desired is to place the geodetic work of Canada, United States, and Mexico upon a uniform and

continental basis; and thereby not only facilitate the use of the information, but at the same time remove the inconveniences which arise in the application to local surveys when the basic information in an area is not treated as a unit. In Eastern Canada the transfer has progressed to the stage where it is now possible to adjust all future work in Newfoundland and along the north shore of the Gulf of St. Lawrence directly upon the new basis; and a great convenience has thus been accomplished.

Canada is under agreement with the Commission of Government of Newfoundland to adjust and publish the Newfoundland data, and this is now being advanced upon the 1927 North American datum.

Extensive demands for triangulation data have been received from the Chief of Engineers, U.S. Army, Washington, and other Military and Naval organizations, in connection with proposed and projected operations dealing with the war effort. Extensive use has been made of the geodetic data in Canada by the Federal survey organizations and many of the larger requests for information in Eastern Canada have been expeditiously handled through the availability of the existing publications.

As in former years, this Division has assisted in the solution of technical problems of a secret nature associated with the war, which have been referred to the Department by the Navy, Army, and Air Services.

INTERNATIONAL BOUNDARY COMMISSION

Under the terms of the Treaty of 1925 the function of the International Boundary Commission is to maintain the entire boundary between Canada and the United States, including Alaska, in a state of effective demarcation. The line between Canada and the United States proper is 3,987 miles in length; between Canada and Alaska it is 1,540 miles long. Throughout this whole distance there are 7,990 monuments of various kinds to keep in repair and 1,353 miles of vista through the wooded sections to be kept clear of undergrowth. This vista is 20 feet wide, 10 feet on either side of the line. It is a boundary reference for customs and patrol purposes and forms a significant landmark for aeroplanes in time of war.

Conference of Commissioners

The Commissioners, Noel J. Ogilvie for Canada, and Thomas Riggs for the United States, held a conference in Washington, D.C., from May 11 to May 14. They discussed the operations of the field parties and agreed on the program of maintenance work to be undertaken by the two sections of the Commission during the coming season.

Inspections

On August 18 the Commissioners met in Detroit to inspect the triangulation work being done on the Detroit River, Lake St. Clair, and St. Clair River by a party in charge of an engineer from the United States section of the Commission. They first visited the temporary office of the party in Marine City, Michigan, and reviewed all the progress data and the computations of the triangulation being done. This was followed during the next two days by a field inspection of the work under way. On the 19th they inspected the work of the party along the St. Clair River from Algonac to Lake St. Clair in a launch furnished by the United States Customs Patrol. On the 20th they inspected the work done on the southern part of the Detroit River, going down on the Canadian side to Amherstburg and on the United States side to the southern end of Grosse Ile. On the 21st the Commissioners returned to Ottawa and Washington.

Later, on September 17, the Commissioners met in Montreal and from there inspected points on the boundary near Lacolle and the monuments near the Richelieu River. They then went to Newport, Vermont, and inspected the line west of Rock Island and the crossing, near Highwater, of the oil pipeline which runs from Portland, Maine, to Montreal. They then drove to St. Georges to visit the Canadian party working on the Southwest Branch of the St. John River. On these trips, local transportation was furnished by the Border Patrol of the Royal Canadian Mounted Police at a considerable saving in time and expense.

Maintenance Operations

A party in charge of D. F. Chisholm from the Canadian section of the Commission carried on maintenance operations along the 45th Parallel from Monument 588 west of Lake Memphramagog, eastward as far as Stanhope, Que. On this section a distance of 36 miles of boundary line was covered, 99 monuments were inspected and repairs made to 10 of them, and 28 miles of boundary vista was recleared.

The party was then moved to St. Camille, Que., to inspect and repair boundary reference monuments along the Southwest Branch of the St. John River and to reclear the lines between opposite monuments on the banks of this river. This assignment was completed from Monument 309 to Little St. John Lake by the middle of October. On this section a distance of 38 miles of boundary line was covered, 97 monuments inspected, and 12 miles of lines between opposite monuments recleared.

G. T. Prinsep from the Canadian section was again attached as representative to the United States party working along Detroit River, Lake St. Clair, and St. Clair River. This project was a continuation of a re-survey begun in 1938, of the section of the boundary which had been surveyed by the International Waterways Commission. A new triangulation net, connected to the United States Coast and Geodetic Survey, was completed between Lake Erie and Lake Huron, 98 miles in length. In this net, 240 triangulation stations and reference monuments were occupied and re-marked where necessary, 98 intersection points were cut in and 5 base lines measured. The net was adjusted by the United States section last winter and the revised geographical positions will be available shortly.

A party under H. S. Mussell of the Canadian section was engaged on maintenance operations along the 49th Parallel from Monument 44 on the east side of the Columbia Valley to the Initial Monument on the west side of Point Roberts. On account of the heavy rains on the Pacific Coast the growth on this section of the boundary is very rapid and it is necessary to reclear the vista every three or four years. Thirty-four miles of boundary were covered by this party, 27 miles of vista recleared, and 55 monuments inspected. The monuments were all found to be in good condition and none of them needed repairs. A cribwork of logs was built around Zero Monument down on the shore at Point Roberts to protect it from damage by waves and floating logs.

During the summer a request was received from the Customs Division to have the boundary vista cleared out between the Beach Road Customs Office and a Line Store, on the west side of Boundary Bay. Just here the boundary was so badly overgrown that the vision of customs officials was greatly restricted. This work was done early in the summer.

Miscellaneous

During the year boundary maps and reports and the geographical positions and descriptions of points along the boundary were supplied in connection with military operations, particularly on the Southeastern Alaska and 141st Meridian sections of the boundary.

Work was continued on the preparation of material for the Commissioners' Report on the Southeastern Alaska section of the boundary from Mount St. Elias to Cape Muzon.

HYDROGRAPHIC AND MAP SERVICE

HYDROGRAPHIC SERVICE

The principal activities of the Hydrographic Service consisted of charting coastal waters of Canada and Newfoundland and the publication of nautical charts and Pilots; investigation of tides and tidal streams affecting navigation and the compilation of the Canadian Standard Tide Tables; precise recording of the water surface elevations of the St. Lawrence-Great Lakes Waterway and the issuing of official Water Level Bulletins. All divisions were operated at capacity, over 90 per cent of the work being directly for the fighting services.

During the year, as naval and air activity gathered momentum, sales of standard navigation charts and other hydrographic publications surpassed all records in the history of this Service. While revenues correspondingly increased, the primary object in issuing these vital aids to navigation is to contribute to the safety of life and property at sea.

The administration of the various divisions comprising the Hydrographic Service was conducted from Hydrographic Headquarters, Ottawa, which also served as a clearing centre for general navigational information. The District Hydrographic Office at Victoria supervised charting and tidal operations on the Pacific Coast and served as a distributing centre for hydrographic publications pertaining to that seaboard. This geographic organization of the Hydrographic Service permitted closest contact with the chart requirements of the Naval establishments on both coasts and at Naval Headquarters, Ottawa.

To meet war exigencies, charting was conducted in strategic areas of the Atlantic and Pacific seaboards. In these operations the factor of time was of paramount importance and, in consequence, closest liaison was maintained throughout the year with Canadian Naval, Air Force and Military headquarters. The two Hydrographic Service vessels *Acadia* and *Cartier*, remained with the Navy on war duty, but to expedite hydrographic surveys on the Atlantic Coast small charting units with launches and echo-sounding equipment were based at convenient coastal points. Hydrographic work on the Pacific Coast was conducted with the *Wm. J. Stewart* and auxiliary craft. In northern regions special charting required in connection with major defence projects was carried out in Labrador and Hudson Bay. To accomplish this work two hydrographers, equipped with an echo-sounding launch, operated from a Department of Transport vessel. In Lake Melville, Labrador, a number of important dangers to navigation were found and charted, positions for permanent ship-ranges were located, and assistance was given in establishing a system of buoyage to guide shipping into the Goose Bay Air Base anchorage. In Hudson Bay, Coral Harbour in Southampton Island was charted for strategic purposes and a new chart of that area was issued for the use of aircraft and war-shipping. Due to lack of funds and facilities to carry on extensive new charting in northern waters, portions of the existing small-scale general chart of Hudson Bay and Strait are still based only on reports of early explorers and navigators. A valuable result of the hydrographic work conducted during the season under review was the correcting of this chart in a number of important instances.

A feature of the year's work at Hydrographic Headquarters, Ottawa, was the construction of a large number of wall charts for strategic plotting purposes. Complete sets of such charts were supplied for the new Canadian Naval building at Ottawa for use in connection with fleet operation, routeing, convoy, patrol, and naval intelligence purposes. Strategic charts, direction-finding diagrams, and other confidential publications were in continuous production throughout the

year. In accordance with the plan adopted several years ago, the regular series of Canadian navigation charts was further standardized, both in dimensions and in cartographic detail. Experiments were conducted in the general interest of economy and efficiency of chart production, and considerable progress was made in colour printing adapted for use under conditions peculiar to war-time lighting at sea.

Launching of ocean-carriers and warships, planning and installation of harbour defences, and the conduct of naval operations in general, all require accurate information in regard to the tides. For the most part, such information was supplied by the Tidal and Current Division through the medium of the Standard Tide Tables and other tidal publications. Special tidal data were supplied on request to Canadian Government departments, the British Admiralty, U.S. Government, and commercial interests engaged in war work. In the past year, when shipping space was scarce, the reports of water levels of the Great Lakes-St. Lawrence Waterway were of special importance. A few extra inches of water underneath the keel of a freighter may mean hundreds of tons of cargo above it.

Exchange of Hydrographic Data.—As in past years, several other Government departments participated in the exchange of information pertaining to the navigation of Canadian waters. In particular, a great deal of very important material affecting nautical charts and volumes of "Pilots and Sailing Directions" was received from the Naval Service. The Departments of Transport and Public Works also supplied considerable data relating to aids to navigation and in connection with channel and harbour improvements. Reciprocating, the Hydrographic Service furnished these Departments with standard nautical publications such as Charts, Sailing Directions, Tide Tables, and Water Level Bulletins. The Hydrographic Service reported on the finding of uncharted rocks or other dangers to navigation and also informed maritime interests in regard to chart corrections and the issuance of new charts. This was done through the medium of the official Notices to Mariners, published by the Department of Transport.

Many new charts and publications were received from the British Admiralty Hydrographic Department, the U.S. Hydrographic Office, and the U.S. Lake Survey Office. A large proportion of Canadian coastal waters are covered only by original Admiralty charts, and in order to keep them corrected to date, information was supplied from time to time to the Admiralty. In addition, frequent consultations on marine matters were held with Hydrographic Offices of the Admiralty and the United States. Close co-operation was maintained with The Tidal Institute of Liverpool, England, whose scientific facilities for tidal analysis and prediction have been generously extended to this Service for many years. Owing to European postal difficulties, the long standing active connection between this Service and the International Hydrographic Bureau at Monaco was temporarily suspended.

Pilots and Sailing Directions.—Supplemental to the information given on the nautical charts, are the mariner's official handbooks known as "Pilots and Sailing Directions" published by this Service. These indispensable aids to navigation cover a great part of the coastal and all the navigable waters of the Dominion. To maintain them up-to-date they were kept under constant revision during the year and new editions were published of the following: St. Lawrence River Pilot (Montreal to Kingston), Great Lakes Pilot (Volume 2), Supplement to St. Lawrence River Pilot (Quebec to Montreal), Supplement to Great Lakes Pilot (Volume 1).

HYDROGRAPHY

Further progress was made in the accurate charting of the coastal and inland waters of Canada and Newfoundland. Most of the work was for war purposes, much of it of a strictly confidential nature. As far as possible these isolated hydrographic surveys will be incorporated into the general scheme of coastal charting, existing charts will be revised, and a number of new ones made available for the use of the mariner.

ATLANTIC COAST AND INLAND WATERS

Atlantic Coast—Bay of Fundy.—This hydrographic unit continued the detailed charting of the southeastern coast of Nova Scotia and, at the urgent request of the Navy and Air Force, conducted strategic charting operations in Newfoundland. This survey was equipped with modern echo-sounding launches, fitted out at East Lahave, and from May 14 to November 1 a party was engaged in charting the coastal waters from Pearl Island to Cape Lahave. Included in this work was the large-scale, detailed charting of the entrance and immediate approaches to Lahave River. In addition there was carried out an examination of a reported shoal in Shelburne Harbour.

From June 10 until December 15, members of this unit operating in Newfoundland conducted important charting for war purposes at the following places: Harbour Grace, Carbonear, Holyrood, Bell Island, and Bay Bulls.

As a result of the season's work, a number of detailed hydrographic plans were supplied to the Naval and Air Force authorities and the following navigation charts will be published: "West Ironbound Island to Riverport, N.S."; "Holyrood Bay, Nfld."; "Harbour Grace and Carbonear, Nfld.".

Summary of Season's Work

Boat sounding	1,300 linear miles
Coastlining	196 " "
Shoals examined	105

Gulf of St. Lawrence—Cape Breton.—The fitting out of the launch *Henry Hudson* and her smaller auxiliary craft commenced at Charlottetown on April 15 and was completed on May 21. The following day departure was made for Tatamagouche, Nova Scotia, and by June 30 the charting of Amet Sound and Wallace Harbour was completed. On July 21 a detachment of this unit proceeded to Annapolis Basin, Nova Scotia, to undertake detailed charting in connection with the establishment of the new naval training base. To replace worn out equipment a new echo-sounding launch, the *Anderson,* was provided for the latter survey. On completion of the charting of the main portion of Annapolis Basin, the launch was laid up on November 13 for the winter. Meanwhile, the *Henry Hudson,* operating in Northumberland Strait, completed the charting of Pugwash Harbour and its approaches and extended the general coastal charting eastward from that port. On October 31 the latter survey was brought to a close and the launch proceeded to lay up at Charlottetown.

As a result of the season's work the following charts will be published: "Amet Sound", "Wallace Harbour", "Pugwash Harbour", "Annapolis Basin".

Summary of Season's Work

Boat sounding	1,589 linear miles
Coastlining	144 " "
Shoals examined	236

St. Lawrence River.—The territory served by the echo sounding hydrographic launch in this area, C. G. L. *Boulton,* extended from Lake St. Peter to Ile aux Coudres, in the lower St. Lawrence. Outfitting of the craft occupied the period from April 14 to May 14. Main work of the season was the completion of the detailed charting of Lake St. Peter. In addition, special emergency

hydrographic surveys were undertaken at the request of the Naval Service. On completion of the season's work the launch returned on October 28 to her base at Prescott.

Summary of Season's Work

Boat sounding	306 linear miles
Coastlining	22 " "

Hudson Bay and Strait.—Resuming the hydrographic work in sub-Arctic waters which had been suspended since 1935, two hydrographers attached to a Department of Transport vessel carried out hydrographic surveys and examinations at various strategic points. The work was entirely for war purposes and much of it was conducted jointly with United States hydrographers.

Summary of Season's Work

Ship sounding	640 linear miles
Boat sounding	110 " "
Shoals examined	15

PACIFIC COAST

The systematic charting of shoal-infested waters of British Columbia was conducted with the hydrographic ship *Wm. J. Stewart* and the Houseboat *Pender*. A number of urgent surveys for the Defence Forces were carried on from the Victoria Office.

On the completion of arming operations to the vessel, the C.G.S. *Wm. J. Stewart* with the Houseboat *Pender* in tow, sailed from Victoria on July 20 for the season's charting operations. On August 29 the survey of Beaver Harbour and Hardy Bay was completed and the charting extended westward in Goletas Channel. On September 4, after coaling, the Houseboat *Pender* was anchored in Safety Cove, Calvert Island. From this date until October 14, hydrographic operations were carried on in the Fitzhugh Sound area and several large-scale surveys were made for the Defence Forces. The Houseboat *Pender* was then moved to Deep Bay, south of Union Bay, and the ship proceeded north to Porpoise Harbour, of which a detailed survey was completed on November 6. On her southbound voyage a number of special surveys were made. During the week November 16 to 23 the Fraser River was recharted from its entrance to a few miles above Steveston. The following day the *Pender* was taken in tow at Deep Bay and on November 25 the ship arrived at Victoria. Practically all the above survey operations were major projects.

Results of the hydrographic work conducted during the season will be incorporated in a number of new navigation charts and in special plans for the use of the Defence Forces.

Summary of Season's Work

Coastlining	150 linear miles
Boat sounding	756 " "
Ship sounding	212 " "
Shoals examined	300

Hydrographic Houseboat Pender.—The detailed large-scale re-charting of Esquimalt Naval Base, commenced the previous season, was continued by this auxiliary craft during the latter part of the calendar year. Eighty-five linear miles of boat sounding was completed, 39 shoals were examined, and 127 were swept.

PRECISE WATER LEVELS

Affecting as they do both the loading capacity of ships, and major water-power developments of this country, water surface elevations of the St. Lawrence-Great Lakes Waterway are of vital importance under present war conditions. The work of the Precise Water Levels Division is to record and furnish, periodi-

cally, detailed reports pertaining to the rises and falls of these waters. For this purpose there is maintained a complete system of self-registering gauges from the head of Lake Superior nearly to Quebec. During the year, from the 522 months of continuous recordings in the field, over 600,000 water surface elevations were compiled into comprehensive tabulations. A total of 19,000 sheets of bulletins, profiles, etc., were issued. Twelve monthly, 5 annual, 6 general data, and 5 graphic bulletins were also published. Many requests were received for information relative to specific problems in which water levels were the main factor. In most cases, special analyses, tabulations, and deductions were required.

Precise water level information is supplied to all Government departments, to certain Provincial departments, and to shipping and power interests.

TIDES AND CURRENTS

The investigation of tides and tidal currents and the preparation of tide predictions in the form of Standard Tide Tables and related publications are the chief functions of the Tidal and Current Division. New information for the refinement, or the extension, of existing tidal data is continually being studied and tabulated. Canada possesses one of the longest coastlines in the world and her bordering waters contain examples of almost every known kind of tide. Under war conditions, when many vessels are obliged to navigate well off the beaten tracks, knowledge of local tidal action is more than ever necessary to the mariner. In providing this information in concise and practical form, the Tidal and Current Division performed an essential part in the war effort.

The various editions of the Tide Tables for 1943 were produced for release in October, 1942, and the preparation of the 1944 issue was also well advanced. Two complete editions, one for the Atlantic Coast and one for the Pacific Coast, are published for shipping interests generally. Besides these, there are 6 abridged pocket editions to serve the needs of fishermen and others locally, 4 cover various localities on the east coast and 2 on the west coast. The publications are classified as follows:—

Atlantic Coast Tide Tables.—"Tide Tables for the Atlantic Coast of Canada", complete edition. There are also four abridged editions entitled "Quebec and Father Point", "Charlottetown and Strait of Canso", "Halifax and Sydney", "Saint John and Bay of Fundy".

Pacific Coast Tide Tables.—"Tide Tables for the Pacific Coast of Canada", complete edition. There are also abridged editions entitled "Vancouver and Sand Heads" and "Prince Rupert and Northern British Columbia".

Publications on Currents and Tidal Streams for the assistance of navigation are as follows: "Tables of Direction and Velocity of Currents in the Bay of Fundy and its Approaches"; "The Currents in the Gulf of St. Lawrence"; "The Currents in the Entrance to the St. Lawrence" (Gaspe region); "The Currents in the St. Lawrence Estuary, Ste. Anne des Monts to Father Point", and "Tidal Current Charts for Hourly Stage of the Tide, Orleans Island to Father Point".

Other publications not bearing definitely on navigation are "Tide Levels and Datum Planes, Atlantic Coast"; "Tide Levels and Datum Planes, Pacific Coast"; "Tide at the Head of the Bay of Fundy", and "Tides and Tidal Streams", a descriptive booklet by Dr. W. Bell Dawson, the former Superintendent of the Tidal Survey.

The principal tidal stations maintained in operation are:—

Atlantic Coast.—Quebec, Father Point, and Harrington, P.Q.; Charlottetown, P.E.I.; Saint John, N.B.; Halifax, N.S.; Churchill, Man.

Pacific Coast.—Vancouver, Victoria, Clayoquot, and Prince Rupert, B.C.

Investigation of Currents and Tidal Streams.—A new tidal station was established at Chicoutimi and temporary tide gauges were set up at Digby, Pugwash, and Malagash, N.S.

Information Service.—Tidal data were furnished to navigational interests, engineers, and coast industries. Information was also supplied to a number of Government departments and tidal predictions for several ports were prepared for the Admiralty and United States Government.

CHART CONSTRUCTION

To keep pace with the chart requirements of the Navy and the Merchant Marine, the Chart Construction Division and Chart Printing establishment were taxed to capacity. During the year there was always a considerable backlog of charts waiting for compilation or printing and as a result, the problem of chart production was entirely one of priority. During the year, 172 charts and other navigational publications were printed and existing stocks were kept corrected to date.

Large quantities of Canadian charts were supplied to the Naval Chart Depots and a number of reproductions were made of certain Admiralty charts on very short notice. A feature of the year's work was the large number of special and confidential charts prepared for the Defence Forces. The year's output of all charts consisted of the following: 50 charts published in colours; 33 charts published in black only, including 17 reprints of Admiralty charts; 71 wall and special charts for the Defence Forces; 9 miscellaneous charts; 9 patches for chart correction.

As a matter of war economy the list of nautical charts published during the year has been deleted from this Report, but if Mariners or other interested persons desire to secure the information, it can be obtained on application to the Surveyor-General and Chief, Hydrographic Service, Department of Mines and Resources, Confederation Building, Ottawa.

Distribution of Nautical Publications

As indicated in the following summary of annual distribution, the demand for navigation charts has increased 500 per cent in the last decade: 1933, 8,470; 1934, 9,236; 1935, 10,228; 1936, 12,833; 1937, 14,006; 1938, 17,999; 1939, 19,850; 1940, 33,136; 1941, 47,699; 1942, 50,968.

Nautical publications distributed during the year were as follows:

Catalogue of Charts, Sailing Directions, and Tidal Information with Index Maps	513
Navigational Charts	50,968
Pilots and Sailing Directions	1,262
Tide Tables	44,315
Water-levels Bulletins, Graphs, etc.	19,000

MAP SERVICE

The demands for maps and charts by the three armed services, particularly by the Air Force, continued to channel the efforts of the Map Service to war work, and for the time being most peace-time operations have, of necessity, been postponed.

The unprecedented expansion of military aviation in Canada during the year required a corresponding increase in areas to be mapped and resulted in the extension of the eight mile to one inch air navigation charts to include the more northern parts of Canada. From time to time during the year, areas requiring map coverage were extended. Altogether 58 new sheets were printed; 7 of these are standard editions in full colours and 51 are preliminary editions.

The preliminary editions are in from two to four colours only; they may be quickly prepared and are comparatively easy to revise as new information becomes available. Eventually the majority of them will be converted into standard editions. The total number of sheets printed in the Canadian air navigation series is now 116, and they cover an area of about 2,500,000 square miles.

Good progress has been made in the North America plotting series, the compilation of which was commenced last year. This is a part of the 1:1,000,000 plotting series designed for world coverage within the limitations of the mercator's projection on which it is drawn. The area requested of the Map Service in the present program is, roughly, between latitudes 23° N. and 71½° N. and longitudes 32° W. and 174° E. Sixty-two sheets have been printed; twenty-six sheets, two of which lie south of latitude 23° N. remain to be completed. Revision will be required as new information becomes available. Included in the general continental program is the whole of the United States proper, Alaska, Newfoundland, Labrador, the Bahamas, and Cuba, and parts of Canada, Siberia, the Hawaiian Islands, Mexico, Honduras, Nicaragua, the West Indies, and Greenland.

Co-operation with the United States in all mutual mapping projects relating to air navigation has been maintained and overlapping of effort avoided. In addition considerable information concerning surveys in Canada was furnished to United States engineers for many of their defence and development projects.

Concurrent with the expansion of military aviation was the expansion in air training. Features of the latter included the formation of the Air Cadet League, and the inclusion of air navigation in the curriculae of certain schools, all of which tended to an increase in the number of air navigation charts required during the year. As reported elsewhere, the total number of copies of map sheets printed reached the enormous total of 1,830,000, twice that of the previous year, and from nine to ten times that of the average yearly output before the war. The weight of the paper used was about 84 tons. The only major change in the specifications for the air navigation charts was the adoption of purple colour instead of red for the overprinting of aeronautical data. The change was made so that the charts could be used with a red light.

Reprints were particularly numerous during the year. While this was partly due to the impossibility of accurately estimating the increasing number of copies that would be required, the main factor was the inadequacy of the storage space available to accommodate the very large stock of maps needed for distribution. Grateful acknowledgment is made to the Geographical Section, Department of National Defence, for their very considerable assistance in reprints.

The number of maps distributed was more than doubled during the year. Since most of the maps issued were for Government purposes, the total cash revenue was about $22,400. However, if the same number of maps had been distributed in the normal way, the total value would be over $250,000. In order to efficiently carry on this large distribution, further shelving accommodation is being secured in an adjacent building.

Legal Surveys

This Division is charged with the preparation of instructions and the examination of field returns in connection with all land surveys in the Northwest Territories and the Yukon Territory, as well as surveys made in any of the 2,200 Indian reserves located throughout the Dominion. It also acts as a central surveys bureau for the various Government departments.

During the year under review, instructions were issued under the provisions of the "Quartz Mining Act" for the survey of 169 mineral claims in the Northwest Territories and returns for a corresponding number were examined and recorded.

With the view of providing an equitable distribution of cultivable and of wooded lands among the individual Indians affected, 90 lots were surveyed in Dokis Reserve in the Nipissing District, Ontario.

One hundred lots were laid out in St. Regis Reserve in the vicinity of Cornwall, Ontario, for occupation in accordance with requirements of the Indian advancement scheme initiated by the Indian Affairs Branch.

The Indians of Walpole Island desired to drain a large portion of the marsh on their reserve adjoining Lake St. Clair in order to meet an increasing demand for corn land. An officer of this division visited the area and on his recommendation a pumping scheme was installed and placed in successful operation. The area embraced by the scheme was divided into forty-five farm lots of appropriate size served with roads at suitable intervals. Three summer resort subdivisions were also made of individual Indian holdings fronting on St. Clair River in this reserve. The lots in these subdivisions will be leased for the benefit of the individual Indians concerned.

Instructions were issued for extensive land surveys in connection with the power development project of the Calgary Power Company, Limited, at Lake Minnewanka in Banff National Park, and the plans and other returns of these surveys were examined and checked in this office upon completion.

As already stated, there are upwards of 2,200 Indian reserves in Canada. These embrace an aggregate of five and one-half million acres of land and shelter some 118,000 treaty Indians. The plans of survey and the field notes relating to these reserves are deposited in this Division, and legal descriptions for all land transfers and individual allotments are prepared here. In this connection 143 legal descriptions and fifty-six plans were prepared during the year.

Many requests for information were received from the Provinces of Manitoba, Saskatchewan, Alberta, and British Columbia regarding surveys within those provinces made under the direction of the Surveyor General before the transfer of the natural resources to the administration of the provincial governments, and from other provinces in connection with the co-ordination of surveys.

Land surveys have been cut to the minimum in order to curtail expenditure, and also that the staff may in as far as possible engage in work more closely connected with the prosecution of the war.

Mapping Division

Map Compilation.—Demands for air navigation charts, which in last year's report were stated to have become so numerous and urgent as to practically monopolize the entire energies of this Division, have continued to increase during the year and it has been necessary to add considerably to the staff in order to cope with them.

The needs of the Combined Air Training Organization and of civilian aviation generally have also been met. The major part of the requirements of the former and all of the needs of the Trans-Canada Air Lines and some subsidiary lines have been satisfied by our standard air navigation sheets, issued prior to the present year, with periodical revisions of the air navigation information overprinted as warranted by changes and developments. It has been necessary, however, to prepare a few new standard sheets, as well as to revise some of the older ones and to prepare special sheets for air training purposes. Civil aviation in areas distant from settlement has not yet received much mapping help, but will be considerably aided by the air navigation charts now being issued.

The form of the standard charts has been described in previous annual reports. Briefly, they were designed to show all topographical and cultural features of importance in air navigation consistent with the scale to which

they are drawn. There are no detailed topographic surveys in much of the vast northern areas of Canada, and the best that can be done at this time to satisfy the urgent demand for charts in these areas is to show all the information which is available. These charts have been termed Preliminary editions, to distinguish them from the Standard editions showing more complete detail; they are printed in from two to four colours only, all topographical detail being shown in black and water areas in light blue. As there are, as yet, few aids to air navigation in these northern areas, there are very few of these preliminary editions with air navigation information overprinted in colour.

Of the 58 air navigation charts mentioned last year, 56 were standard charts. During the past year 7 new standard charts and 51 preliminary charts have been issued, making the total charts issued as of March, 1943, to be 62 standard and 53 preliminary charts. The area covered by the standard charts is 1,423,000 square miles and by the preliminary charts 1,101,000 square miles. In addition to these sheets already published there are in hand, in various stages of preparation, 15 standard sheets (3 of which are revisions of existing sheets) and 38 preliminary sheets (3 of which are revisions).

As explained in previous reports, the air navigation information is shown on the standard charts by an overprint in colour, revised as is necessary to keep them up-to-date. Besides preparing air navigation information for the new charts issued, 181 revisions were made for overprints on previously printed charts.

Besides the above, there have been printed two more air navigation charts designed to the specifications of the Royal Air Force, making a total of four in all issued by this Service. These charts are needed for training purposes and are issued for specially selected areas. A fifth chart of this type is in hand.

During the year urgent requests were received from the Royal Canadian Air Force for charts of the North America Plotting Series. The charts of this Series are drawn to the same specifications as those inaugurated by the British authorities for a world-wide series of charts, designed to facilitate air navigation with the special instruments designed by them and now in general use in the Combined Air Training Organization. This Service has undertaken to prepare charts of this Series to cover the whole of the mainland of the North American continent and to extend considerably east and west into the Atlantic and Pacific Oceans. To date there are 62 of these charts issued and 19 in hand in various stages of preparation.

Requests were received during the year from all three of the armed services for designs of maps and charts for special purposes of a highly confidential nature. The considerable amount of mathematical computation necessary was done by this Service; in some cases the charts were also laid down, drawn, and printed while in others only the computed results with explanatory matter was supplied to the Service requesting them.

Engineering developments in all parts of Canada due to war conditions have created a greatly increased demand for topographical maps (civilian editions) on larger scales than our air navigation charts and our stock of many of these became exhausted during the year. Reprints were confined to maps required in the war effort, some for engineering development and others for administrative purposes. Thirty-one topographical maps on the scales of 1, 2, 3, 3·95, and 4 miles to one inch have had to be reprinted. Most of these were printed many years ago and in some cases they were examined to see what corrections would be necessary to bring them up-to-date, the corrections being restricted to those which could be done on the printing plate, but latterly no time or staff has been available to make these examinations and the sheets have been reprinted without change. There were as well, many requests for small-scale maps, such as the 100-mile map of Canada and the 50-mile map of Northwestern Canada. Many

small-scale maps of Canada were printed with overprints showing added information required by various Government agencies. There was also a very large demand for maps suitable for the study of trans-ocean and trans-continental air routes which necessitated reprinting of the map of the North Atlantic Ocean and Adjacent Countries and of the map of the North Pacific Ocean and Adjacent Countries. A map of the Northern Hemisphere on a polar equidistant projection designed and issued in 1941 also experienced a very large demand in connection with the study of trans-polar flights and had to be reprinted during the year.

The intense activity which has developed in Northwestern Canada since the entry of the United States into the war has produced a large number of requests from the United States military authorities and others, for information regarding surveys made by this Service many years ago. A large amount of information has been obtained from the records and supplied to them in convenient form. Similarly this Service, in order to keep its maps up-to-date, has requested that it be supplied with information of large topographical projects undertaken in Canada by the United States authorities and they have been very willing and prompt in their co-operation.

In the matter of keeping the mapping work up-to-date, this Service co-operates with all survey organizations of Federal and Provincial governments, with the various United States authorities, and with private engineering companies, from whom there is obtained current information necessary to a mapping organization. An important part of the work of this division is to initiate and develop this co-operation in every way possible and to suitably record and file for future study all the various maps, plans, and sketches received which are considered of value for mapping purposes. Besides all the various information received from Federal Government organizations, some 770 plans, prints, and sketches have been received, examined, and filed during the year.

The issue of so many new maps, particularly those of hitherto unexplored areas where recent information has revealed a large number of topographic features of importance, has emphasized the necessity for the proper selection of names for these features. This selection is usually done in co-operation with the provincial authorities concerned to ensure that the names are in accordance with the principles laid down by the Geographic Board of Canada. All names that are selected for topographic features by other mapping organizations are submitted to this Division for consideration and recommendation.

Electoral Maps.—A fair demand continued for electoral maps, due principally to the need for these maps for administrative purposes by the many newly created government organizations made necessary by the war. The usual work was done in keeping plans up to date as regards parish, municipality, and county boundaries, which information will be required for the next redistribution bill covering electoral representation.

Magnetic Work.—The compilation of a new magnetic map of Canada was completed and the map printed during the year. This map shows the isogonic lines, suitably generalized, at one degree intervals across Canada. The information on which these lines are based consists of the records of about 37,000 magnetic declination observations taken by surveyors of this and other surveying organizations over the last fifty years. Much of the value of these older observations is preserved by using information obtained and supplied to this service by the Dominion Observatory as a result of their field observations and studies to determine the distribution of the annual change in declination across Canada.

The number of recorded magnetic declination observations of this Service is still increasing, although at a much slower rate than formerly when extensive land survey operations were carried on. Most of these records are now received

from other surveying organizations with whom co-operation is maintained; during the year the needles of twelve of their surveying instruments were standardized against this Service's standard instrument which is itself standardized each year by the Dominion Observatory; the field records of 315 declination observations taken with these instruments throughout Canada were received, reduced, and incorporated into the records.

Miscellaneous.—The Astronomical Field Tables were computed and issued as usual. Many official distances were computed and supplied to the Post Office Department, to be used as a basis for air mail contracts. Many requests were received from National Defence and other Government offices for the transfer by purchase or loan of surveying instruments from this Service's stores, and these were complied with wherever possible.

Field Work.—No mapping field work was done by this Service during the year, although one Dominion Land Surveyor was loaned to the Geodetic Service for astronomical work in Northwestern Canada.

Survey Records and Distribution

Survey Records.—This division has charge of the registration and recording of all field notes and plans of legal surveys of Dominion lands, and of all topographical surveys which have been carried out by this Service for mapping purposes; the supplying of information relating to these records, and the storing and distribution of the official plans of townships, townsites, and settlements. Up to the end of the fiscal year, 22,236 books of survey notes and 39,883 plans had been placed on record. During the year 558 technical requests were dealt with and 5,073 official plans were distributed.

Distribution of Maps and Publications.—This Division has charge of the storage and distribution of all of the maps and publications. The maps consist of all the various topographical and geographical maps published by this Map Service; the topographical and geographical maps issued by the Bureau of Geology and Topography of this Department; and the topographic maps published by the Geographic Section, Department of National Defence, except the special military maps which are not available to the public.

During the past twelve months, the Division has received stocks of 214 new maps. There are now about 1,600 different maps available for distribution. In carrying on this work, 18,811 letters and requests were dealt with.

Since the beginning of the war, there has been a steady and ever-increasing demand for maps, as shown by the following statement: 1938-39, 137,723; 1939-40, 161,793; 1940-41, 257,101; 1941-42, 586,256; 1942-43, 1,209,144.

It will be seen that the number distributed during the past year is more than double the number distributed during the previous year and that it represents an increase of more than 877 per cent over the number sent out during the last year previous to the war.

The reason for this unprecedented growth in the quantity of maps distributed is the ever-increasing needs of the war departments of the Government and of other organizations connected with the war effort. By far the greatest demand from any single department comes from the Royal Canadian Air Force. In addition to the air navigation charts, which are furnished to all of the various training centres, many special charts which are required in connection with the air training scheme are also supplied.

Since the United States entered the war, this Service has also been supplying a large number of air navigation charts and other maps to the United States Army Air Forces and other branches of their War Departments. In addition to this special war work, the regular work is still carried on of supplying maps

to other branches and departments of the Federal Government, to departments of Provincial governments, to business firms, to libraries, universities, and schools, and to the general public.

In regard to the distribution of the maps, it might be noted that there are certain war-time restrictions. Air navigation and plotting charts are distributed only on the request of the Royal Canadian Air Force Headquarters. For security purposes, there are also restrictions with regard to all maps on scales of from one to eight miles to an inch. According to a request of the Department of National Defence, such maps, which cover any part of certain special areas, are not to be distributed to the general public for the duration of the war.

Map Publication

The Draughting, Photo-Mechanical, and Lithographic Divisions make finished drawings, photograph them to the printing scales, prepare the printing plates, print the maps, and perform other related and miscellaneous tasks. Photography and printing are also done on the hydrographic charts.

Altogether 479 maps, charts, and miscellaneous jobs were printed during the year to a total of 1,830,000 copies, double the number of copies printed the previous year. All the printing plates involved were prepared by and are carefully filed at the Map Service; 105 of the total number of jobs were printed by the Geographic Section, Department of National Defence, or by a local commercial printing firm.

Of the 168 new maps printed to a total of 481,000 copies, 7 were standard editions in the Canadian Air Navigation Series printed in from six to nine colours; 52 were preliminary editions in the same series in from two to four colours. Sixty-two new plotting series charts in the North America Plotting Series were printed in black only with the exception of four that were overprinted with certain air information in red colour. The remainder were miscellaneous maps and charts of various kinds which were required by the Army, Navy, Air Force, and other Federal agencies engaged in the war effort, and differed widely in design, construction, and the number of colours used.

Reproductions during the year were limited to 18 maps, 15 of them being target maps. Eight maps, including six air edition bases, were revised, necessitating the preparation of complete new sets of drawings and printing plates.

Reprints were particularly heavy, numbering 173 to a total of 1,217,000 copies.

New maps printed	168	Total copies	481,000
New township plans printed	16	" "	2,800
Maps reproduced	18	" "	29,700
Maps revised	8	" "	44,700
Reprints	173	" "	1,217,100
Hydrographic charts and miscellaneous jobs	96	" "	54,700
	479		1,830,000

For the overprinting of aeronautical data on air navigation charts, 181 new drawings or revisions were made, photographed, and printed on 613,900 copies. Four printing plates of aeronautical data were overprinted on a total of 33,700 plotting series charts and six miscellaneous overprinting plates on a total of 12,100 maps.

While most of the work was in connection with air navigation charts, work was also done for other branches of the Department as well as for other Federal departments. The printing of these maps necessitated approximately 8,863,800 impressions, as most of the maps were printed in several colours.

The work performed in the Photo-Mechanical Division included:—wet plate negatives 1,428; photo-lithographic plates 1,010; contact prints and enlargements 3,044; vandyke prints 1,732; blue printing 141,324 square feet; vandyke

printing 7,176 square feet; photostat work 7,106 sheets. Much of this work was done for other branches of the Department and for other Federal departments.

Since the retirement of the departmental bookbinder in 1940, the work of map-mounting and book-binding has been carried on to a considerably lesser degree. During the past year the work was more curtailed due to the lack of staff and more urgent work and consisted of the mounting of 132 maps. Rollers were attached to 567 maps by the Dominion Observatory.

It has been the custom to include a list showing the maps published during the year and those in course of preparation. As a war economy such a list was omitted from the report last year and is again omitted this year. However, anyone desiring information regarding any of these maps may obtain the same by writing to the Surveyor General, Department of Mines and Resources, Ottawa.

Board of Examiners for Dominion Land Surveyors

The Board of Examiners for Dominion Land Surveyors held two meetings during the year. The first was a special meeting convened on July 30 in connection with an examination held in England in June for candidates in the Canadian Armed Forces. This examination was requested by the Director of Education, Canadian Legion War Services, and was held under his auspices. There had originally been more than thirty applicants but owing to "movements of troops, urgency of military courses and other factors" only eleven candidates were able to present themselves for the preliminary examination, and of these two were successful.

The second meeting was the statutory one and was held from February 8 to April 3. During this time examinations were conducted at Ottawa, Ont., Vernon, B.C., and again in England, and fifteen candidates presented themselves, twelve for the preliminary and three for the final examination. Two candidates were successful at the preliminary and one at the final examination.

Two commissions were issued to candidates who had passed the final examination and had furnished oaths of office and allegiance and bonds for the sum of $1,000 as required by Section 25 of the Dominion Lands Surveys Act.

One certificate of preliminary examination was issued to a successful candidate who had complied with the requirement of the law.

During the year, Mr. W. M. Tobey, Dominion Topographical Surveyor, Assistant Dominion Geodesist, and member of the Board of Examiners, was superannuated from the Service and consequently retired from membership of the Board of Examiners which he had held since 1916.

On November 15, Mr. J. E. R. Ross, a Dominion Topographical Surveyor and a member of the staff of the Geodetic Service, was appointed by Order in Council as a member of the Board of Examiners to fill the position formerly occupied by Mr. Tobey.

INDIAN AFFAIRS BRANCH

Dr. H. W. McGILL, DIRECTOR

Since the publication of the previous annual report, there has been a decided and sustained improvement in the economic condition of the Indians throughout the Dominion.

Reports from the Northwest Territories indicate that fur prices generally were very good. In the Fort Simpson Agency, the beaver catch was average, but rabbits, grouse, and ptarmigan were plentiful. Despite the dry summer weather, which caused a plague of grasshoppers at Fort Simpson and Fort Providence, crops were harvested safely, and the yield was better than had been at first expected.

In the Fort Norman Agency all areas reported very few moose and the Indians complained of a marked increase in wolves. Fewer muskrat were trapped during the spring hunt but prices were higher than for many years. White fox were fairly numerous. Fishing was relatively good east of the Mackenzie but to the west was reported a complete failure. Dogfeed was secured from fishing grounds adjacent to Fort Norman.

Hunting, trapping, and fishing are the main occupations of the Indians in the Fort Resolution Agency. Trapping was very poor at Resolution, Little Buffalo River, Rocher River, and Yellowknife, and during the winter months, few caribou were seen, which may have been caused by the intense cold as well as by the lack of grass and moss destroyed by fires. Mink and lynx were scarce. White fox, however, were reported abundant in the Barren Lands and the Indians who could afford to travel far and overcome the hardships of the trip made good catches. Muskrats were scarce south and north of Great Slave Lake. Fishing was done mostly to feed the dogs.

There has been a general improvement in the condition of the Indians of British Columbia as compared with the preceding year. There was an increased demand for labour on the home front in the vital industries of fishing, lumbering, and shipbuilding. The Indians readily responded to the call made upon them to engage in this division of the war effort, particularly fishing, in which they have taken a leading part since the beginning of the war. Those engaged in cattle-raising and trapping also shared in the general prosperity. The men in many cases made excellent returns and the women found plenty of employment in the canneries.

Every effort was continued to further the campaign for increased production and to stimulate interest among the Indians in the various divisions of war work.

Hay, grain, and root crops were good and there was a ready market at good prices for all farm produce. The cattle situation generally was satisfactory. Feed was plentiful throughout the province and the stock came through the winter in good condition. Prices for beef cattle were high and the Indians took full advantage of the opportunity to dispose of their mature stock. A good boar was issued to the Pemberton Indians in the New Westminster Agency, which will greatly improve the quality of their bacon hogs.

The Indians of the Lower Fraser Valley improved their herds in line with the requirements of the Provincial Dairy Inspection Branch, and the interior Indians gave increasing attention to the eradication of pests from their orchards by spraying and other protective measures.

Halibut fishing was carried on successfully in the Skeena Agency, and other Coast Indians were employed in salmon fishing and clam-digging. The Bella Coola Indians engaged in logging operations and thereby made an important contribution to war requirements.

Cattle on the reserves in the Blackfoot, Blood, Peigan, and Stony Agencies in the Province of Alberta increased in numbers during the year. Results obtained from the cattle industry were very encouraging. Indian cattle in Alberta are exceptionally high grade, and with the exception of the Blackfoot Indians who pay for their sires from their band funds, the Department supplies the best herd bulls, which are purchased at the annual bull sale at Calgary. A number of Indians raised pigs for sale, with good results. Considerable income was derived from the sale of chickens and turkeys. One Indian on the Blood Reserve who started raising sheep about four years ago, sold some 72 lambs, and wool to the value of nearly a thousand dollars. The coal mine on the Indian Reserve at Blackfoot was operated successfully and a fair tonnage was taken out during the season. A few of the Indians dug their own coal at an old mine in the St. Mary's River in the Blood Agency.

The fur catch was fair with prices good. Saddle Lake was restocked with about two million whitefish eggs which were obtained from the Alberta Government Fish Hatchery at Canyon Creek. The Blackfoot Indians were busy for a few weeks digging out old buffalo bones from a pit or buffalo pound, north of Gleichen off the Reserve. The bones were hauled to the railway at Gleichen and sold to a local dealer for $10 a ton, realizing about two thousand dollars. The grain crops were heavy and of good height, but because of continuous rains and lack of sunshine, were late in ripening. Harvesting operations were greatly retarded by rain and wind. No loss was suffered from hail or grasshoppers. Most of the oats was touched with frost and was unfit for seed. The wild hay crop was excellent and the campaign for the eradication of noxious weeds was continued. The potato crop was fair on most of the reserves and a sufficient supply for winter use and for seed was reported. The Indians also had some very good gardens. Employment during the year was easy to find and was obtained with farmers and ranchers and in the beet fields, as well as in logging camps and lumber mills. The Indians were also engaged on the New Highway to Alaska and as guides and river pilots. At the latter occupation some earned from $8 to $12 a day.

The Indians in Saskatchewan had one of the most favourable crop years they have had for some time, although in certain districts excessive rain made the crops difficult to handle at harvest time. Approximately 550,000 bushels of grain were threshed. More potatoes and other garden produce were harvested than in any previous year.

There was a considerable increase in the live stock holdings of the Saskatchewan Indians. The value of cattle sold and used for beef amounted to over $80,000.

The fur catch during the winter was light. Most of the fur-bearing animals were scarce, and because of the demand for labour, fewer Indians than usual took part in the hunt. The Sipanok Fur Development on the Saskatchewan produced its first crop under governmental control with 5,314 muskrats which were sold at a satisfactory average price of $2.27, and in the proceeds of this development, 271 Indians participated on a monthly basis, averaging approximately $12.50 per family.

Every able-bodied Indian was engaged in some form of work and no direct relief was given out during the year. A large number of Indians were employed in the bush camps, and during the summer about 3,500 men and women worked outside their reserves among the white farmers for the harvesting and threshing season. Many of the Indians made a good living cutting firewood which they sold in towns adjacent to their reserves.

The Homemakers' Clubs continued to be active, the most progressive being in the Crooked Lake, Onion Lake, Pelly, and Qu'Appelle Agencies. These Clubs have proved invaluable in making up women's and childrens' garments from discarded military clothing, and provided the Indians with warm winter apparel.

The grain crop in Manitoba was the heaviest harvested in years, and the yield per acre was unusually high. The potato crop was damaged severely by a heavy frost in the autumn. The hay crop was good. Cattle wintered well in spite of the extremely cold weather.

The fishing Indians had a successful year. The catch in some lakes was excellent and high prices prevailed throughout the season. In some districts trapping was good but at other points little fur was obtained. Good pelts sold at a high price and in the Portage la Prairie Agency the Indians received from $2 to $2.50 for a skunk skin. The catch at Oxford House and on some reserves north of The Pas was light.

There were more and larger gardens than in previous years which generally speaking were good, and more than 1,500 Manitoba Indians had gardens.

Bush Indians found work plentiful and there was a big demand for fuel and pulpwood cutting. The Homemakers' Clubs functioned successfully and are having a beneficial effect upon the Indians.

The organization has been completed of the 7,000-square mile area known as the Kesagami Beaver and Fur Preserves located in the James Bay District, which was established in 1941 by arrangement with the Province of Ontario whereby this Branch is given administrative control of the area for a period of five years for the propagation of fur-bearing animals. Some forty Indian tally-men are employed on this preserve. Twenty-eight beaver have been live-trapped and released in the preserve as the first stage of a five-year re-stocking program. A second preserve of 9,000 square miles on the west coast of James Bay, lying between the Kwataboahegan and Albany Rivers, has also been established, and preliminary field organization is under way, which includes the transplanting of live beaver each year. An extensive examination of the areas in the north-west part of the province was carried out. Results of these explorations were encouraging. Indians are gradually grasping the potential benefits that are likely to accrue from the development of beaver and fur preserves, and steps have been taken to survey and explore the areas suitable for the propagation of fur-bearing animals. Throughout the province an average fur crop was harvested at satisfactory prices. Muskrats reached a high average of $2.25 per pelt.

Employment throughout the year remained plentiful and Indians experienced no difficulty in securing work in war industries, on farms, and in lumber camps. Their earnings enabled them to enjoy a higher standard of living than they had experienced in recent years.

Agricultural operations on the reserves were extensive and were generally successful, showing a substantial increase in the acreage under cultivation. The production of vegetables and other canning factory crops showed a marked increase.

The hunting and trapping Indians in the Province of Quebec had a fairly good year. Some of them had a smaller catch than usual, which included all fine fur, but a notable exception is the areas where some supervision and control is exercised. The smaller catch was compensated for to some extent by the prevailing high prices locally. Marten were very scarce and fur dealers realized excellent prices averaging $50 a skin, while lynx sold at $60, beaver at $45, and mink up to $20 each.

The Bersimis Indians took more interest in the Gaspe salmon fishing and had fair returns. The Quebec Indians are realizing more and more the value of vegetables, and many of them had good gardens. The potato crop on the whole was not very good, owing to lack of moisture.

Plantations of willow have been started at St. Regis, Pierreville, and Maria, which will eventually replace the ash previously used by the Indians for the making of baskets and now very scarce. Willow baskets are much stronger and more durable than any ash basket that can be made.

As the Natashquan Indians were located 120 miles from the Indian Agency at Harrington Harbour and as it was considered that the distance was too great for the Indian Agent there to successfully take care of them, a new agency was established at Natashquan for the purpose of looking after their welfare.

The demand for labour of all kinds increased during the year which enabled more Indians to be self-supporting. They found employment in war industries, in the steel and building trades, as well as cutting wood and in lumber camps.

In the Maritime Provinces the improvement in economic conditions was reflected most favourably on the comparatively small Indian population. A number of Indians worked in the steel industry and on farms, as well as in lumber camps, resulting in a substantial reduction in the relief costs.

In Nova Scotia and Prince Edward Island the policy of centralization was continued without interruption. In Nova Scotia sawmills have been established on the Eskasoni and Shubenacadie Reserves for the purpose of supplying lumber and shingles required for the new building program. All able-bodied Indians found employment plentiful and enjoyed a higher standard of living than in former years throughout the Maritime Provinces.

War Services

Indian enlistments in the Armed Forces in the present conflict are as follows:—

Prince Edward Island	21
Nova Scotia	86
New Brunswick	139
Quebec	144
Ontario	732
Manitoba	98
Saskatchewan	317
Alberta	61
British Columbia	201
Northwest Territories	0
Yukon Territory	2
	1,801

According to branch records, 82 Indians have enlisted in the Veterans' Guard; 29 Indians have enlisted in the Air Force (one is reported missing); 9 Indians have enlisted in the Royal Canadian Navy; 16 Indian women have enlisted in the Army and Air Force; 5 Indians were taken at Dieppe, one is reported missing, two are prisoners of war, and two are reported to have been killed; 7 Indians were captured at Hong Kong, one is reported missing, and one to have since died of wounds. The remainder are in the Army.

As stated in previous reports Indians everywhere throughout Canada have shown a patriotic spirit and have manifested their loyalty in many ways. Indian women have continued to show a keen desire to assist in the war effort, reflecting greatly to their credit, and have taken an active part in local Red Cross work.

Over $15,000 has been received at Ottawa from Indians for war purposes. This sum includes contributions to the Canadian Red Cross, Canadian War Services, British War Victims Fund, Canadian Aid-to-Russia Fund, Queen's

Canadian Fund, British and Canadian War Effort, Catholic Refugee Children's Fund, Salvation Army, London Orphans' Fund, and the "Wings for Britain" Fund (Indian Spitfire Fund).

Some examples of Indian community contributions to the war effort are worthy of mention. At Hole River on the eastern side of Lake Winnipeg the Indians of the Hollow Water Band held a "Pie Social" on New Year's Eve. Under the direction of Chief George Barker, an auction sale of the pies brought by the various Indian families was held. A total of $175 was raised, which was apportioned as follows: $75 for the Aid-to-Russia Fund, $50 for the Canadian Red Cross, and $50 for the Canadian War Effort.

The Old Crow Indians in the Yukon Territory this year made a further contribution of $360.84, this time to the Aid-to-Russia Fund. The Indians of British Columbia have made frequent and generous contributions to the "Wings for Britain Fund" (Indian Spitfire Fund), and during the year $1,500 was raised.

An Iroquois Indian of the Six Nations of the Grand River Band whose reserve is located near Brantford, in the Province of Ontario, has attained the rank of Brigadier. He is Brigadier O. M. Martin. Brigadier Martin, however, has been enfranchised and has acquired full citizenship and is no longer an Indian by law.

INDIAN HEALTH SERVICES

Abnormal movements of population caused by war conditions have brought many epidemics to the northern Indians, particularly in the Yukon and the Mackenzie River basin. Outbreaks of influenza, typhoid, diphtheria, whooping cough, and measles have occurred. Medical and nursing aid was provided as promptly as possible.

Vaccination for smallpox and inoculation against diphtheria has been carried out in as many bands as possible. Wherever typhoid occurred Indians who were exposed were given typhoid vaccine. Inoculation against whooping cough is being attempted in some bands.

Tuberculosis continued to be the leading cause of death among Indians. Death rates from this disease are from ten to thirty times higher than among the white population. During the year over 1,500 Indians were treated for this disease in hospitals and sanatoria, with an average of slightly over 800 under treatment. Surveys in co-operation with the Provincial Health Departments were held in eight provinces and as many as possible of the active cases discovered were brought under treatment.

There is at present a shortage of sanatorium beds and many Indians are on waiting lists for treatment. In 1941, the last year in which complete figures are available, the Indian death rate from tuberculosis was lowered by ten per cent.

The Indian Affairs Branch operates fourteen departmental hospitals solely for Indians, with a total bed capacity of 540. More than half of these beds are occupied by cases of tuberculosis. Staff problems have been greatly aggravated by war conditions, but it has been possible to provide full treatment facilities at costs considerably below what the Department is called upon to pay in outside hospitals.

The Branch has continued its scientific investigations of nutritional diseases among Indians, caused by deficiencies in their diet. A campaign has been undertaken to improve the food habits of the Indians by health education, stressing the use of dairy products, gardening, and the proper cooking of vegetables. Much of the blindness among Indians has been traced to vitamin deficiencies.

The campaign against trachoma has been continued, with sulphanilamide treatment playing a major role. Excellent results are being obtained.

Tonsil and dental clinics have been held in a number of residential schools and glasses have been supplied to a number of children with defective vision.

The field nursing staff rendered valuable service, often in areas where a doctor was not available.

WELFARE AND TRAINING SERVICE

TRAINING

A table of pupil enrolment and attendance follows:

Fiscal Year	Residential Schools		Day Schools		Total		
	Enrolment	Average Attendance	Enrolment	Average Attendance	Enrolment	Average Attendance	Percentage of Attendance
1933-34.....	8,596	7,760	8,852	5,592	17,448	13,352	76·52
1934-35.....	8,709	7,882	8,851	5,560	17,560	13,442	76·54
1935-36.....	8,906	8,061	9,127	5,788	18,033	13,849	76·79
1936-37.....	9,040	8,176	9,257	5,790	18,297	13,966	76·34
1937-38.....	9,233	8,121	9,510	5,978	18,743	14,099	75·22
1938-39.....	9,179	8,276	9,573	6,232	18,752	14,508	77·36
1939-40.....	9,027	8,643	9,369	6,417	18,396	15,060	81·87
1940-41.....	8,774	8,243	8,651	6,110	17,425	14,353	82·37
1941-42.....	8,840	8,283	8,441	5,837	17,281	13,935	80·63
1942-43.....	8,830	8,046	8,046	5,395	16,876	13,441	79·64

An attempt has been made since the outbreak of the war to protect Indian educational institutions from serious impairment of efficiency. This has not been an easy task. A large number of fully qualified Indian day school teachers have joined the Armed Forces. Others have abandoned teaching in favour of work in war industries. With the exception of a few male teachers, with physical disabilities, and a number of missionaries who have been exempted from military service, we have few male teachers now in charge of Indian day schools. The shortage of fully qualified female teachers has also remained acute. The shortage has resulted in the employment of married women, many of whom have not been engaged in the teaching profession in recent years. This failure to secure fully qualified teachers is reflected in the progress and general efficiency of the schools.

Difficulty has been experienced in maintaining enrolment at day and residential schools. 'Teen age boys and girls have experienced little difficulty in finding lucrative employment at farm work, particularly in harvesting operations, in the early months of the academic year. Their absence from school not only disrupts the regular school program but reduces as well the per capita grant payments. The principals of schools are thus confronted with steadily declining revenues and increased recruiting costs. The problem is one for which no solution appears in sight.

A three-day conference of Roman Catholic residential school principals and teachers was held at St. Boniface, Manitoba, toward the end of November. This conference, the first of its kind held at any time in recent years, was organized with the object of stimulating interest in the organization and promotion of vocational courses of study.

Competitions, designed to encourage the beautification of school grounds, were organized at the Six Nations and Tyendinaga Reserves. The competition was unusually successful on the Six Nations Reserve where one of the schools won third prize in the provincial competition. The prizes provided at Tyendinaga were the result of local contributions.

Teachers continue to take an active part in the health and physical well-being of their pupils. Provision has been made for the serving of a hot lunch at a large number of schools in the outlying districts. A special biscuit has been manufactured for distribution to schools where the supply of vegetables is limited or non-existent. Thirteen tons of these biscuits, which were made up of raw pulped carrots, soy bean flour, oat flour, brewer's yeast and Canada approved vitamin B flour, were distributed during the year.

The following schools were totally destroyed by fire:—Back Settlement day school, Caradoc Agency, Ontario; Cross Lake (United Church) day school, Manitoba; and Fort George (Church of England) residential school, Fort George, Quebec.

Indian Education—Ordinary Expenditure, 1942-43

	Day Schools	Residential Schools	General	Total
Nova Scotia	9,073 31	27,860 97	.....	36,934 28
Prince Edward Island	866 23	.....	.....	866 23
New Brunswick	14,463 87	.....	.....	14,463 87
Quebec	54,350 35	13,557 97	.....	67,908 32
Ontario	100,849 74	263,633 57	.....	364,483 31
Manitoba	53,483 61	185,998 96	.....	239,482 57
Saskatchewan	33,064 14	280,797 58	.....	313,861 72
Alberta	1,066 25	311,660 97	.....	312,727 22
British Columbia	69,851 12	302,300 85	.....	372,151 97
B.C. Schools Vocational Instruction	.....	.....	9,166 02	9,166 02
Northwest Territories	1,667 15	31,558 00	.....	33,225 15
Yukon	3,203 19	16,428 10	.....	19,631 29
Assistance to Ex-Pupils	.....	.....	101 28	101 28
Freight and Express	.....	.....	38 95	38 95
Salaries and Travel	.....	.....	22,126 52	22,126 52
Stationery	.....	.....	30,240 72	30,240 72
Tuition	.....	.....	12,616 57	12,616 57
Miscellaneous	.....	.....	424 44	424 44
Total	341,938 96	1,433,796 97	74,714 50	1,850,450 43

WELFARE

Throughout the year, employment was plentiful and wages satisfactory. The elimination of Japanese competition enabled an unusually large number of Indians to secure gainful employment in the fishing industry of the Pacific Coast. The opportunities for employment and the prevailing high wages have induced a great many Indians to temporarily abandon their farming operations. At certain reserves in the Prairie Provinces it was exceedingly difficult to secure the help necessary to carry through the season's harvesting operations, with the result that large quantities of wheat and oats remained in the stook during the winter months.

The task of convincing the Indian that there is a vital relationship between the production and cultivation of vegetables and his physical well-being is a somewhat difficult one. In this connection a worthwhile adult educational program appears necessary. It is gratifying to note, however, that there has been a gradual extension of gardening operations, particularly on the northern reserves.

A limited acreage of reserve lands at the Caradoc Agency, Ontario, the St. Regis, Maria, and Pierreville agencies, Quebec, and at Lennox Island, Prince Edward Island, has been set apart for the production of Welsh willow. While this project is experimental, it is undertaken in the hope that an assured supply of willow canes will contribute to the extension of the basket-making industry on these reserves.

There has been a steady increase in the number of Homemakers' Clubs. The members of these clubs, with little departmental assistance or supervision, meet regularly for the remodelling of discarded military clothing, the canning of fruits and vegetables, and for the discussion of welfare problems. In a number of cases they have become responsible for the organization and promotion of worthwhile gardening programs, of school attendance, and of school lunches. The existence of these organizations is one of the most encouraging features of the welfare program.

There was a steady demand throughout the year for girl graduates of residential schools to work as domestics in the larger centres. A large number of these girls have now found employment, not only as domestics, but in war industries. The reports indicate that the service rendered has been uniformly satisfactory. Toward the end of the year the demand for these girls far exceeded the supply.

The following is a statement of welfare expenditures by provinces for the year 1942-43:—

Welfare Expenditure by Provinces 1942-43 and 1941-42

Province	1942-43	1941-42	Province	1942-43	1941-42
Nova Scotia	75,689 72	88,709 95	British Columbia	78,118 72	76,498 94
Prince Edward Island	9,088 07	8,644 99	Northwest Territories	14,792 25	15,625 53
New Brunswick	21,524 22	34,753 28	Yukon	11,025 82	12,244 13
Quebec	115,902 58	124,353 38	Triennial Clothing	3,505 47	6,665 36
Ontario	88,070 08	95,375 48	Headquarters		
Manitoba	83,531 82	83,930 19	Salaries	16,450 41	15,538 90
Saskatchewan	60,940 27	80,172 49	Miscellaneous	13,575 79	3,727 07
Alberta	54,696 21	56,451 18	Handicraft	1,066 15	4,665 96
				647,977 58	707,356 83

HANDICRAFT

There was a steady decline during the year in the production of basketry, hand-loom weaving, wood carving, and other types of handicraft work. This decline took place despite an increased demand for handicraft products, particularly basketry. The decline was due wholly to the number of Indians, particularly Indian girls, who had become employed in essential war industries. A number of Indian girls, who had become expert weavers, are now engaged in the inspection of materials for parachutes and cloth for army clothing. Indian men who formerly produced bark and wooden work articles are now employed in war industries. A great many young men, whose main source of revenue apart from handicraft was hunting, guiding and trapping, have enlisted in the Armed Forces.

Old people and women with young children still living on reserves are producing as much craft work as possible, in an effort to hold the ever increasing market. It is essential, in the interests of the Indian, that this market should be held. Indians who return to the reserves in the post-war period will be anxious to again take up handicraft work.

Goods were marketed through the central warehouse at Ottawa to the value of $16,000. In addition to this, an effort has been made to assist in securing raw materials for other reserves, where handicraft projects are being organized with only slight supervision by the Department. Provision for the future is also being made by arranging with certain agencies for the planting of black ash seedlings, willows, and sweet grass.

Grants to Agricultural Exhibitions and Indian Fairs, 1942-43

Ontario—	
Garden River Agricultural Society, Sault Ste. Marie	100 00
Caradoc United Indian Fair, Muncey	150 00
Caradoc United Ploughing Association	35 00
Manitoulin Island Unceded Agricultural Society	150 00
Thunder Bay Agricultural Association	250 00
Tyendinaga Agricultural Society	100 00
Ploughing matches	155 00
Field prizes, standing crop competitions	308 00
Garden prizes, standing crop competitions	270 00
Manitoba—	
Manitoba Provincial Exhibition	250 00
Rossburn Agricultural Society	25 00
Garden prizes, standing crop competitions	75 00
Saskatchewan—	
Prince Albert Agricultural Society	400 00
Regina Agricultural and Industrial Exhibition Association, Limited	400 00
Garden prizes, standing crop competitions	75 00
Alberta—	
Calgary exhibition	500 00
British Columbia—	
North and South Saanich Agricultural Society, Cowichan	50 00
Windermere and District Fall Fair, Kootenay	150 00
Chilliwack Fair, New Westminster	50 00
Armstrong Fall Fair, Okanagan	250 00
	$3,743 00

CONSTRUCTION AND ENGINEERING WORKS

Agency Buildings and Structures

Repairs and improvements were carried out at practically all Indian Reserves in Canada. New Agency buildings and structures were provided as follows:—

Ontario: A garage for the snowmobile was constructed at the James Bay Agency.

Manitoba: Assistance was provided in the construction of a residence for the electric power plant operator at Norway House, and the agency dock was rebuilt.

Saskatchewan: A new residence for the Indian Agent at Crooked Lake Agency was constructed.

Roads and Bridges

Roads on Indian reserves requiring attention were improved.

The bridge over the Brokenhead River between the Municipality and the Brokenhead Indian Reserve, Clandeboye Agency, Manitoba, was repaired in co-operation with the Municipality and bridges located on roads in the Fisher River Agency, Manitoba, were also given attention. Minor repairs were made to the bridge over Birdtail Creek, Birtle Agency, Manitoba.

Water Supplies

Wells were provided at the Pelly Agency, Saskatchewan, and the Saddle Lake Agency, Alberta. Wells were cleaned out and repaired at the Crooked Lake Agency, Saskatchewan; Saanich Indian Reserves in the Cowichan Agency,

British Columbia, and the One Arrows Reserve in the Duck Lake Agency, Saskatchewan. Dugouts were constructed at Gordon's Reserve in the Touchwood Agency, Saskatchewan. A water system was installed in the R.C.M.P. quarters at Bersimis, Quebec.

Fences

Fences were repaired at Christian Island, Ontario; Fisher River Agency, Manitoba; Hobbema and Peigan Agencies, Alberta.

Irrigation and Miscellaneous

Irrigation systems were repaired on numerous Indian Reserves in British Columbia, and funds were transferred to the Surveys and Engineering Branch for the construction, maintenance, and repair of irrigation systems in British Columbia where the work required engineering supervision or advice. A list of the works carried out will be found in the report of the Surveys and Engineering Branch.

Funds were also transferred to the Surveys and Engineering Branch for other works requiring engineering supervision such as the completion of the Port Simpson water supply system, Skeena Agency, British Columbia; extension of water pipe-line, Nanaimo Indian Reserve No. 1, Cowichan Agency, British Columbia; and repairs to retaining wall at Kenora, Ontario.

Furnaces were installed at the agency residences at Restigouche, Quebec; Nut Lake Reserve, Touchwood Agency, Saskatchewan; and Lake Manitoba Farm Residence in the Portage la Prairie Agency, Manitoba.

A shallow well pump was installed at St. Regis Agency buildings, Quebec, and a water system was provided for Walpole Island Agency residence, Ontario. Storage batteries and a windcharger, plumbing system, and electric wiring were provided at Fort Chipewyan Agency residence, Athabaska Agency, Alberta. A water pressure tank was installed at the Blood Agency buildings, Alberta, and lighting plant batteries were purchased for Fort Simpson Agency buildings, Northwest Territories.

Departmental boats requiring attention were repaired and replacement of parts in engines made where necessary.

RESERVES AND TRUSTS SERVICE

RESERVES DIVISION

Land Sales and Leases

During the fiscal year a total of sixty-nine sales of Indian lands were made. Forty-eight of these sales were for cash amounting to $60,838.70 and twenty-one were time sales amounting to $11,189.56, a total for the year of $72,028.26.

Collections on land sale agreements amounted to $148,776.63 being $97,125.34 paid on principal and $51,651.29 in interest, the former amount being added to the Capital Accounts of the bands interested. In addition to the above, $9,748.09 was received and placed in suspense pending completion of sale agreements.

With reference to old land sale contracts, fifty-eight were paid out in full, nineteen were cancelled for non-fulfilment of the conditions of sale and ten reductions were made by revision in accordance with ruling of the Board of Review under the terms of the Farmers' Creditors Arrangement Act, with the result that the total number of current time sales at the end of the fiscal year stood at 654, a decrease of fifty-seven from the previous year. Sixty-five patents to Indian lands were issued upon completion of sale contracts.

Rentals collected under leases, permits, etc., for the fiscal year amounted to $168,790.18.

Adjustments under the F.C.A.A.

Ten land sale contracts were reviewed under the Farmers' Creditors Arrangement Act and resulted in gross reductions in arrears of $27,926.47, of which $26,281.46 was on account of principal and $1,645.01 on account of interest. This compares with a gross reduction of $101,108.27 during the previous year.

Petroleum and Natural Gas

The search for oil on several of the Indian Reserves in Western Canada continued during the year but discovery and production have not yet been brought about. Attention was focused mainly on the Blood Reserve where two deep wells were drilled without satisfactory results. A third well is now drilling in order that the Reserve may be thoroughly tested.

On the Stony and Sarcee Reserves, Petroleum and Natural Gas leases have been kept in good standing with actual drilling in prospect and it is expected that several tests will be made during 1943.

Fur Conservation

With the active co-operation of the provinces development of fur preserves across Canada in the interest of the Indian trapping population has continued to make satisfactory progress. Four large areas were held under lease from the Governments of Quebec and Ontario as fur rehabilitation blocks each averaging upwards of 8,000,000 acres. Although all fur-bearers come within the scope of the development plan these four blocks were acquired for the particular purpose of restoring the beaver population to something approaching the numbers these areas supported in the past. Plans for the restoration of beaver have been carefully worked out and the resident Indian population has been fully enlisted into the service. The effort put forward to interest and educate the Indian in this particular conservation plan has met with gratifying success. On the Nottaway Preserve (James Bay district, Province of Quebec) since active management has been undertaken the beaver population has increased from an estimated population of 255, based on the best obtainable information, to a population of 3,315, based on actual count made by 40 tallymen, appointed, instructed, and partially trained for that purpose.

Since these areas were set aside no beaver has been taken from any of them and the Indian co-operation in this regard also has been most thorough and complete. The other areas have been completely organized and substantial and satisfactory progress made. The four preserves in order of their acquisition are the Nottaway, 8,600,000 acres; the Peribonca, 8,000,000 acres; Old Factory, 10,000,000 acres (in the Province of Quebec); and the Kesagami, 4,500,000 acres (in the Province of Ontario). The last named is the first to be set aside in Ontario and already gives promise of being one of the best areas under development. Negotiations proceeded during the year for the acquisition of two more large areas of selected land one in each province.

Studies indicate that it will take a development program of seven years to bring a beaver preserve into limited production and from ten to twelve years to bring it into the state of production where it can maintain the resident population of each area on a sustained yield basis. Prospects for the attainment of the objective are good. The whole program holds promise of placing a large portion of Indian population who live in the northern portions of these provinces on a permanent self-sustaining basis.

In the Prairie Provinces the fur conservation effort has been directed largely to the rehabilitation of the muskrat. In Manitoba the muskrat projects at The Pas are already in commercial production. A further large block is under

development with the co-operation of that Province, at Fisher River, where the rat population in three years has increased from virtual depletion to over 2,000 houses (15,000 animals) by actual count. Two more years should bring this new area into commercial production on a substantial scale where the production for the last twenty years has been negligible.

In Saskatchewan four areas, primarily rat projects but in each of which a substantial beaver population is being built up, are in their third and fourth years under planned management. Of these the Sipanok Development at Carrot River is in the most advanced stage and has been in partial production for the past two years. At the end of the fiscal year there was an estimated population of 20,000 muskrats on the area indicating an increase of ten times the number present when the development was commenced in the summer of 1940. Three other developments at Kazan, Emmeline, and Beaupry Lakes are expected to come into production in 1943.

In Alberta within the year the attention of this Branch was directed chiefly to co-operation with the Province in establishing a comprehensive plan of fur administration under the trapline system. Substantial progress was made resulting in the allocation of over 150 traplines in that Province to Indian trappers. The Branch has co-operated closely with the Provincial administration in this important work which should result in improved conditions for the Indian trappers of that Province.

In British Columbia further extensions of the Indian traplines have been secured and in one area a group of these traplines has been set aside and organized into an experimental beaver conservation block, the first to be attempted in that Province.

The Department, in its effort to improve conditions among the trapping Indians, has received sympathetic co-operation from the Governments of the Provinces in which fur development is of importance to the welfare of the Indians.

Timber and Forestry

During the year 1942-43 the administration of the timber resources on Indian Reserves in Canada involved the sale of 15,241,294 feet board measure of saw timber and 80,462 cords of pulpwood, under licence, on which royalties and stumpage in the amount of $65,213.16 was collected and in addition $32,500 stumpage was collected on one advance sale.

The Indians, under permit, harvested and sold wood products such as saw timber, cordwood, poles, ties, Christmas trees, fence posts, etc., from which royalties to the amount of $31,768.78 was added to the funds of the Bands.

Payment of rentals and fees of $1,960.80 were received making a grand total of $131,442.74 revenue from timber sources for the year.

Forest Protection

The number of forest fires during 1942 was approximately fifty per cent less than the number reported for the previous year, and the loss sustained was greatly reduced from that of the year 1941. The total amount expended on fighting forest fires during the year 1942 was only about twenty-five per cent of the 1941 cost, or $2,134.14 as against $8,283.63.

Mining

A total revenue of $4,735.20 was received, consisting of royalties from the sale of sand and gravel, $3,177.70; rentals and fees, $1,557.50.

Indian Enfranchisement

There were forty-five enfranchisements carried out during the past fiscal year, comprising a total of 109 individuals, an increase of approximately 50 per cent over the previous year.

Indian Estates

There has been a substantial increase in the number of Indian estates administered by the Branch. The increase in the volume of this work is the direct result of the assumption by the Branch of responsibility for administration by the appointment of personal representatives, payment of debts, and the distribution of personal assets among those entitled to receive them as directed by the Act. The former practice of distribution by tribal custom or by the direction of the Band Council is being gradually discontinued.

The extension of the Location Ticket system of land holdings and establishment of permanent land records has necessitated examination into the chain of title to many properties and has resulted in bringing up for review many old estates which have either not been administered at all or concerning which final distribution had not been effected. Substantial progress toward the establishment of legal Indian title to land, payment of debts, and the proper distribution of estate assets has been made during the year.

TRUSTS DIVISION

The Division administered 446 trust accounts belonging to Indian bands throughout Canada. On March 31, 1943, the aggregate fund totalled $15,027,771.56. A comparison with the previous year is as follows:

Trust Balances	Capital	Revenue
March 31, 1943	$12,353,036 07	$2,674,735 49
March 31, 1942	12,168,534 05	2,473,811 42
Increase	$ 184,502 02	$ 200,924 07

The increase of $184,502.02 in the Capital Account, some $109,000 more than the $75,026.53 increase reported at the end of 1941-42, is attributable to the growing demand for timber and for reserve lands in connection with various aspects of the war effort. The increase in the Revenue Account balance may be regarded as having been caused by improved economic conditions whereby Indians, being able to secure employment at good wages, have not relied to the same extent as heretofore on assistance from their funds held in trust by the Government. Again it is considered sound policy in times of relative prosperity, of urgent need for the full utilization of man-power, and of high wages, to provide against a day of possible greater Indian need and to encourage the saving of the unearned income of the bands.

To that end the representatives of the bands have been consulted, local conditions and local needs examined and considered. Many bands have voluntarily consented to the deferment or curtailment of annual distribution of their unearned income. Some have voluntarily invested it, or a substantial part of it, in War Savings Certificates. Many bands, where local conditions or contractual obligations warrant it, have been paid in full. This policy has been adopted with reference to all Indians living on Reserves in Canada whose income or capital funds held in trust has in the past made possible a distribution of interest on a per capita basis.

Items of receipts were: Earned interest, land sales, land rentals, mining dues, timber royalties, oil land rentals, and fines. Expenditures comprised: Capital and interest distributions, relief expenditures, band loans, agricultural

assistance, road improvements, and enfranchisement. These outline the transactions in connection with Indian Trust Accounts and may be summarized as follows:—

	1941-42	1942-43
Total receipts credited to band funds.... ...	$1,410,298 82	$1,515,277 91
Total expenditures paid from band funds....	1,183,191 25	1,129,796 32
Excess receipts over expenditures	$ 227,107 57	$ 385,481 59

Personal Savings Accounts

In addition to the general funds of the bands the Division administers 1,610 individual savings accounts representing a total of $285,626.15 as at March 31, 1943. A comparative statement of deposits and withdrawals is as follows:—

	1941-42	1942-43
Deposits	$50,648 94	$66,930 67
Withdrawals	45,149 69	46,703 48
Net increase in funds on deposit.....		$20,227 19

The increase in funds on deposit has been due to Indians increasing their incomes by taking advantage of the demand for labour at good wages, and also to the fact that many dependants of enlisted men, saving part of their allowances, have used the facilities offered by Indian Savings Accounts as a means of accumulating a fund to assist in the rehabilitation of enlisted Indians. Assistance and advice was given to approximately forty dependants whose allowances are administered by this Division through the Indian Agent under whose jurisdiction they come. This has often been necessary because the individuals, having no experience in handling money surplus to their essential needs, require supervision in the situations of increased income in which they now find themselves.

From their 1942 income, Canadians of Indian blood left on deposit with the Government over $400,000 which, with generous and general subscriptions privately made, constitutes their monetary contribution to Canada's War Effort.

Annuities

The usual arrangements for payment of Indian Treaty Annuities was made throughout the Dominion, the total distribution being $261,730.55. The distribution of these annuities commenced in April and was completed by September. The difficulty of procuring aircraft under present wartime conditions has in some cases made necessary a return to the former method of boat travel by the treaty parties. The following itemized statement of Annuity distribution will be of interest:—

Number of chiefs paid at $25.00	171	$ 4,275 00
Number of headmen paid at $15.00.....	369	5,535 00
Number of Indians paid at $5.00	47,834	239,170 00
Number of commutations of annuity paid at $50.00.....	55	2,750 00
Number of enfranchised Indians paid at $100.00.....	19	1,900 00
Amount paid on account of arrears for previous years.....	....	1,180 55
Number of Indians paid at $4.00.....	78*	312 00
Amount paid on account of arrears at $4.00.....	....	8 00
		$255,130 55
General advance re Robinson Treaty to be added.....		$ 6,600 00
Total		$261,730 55

* Abitibi.

In addition to above numbers receiving Annuities from Federal Funds there are some 11,137 Indians who also receive Annuity under Robinson Superior, Robinson Huron and Treaty 9 (James Bay). This brings the total number of Indians in Canada receiving Treaty Annuity to approximately 59,511.

Band Loans

During the fiscal year a total of $17,095.90 from band funds was loaned to 110 individual band members, the average loan being $155.42. The sum advanced was for the purposes and in amounts as follows:—

In the purchase of live stock and equipment	$ 7,768 00
Repairs to buildings, etc.	3,705 00
Construction of new buildings and the sinking of wells	4,060 00
In the purchase of property—land and buildings	734 00
Miscellaneous purchases	828 90
Total	$17,095 90

In this connection the following is a recapitulation:—

Applications considered, 156, totalling	$25,745 90
" approved, 110, totalling	17,095 90
" approved, later cancelled, 19, totalling	4,070 00
" rejected, 25, totalling	4,080 00
" in abeyance, 2, totalling	500 00

It might be noted that the borrowers received assistance in the purchase of 47 horses (17 teams included), 15 cows, 1 bull, 6 breeding ewes, 1 threshing separator, 2 binders and 1 tractor. Repairs were made to 24 houses and 8 barns; while 13 houses, 1 barn, 1 granary and 2 stables were newly constructed and 3 wells were sunk.

These are just a few items to indicate the extent to which Indians have been assisted from their own funds to utilize more effectively the productive value of their lands.

From monies advanced in past years, a total of 153 Band Loans in the amount of $25,092.18 were fully retired during the fiscal year, illustrating the "revolving" feature of the funds used for loan purposes.

Year ending	New Loans		Loans Retired	
	No.	Amount	No.	Amount
March 31, 1940	175	$ 28,248 94	.....	$ 19,412 00
March 31, 1941	170	24,795 47	.....	26,329 63
March 31, 1942	133	21,875 25	.....	34,616 99
March 31, 1943	110	17,095 90	.....	25,092 18
Totals	588	$92,015 56	628	$ 105,450 80

SUMMARY OF INDIAN AFFAIRS BY PROVINCES AND TERRITORIES

PRINCE EDWARD ISLAND

Agency.—There is only one agency in the Province, located at Summerside. A large number of Indians live on Lennox Island, and others live at Rocky Point, near Charlottetown, Morell, St. Andrews, and Scotch Fort.

Tribal Origin.—The Indians belong to the Micmac tribe, which is of Algonkian stock.

Occupations.—Subsistence farming is engaged in by a number of Prince Edward Island Indians, with many of them owning their own live stock. During the past year outside work has been readily available with many of the Indians

finding continuous employment in urban centres as well as in the lumbering and fishing industries. Basket-making, especially among the older Indians, has also been engaged in, with profitable results.

Dwellings.—The homes are fairly good and increased employment has resulted in improved living conditions generally.

NOVA SCOTIA

Agencies.—There are two Indian agencies in Nova Scotia, namely, in Hants County (Shubenacadie) and in Cape Breton County (Eskasoni).

Tribal Origin.—The Indians are of Algonkian stock and like the Indians of Prince Edward Island bear the distinctive name of Micmac.

Occupations.—While many of the Indians raise their own gardens, any other agricultural pursuits that are engaged in are on a small scale. With the progress of the war, however, more Indians are finding employment with white farmers and fruit growers. Their natural ability as guides and canoemen is utilized during the tourist season, and their skill at making baskets and at woodworking is another important source of income. They also work in lumber camps and as labourers.

Dwellings.—The houses on most of the reserves consist of one and one-half story frame buildings, fairly well finished on the outside.

NEW BRUNSWICK

Agencies.—There are three agencies in New Brunswick; the Northeastern, at Richibucto; the Northern, at Perth; and the Southwestern, at Fredericton.

Tribal origin.—Most of the Indians belong to the Micmac race, which is of Algonkian stock. There are also some bands of Maliseets, also of Algonkian stock.

Occupations.—Except for growing potatoes and vegetables for their own use, little farming is engaged in by the Indians of the Province of New Brunswick. The potato crop in the State of Maine, however, provides seasonal employment for many Indians every year. They also hunt and fish and act as guides. Many work in lumber camps and sawmills, while others earn a living as day labourers. In certain parts of the Province they are engaged commercially in the manufacture of axe and pick handles and baskets.

Dwellings.—Housing is similar to that in other parts of the Maritime Provinces.

QUEBEC

Agencies.—The 19 Indian agency offices in Quebec are located as follows: Amos (Abitibi), Bersimis, Cacouna (Viger), Caughnawaga, Gagne (Maria), Gaspe, Gentilly (Becancour), Harrington Harbour (St. Augustine), Maniwaki, Mingan, Natashquan, Notre Dame du Nord (Timiskaming), Oka, Pierreville, Pointe Bleue, Restigouche, St. Regis, Seven Islands, Village des Hurons (Lorette).

Tribal Origin.—The principal tribes found in Quebec are: Iroquois at Caughnawaga, Lake of Two Mountains, and St. Regis; the Hurons of Lorette are also of Iroquoian stock; the Montagnais, who are of Algonkian stock, at Bersimis, Mingan, Lake St. John, Seven Islands; the Abenakis, of Algonkian stock, at Becancour and St. Francis; the Micmacs, of Algonkian stock, at Maria and Restigouche; and the Maliseets, of Algonkian stock, at Viger.

Occupations.—The Indians of Caughnawaga are noted steel workers and find highly remunerative employment in that trade. The native handicraft projects organized in this province continue to prove successful. The Indians of

the northern interior and the north side of the Gulf of St. Lawrence depend almost entirely on hunting, trapping, and fishing for their subsistence. In the Saguenay district they act as guides and canoemen and also find employment in lumber camps and mills. The Indians in the organized central and southern portions engage in mixed farming. They raise fruit and dispose of it at nearby markets, and those who possess cows sell the milk to the creameries and cheese factories. A few also act as game guardians on established beaver preserves.

Dwellings.—Many of the Indians in the older settled districts own houses of stone, brick, or frame construction. In the more remote parts they live in tents during the greater part of the year. Because of increased employment housing conditions generally have improved.

ONTARIO

Agencies.—The Indian agency offices in Ontario, 24 in number, are located as follows: Brantford (Six Nations), Chapleau, Chippawa Hill (Saugeen), Christian Island, Deseronto (Tyendinaga), Fort Frances, Golden Lake, Highgate (Moravian), Kenora, Longford Mills (Rama), Manitowaning (Manitoulin Island), Moose Factory (James Bay), Muncey (Caradoc), Parry Sound, Peterborough (Rice and Mud Lakes), Port Arthur, Sarnia, Sault Ste. Marie, Scugog, Sioux Lookout, Sturgeon Falls, Virginia (Georgina and Snake Islands), Wallaceburg (Walpole Island), Wiarton (Cape Croker).

Tribal Origin.—Most of the Indians of Ontario are Ojibwas, and are of Algonkian stock. The Oneidas of the Thames, the Mohawks of the Bay of Quinte, the Mohawks of Parry Sound district, and the Six Nations of Grand River are of Iroquoian stock. There is a band of Pottawottamies at Walpole Island, and Delawares at the Caradoc (Muncey) Agency; these are of Algonkian stock.

Occupations.—In northwestern Ontario the Indians are dependent largely on fishing and the trap-line for their living. In eastern Ontario they engage in lumbering. All northern reserves are reasonably well stocked with merchantable timber. In the southern and western parts of the Province farming is the chief source of revenue, although the Indians in these sections, close to industrial centres, are to a marked degree becoming absorbed into the industrial life of their respective communities. When advantageously located to do so, the Indians engage in guiding during the tourist season, in which they are particularly efficient, and in themselves actually constitute an attraction to tourists unfamiliar with the aboriginal races.

Dwellings.—As in other provinces, because of increased employment, housing conditions generally have improved. Many Indians own houses of brick, stone, or modern frame construction in the more settled districts. The Indians of the northern part of Ontario are nomadic and consequently live in tents most of the year.

MANITOBA

Agencies.—There are seven Indian agency offices in Manitoba, located as follows: Birtle, Griswold, Hodgson (Fisher River), Norway House, Portage la Prairie, Selkirk (Clandeboye), The Pas.

Tribal Origin.—Most of the Indians belong to the Ojibwa race, which is of Algonkian stock. Bands of Swampy Crees are found at the Norway House and Fisher River Agencies and in the York Factory district; these are also of Algonkian stock. The Indians located at the Griswold Agency are Sioux; there are also Sioux at the Birtle and Portage la Prairie Agencies. There is a band of Chipewyans at Churchill; this tribe is of Athapaskan stock.

Occupations.—Fishing, hunting, and trapping constitute the main sources of livelihood for the Indians inhabiting the lake regions and northern sections of Manitoba. The large commercial fishing companies employ many Indians from the lake regions. Agriculture is confined chiefly to the Birtle, Griswold, Portage la Prairie, and Clandeboye Agencies, although Indians from other agencies work in the harvest fields in the farming communities. The new sugar beet industry is also providing work for Indians in the beet fields. Good herds of cattle, principally of the Shorthorn type, and other live stock are to be found on many reserves, and their products are a vital source of income to the Indians of southern Manitoba. Surplus hay is sold; the hay presses owned by some of the Indians enable them to ship their surplus in winter. Taking out wood for winter fuel requirements has always been an Indian occupation, while recently more and more Indians have been engaging in cutting pulpwood. Indian women find their native handicraft, particularly the manufacture and sale of gloves and moccasins, a profitable undertaking.

Dwellings.—On most of the reserves in Manitoba the houses are of log construction, one and one-half stories high with shingle roofs. They are usually white-washed every year which improves their appearance and makes for greater sanitation. There are also a number of houses of frame construction on all reserves. In the extreme north the habitations are more primitive.

SASKATCHEWAN

Agencies.—The nine Indian agency offices in Saskatchewan are located as follows: Balcarres (File Hills), Battleford, Broadview (Crooked Lake), Duck Lake, Kamsack (Pelly), Leask (Carlton), Muscow (Qu'Appelle), Onion Lake, Punnichy (Touchwood).

Tribal Origin.—The most numerous tribes among the Saskatchewan Indians are the Ojibwas, Swampy Crees, and Plains Crees, which all belong to the Algonkian stock. In addition to these, Sioux Indians are found at the Crooked Lake, Qu'Appelle, and Carlton Agencies, and on the Moose Woods Reserve. In the Onion Lake Agency there is a band of Chipewyans, who are of Athapaskan stock. There are also a few Chipewyan Indians in the Ile à la Crosse district.

Occupations.—Farming and stock-raising comprise the chief occupations of Saskatchewan Indians. They are equipped with good implements and horses and employ the same advanced modern farming methods as their white neighbours. Their cattle are of a good type, most of them being of the Shorthorn breed. In the north central sections of the Province they supplement their incomes by selling their surplus hay and taking out fuelwood, while farther north they still depend almost entirely upon hunting, trapping, and fishing for their livelihood. They make good woodsmen. The recent shortage in the pulpwood industry has opened new opportunities for earning good money to Indians from all parts of the Province, many of them finding work in the wooded sections of Saskatchewan and several hundred going as far away as Kapuskasing, Ontario, to alleviate the acute shortage in the timber areas.

Dwellings.—On most of the reserves the Indians are fairly well housed, the homes being usually of log construction with shingle roof; others are of frame construction. In the north when the Indian is out on his hunting grounds his home consists of a log cabin with sod roof in winter, and a tent in summer.

ALBERTA

Agencies.—The ten Indian agency offices in Alberta are located as follows: Brocket (Peigan), Calgary (Sarcee), Cardston (Blood), Driftpile (Lesser Slave Lake), Fort Chipewyan (Athabaska), Gleichen (Blackfoot), Hobbema, Morley (Stony), Saddle Lake, Winterburn (Edmonton).

Tribal Origin.—The Alberta Indians are of Algonkian stock, with the exception of the Sarcees near Calgary and the Beavers and Slaves in the Lesser Slave Lake Agency, who are Athapaskan; the Paul's band in the Edmonton Agency, who are Iroquoian, and the Stonies, who are of Siouan stock. The Algonkian Indians of Alberta are subdivided into Blackfoot Nation, comprising the Indians of the Blackfoot, Blood, and Peigan Agencies; and Plains Crees found in the Lesser Slave Lake, Saddle Lake, Edmonton, and Hobbema Agencies.

Occupations.—Stock-raising is the principal occupation of the Indians of the southern and foothills regions where they have large herds of horses, and cattle herds of excellent Hereford and Shorthorn types. They grow grain on up-to-date well equipped farms. Indians in the northern parts while mainly occupied in hunting and trapping also engage in fishing and selling fuelwood. Those Indians who do not farm for themselves find employment with farmers and ranchers; haying, harvesting, and working in the beet fields for several months during the summer. A number also work in lumber camps, sawmills, and as labourers. The Blackfoot Indians operate two coal mines of their own and obtain a substantial revenue from the sale of coal.

Dwellings.—The condition, on the whole, of the homes and farm buildings is good. Changes are gradually being made by enlarging some of the houses, or dividing large one-roomed houses into several rooms resulting in more healthful living conditions. The majority of the houses are well kept and increased employment has resulted in the purchase of additional furniture. Frame houses and barns are found on the Sarcee and Edmonton reserves. Other houses are of log construction with shingle roofs.

BRITISH COLUMBIA

Agencies.—The Indian agency offices in British Columbia are located at 18 different points as follows: Alert Bay (Kwawkewlth), Bella Coola, Cranbrook (Kootenay), Duncan (Cowichan), Fort St. John, Hazelton (Babine), Kamloops, Lytton, Massett (Queen Charlotte Islands), Merritt (Nicola), New Westminster, Port Alberni (West Coast), Prince Rupert (Skeena), Telegraph Creek (Stikine), Vancouver, Vanderhoof (Stuart Lake), Vernon (Okanagan), Williams Lake.

Tribal Origin.—The Indians of the Bella Coola, Cowichan, Kamloops, Lytton, New Westminster, Nicola, Vancouver, and Okanagan Agencies belong to the Salish tribes. The Kootenay tribe is located in the agency of the same name. The Kwakiutl-Nootka tribe is located at the Kwawkewlth and West Coast Agencies; the Haidas, in the Queen Charlotte Islands; the Tlingits, in the Stikine; and the Tsimshians in the Skeena Agency. The Indians of the Babine, Stuart Lake, and Williams Lake Agencies belong to the Athapaskan race. The Indians of the Peace River Block are Athapaskan, with the exception of a small group of Saulteaux and Crees at Moberly Lake who are Algonkian.

Occupations.—The coast Indians exhibit skill as salmon fishermen and the fishing industry has continued to be their chief occupation. Many own their own power-boats and up-to-date equipment and either fish independently or under contract with the canneries. Herring canneries give work to a large number of Indians, especially Indian women who give excellent satisfaction as cannery workers along the coast. They also engage in clam digging, while others work at various occupations such as logging and as unskilled labourers. Indians of the central and northern interior regions make their living by trapping on registered trap-lines, while towards the south they are turning their attention more and more to agriculture and other pursuits. Many engage successfully in cattle and horse raising; while others are making a success of fruit-growing, some of them having orchards of their own. Whole families participate in the seasonal migratory labour movement to pick fruit, hops, etc., which frequently takes them into the United States in their wayfaring.

Dwellings.—Special attention continues to be given to the improvement of Indian homes. All new houses are built upon modern lines of the small compact type used by white labouring classes, and greater interest is paid to ventilation, heating, and sanitation than formerly.

The best Indian houses are found on the northwest coast among the Haidas of Queen Charlotte Islands, the Tsimshians of Port Simpson, Metlakatla, and Port Essington, and Kwakiutls of Bella Bella. The gradual improvement in all farm buildings and out-buildings continues.

NORTHWEST TERRITORIES

Agencies.—The Indian Affairs Branch has three agencies in the Northwest Territories, namely, Fort Simpson, Fort Resolution, and Fort Norman.

Tribal Origin.—The principal tribes found in the far north are the Slaves, Hares, Loucheux, Sekani, Dogribs, Yellow Knives, Chipewyans, and Caribou-Eaters. All these tribes are of Athapaskan stock. The most northerly tribes are the Takudah, whose territory extends to the Mackenzie Delta; and the Copper Mines, who are located along the Coppermine River. The territory occupied by these two last-named tribes is contiguous to that inhabited by the Eskimos.

Occupations.—The Indians depend almost entirely upon hunting and trapping for a livelihood, and a few cultivate potatoes and garden vegetables. They own no cattle or horses. Large quantities of fish are caught and preserved for their own use and for dog feed during winter. Wild berries are also picked and dried for winter use.

Dwellings.—These Indians live in log cabins in winter and in tents and teepees in the summer.

YUKON

Tribal Origin.—The Forty-Mile, Blackstone, and Moosehide bands belong to the Takudah tribe. There is a band of Slaves at Lancing Creek who migrated from Good Hope on Mackenzie River; another band of Slaves, called Nahani, is located at the headwaters of Pelly River. All these Indians are of Athapaskan stock. At Mayo, Selkirk, Little Salmon, and Carmacks there are bands belonging to the tribe known as Stick Indians. Bands belonging to the Tlingit tribe are found at Whitehorse, Teslin Lake, Champagne Landing, and Carcross.

Occupations.—Hunting, trapping, and fishing are the chief occupations of the Yukon Indians. The women derive some revenue from the sale of moccasins and curios of various kinds, and the men are expert at making toboggans and snowshoes. Little farming is carried on owing to climatic conditions but some of the Indians cultivate patches of potatoes and other vegetables for their own use.

Dwellings.—The Indians of the Yukon live in log cabins.

TABLE 1

Census of Indians: Arranged Under Provinces and Territories, 1939

Province	Number in Province	Religion							Under 7 years		From 7 to 16 inclusive		From 17 to 21 inclusive		From 22 to 65 inclusive		From 65 years upwards	
		Anglican	Baptist	United Church	Presbyterian	Roman Catholic	Other Christian Beliefs	Aboriginal Beliefs	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Alberta	12,163	1,709	.....	1,558	.....	8,745	.....	151	1,374	1,444	1,423	1,406	559	561	2,454	2,311	308	323
British Columbia	24,276	4,701	109	4,794	.....	13,954	690	28	2,192	2,290	2,929	2,922	1,112	1,116	5,301	4,701	868	845
Manitoba	14,561	4,792	50	4,195	643	4,638	.....	243	1,492	1,545	1,739	1,566	919	916	2,853	2,603	460	468
New Brunswick	1,922	.....	.....	.....	.....	1,922	.....	.....	231	214	243	212	84	103	401	353	43	38
Northwest Territories	3,724	640	.....	.....	.....	3,084	.....	.....	396	396	444	401	191	180	795	792	38	91
Nova Scotia	2,165	5	.....	.....	3	2,157	.....	.....	232	241	220	234	113	103	484	405	72	61
Ontario	30,145	9,747	1,179	5,533	220	9,862	887	2,717	2,395	2,573	2,957	3,012	2,001	1,964	6,811	6,654	839	939
Prince Edward Island	274	.....	.....	.....	.....	274	.....	.....	24	33	30	31	11	22	60	50	3	10
Quebec	14,578	2,830	.....	600	.....	11,071	17	60	1,410	1,435	1,649	1,580	783	784	3,250	2,883	391	413
Saskatchewan	13,020	4,256	.....	1,228	139	6,242	10	1,145	1,443	1,594	1,526	1,533	617	547	2,512	2,590	293	365
Yukon	1,550	1,352	.....	.....	.....	146	.....	52	162	179	175	168	81	70	305	272	68	70
Total Indian Population	118,378	30,032	1,338	17,908	1,005	62,095	1,604	4,396	11,351	11,944	13,335	13,065	6,471	6,366	25,226	23,614	3,383	3,623

TABLE 2

Land: Private and Public Buildings and Property

Province	Total Area of Reserves (Acres)	Acres Under Wood	Acres Cleared but not Cultivated	Acres Under Actual Cultivation	Acres Fenced	Private Property								Public Property					
						Stone, Brick and Frame Dwellings	Other Dwellings	Outbuildings, etc.	Ploughs, Harrows, Drills, etc.	Mowers, Reapers, Binders, Threshers, etc.	Carts, Wagons and Vehicles	Automobiles	Tools and small Implements	Churches	Council Houses	School Houses	Saw Mills	Other Buildings	Engines and Machinery
Alberta	1,418,978	447,074½	918,611	53,292½	443,209½	437	1,894	2,595	2,260	1,519	2,398	110	9,474	14	8	8	9	145	264
British Columbia	832,725	500,196¾	295,999	36,529¼	283,696	4,692	2,828	4,229	2,741	962	2,272	470	41,951	155	72	58	9	70	164
Manitoba	521,949	383,736	123,800	14,413	51,794	252	2,884	1,839	869	632	1,312	99	8,200	59	16	42	2	125	50
New Brunswick	37,369	35,932½	1,084	352½	1,161	380	40	222	59	19	62	19	1,140	6	5	11	.....	5	3
Northwest Territories	1,924	1,812¾	34	77¼	81½	.....	338	188	4	.....	.....	.....	481	.....	1	.....	.....	.....	.....
Nova Scotia	18,189	17,275	640	274	1,032	204	39	75	44	10	23	12	580	5	3	7	4	4	1
Ontario	1,335,650	1,194,944½	88,932½	51,773	168,461	2,831	2,312	3,898	3,901	1,173	3,100	617	48,425	108	44	90	13	102	161
Prince Edward Island	2,741	2,483½	200	57½	200	22	1	14	10	6	6	.....	20	1	1	.....	.....	.....	2
Quebec	175,049	153,809½	14,841	6,398½	15,007½	1,534	605	2,351	629	275	1,440	152	6,462	25	4	30	1	26	37
Saskatchewan	1,202,746	419,059½	736,903	46,783½	342,493	274	2,357	3,089	2,428	1,727	2,849	38	15,627	47	25	27	3	71	63
Yukon	3,709	3,701	5½	2½	5½	1	.....	3	3	1	4	1	3	1	.....	.....	.....	1	4
Total	5,551,029	3,160,025½	2,181,050	209,953½	1,307,141	10,627	13,298	18,503	12,948	6,324	13,466	1,518	132,363	421	179	273	41	549	749

Statement of Ordinary Expenditure for Year 1942-43

	Branch Administration	Indian Agencies	Reserves and Trusts	Medical	Grants to Hospitals	Welfare	Education	Grants to Residential Schools	Grants to Exhibitions	Total
	$	$	$	$	$	$	$	$	$	$
Nova Scotia	180	10,902	80	26,986	.....	75,690	9,118	27,816	.....	150,772
Prince Edward Island	70	2,990	.....	4,253	.....	9,088	866	.....	.....	17,267
New Brunswick	.....	8,486	.....	17,805	.....	21,524	14,464	.....	.....	62,279
Quebec	509	45,371	502	94,072	.....	115,902	54,361	13,547	.....	324,264
Ontario	20	112,316	1,117	163,806	.....	88,070	111,555	252,928	1,515	731,327
Manitoba	1,161	73,637	258	89,905	.....	83,532	68,942	170,541	335	488,311
Saskatchewan	16	115,320	175	66,990	.....	60,940	44,782	269,080	875	558,178
Alberta	605	103,561	.....	60,869	1,080	54,696	9,446	303,281	515	534,053
British Columbia	812	130,487	263	158,838	.....	78,119	79,216	292,936	500	741,171
Northwest Territories	20	20,497	.....	28,059	4,320	14,792	2,250	30,975	.....	100,913
Yukon	.....	882	.....	14,753	.....	11,026	4,941	14,690	.....	46,292
Headquarters and Miscellaneous	47,979	12,011	26,210	26,530	.....	34,598	65,549	.....	.....	212,877
Indian Hospitals	.....	.....	.....	301,152	.....	.....	.....	.....	.....	301,152
Tuberculosis Control	.....	.....	.....	348,798	.....	.....	.....	.....	.....	348,798
British Columbia Special	.....	12,916	.....	49,562	.....	26,814	9,166	.....	.....	98,458
Pensions and Gratuities	350	1,330	.....	337	.....	.....	.....	.....	.....	2,017
	51,722	650,706	28,605	1,452,715	5,400	674,791	474,656	1,375,794	3,740	4,718,129
Statutory Indian Annuities	.....	.....	.....	.....	.....	.....	.....	.....	.....	261,741
Statutory Pensions	.....	.....	.....	.....	.....	.....	.....	.....	.....	690
										4,980,560

OPEN ACCOUNT—INDIAN ACT REVOLVING FUND 1942-43

EXPENDITURE

Quebec	$3,000 00	
British Columbia	2,000 00	
		$5,000 00

REPAYMENTS AND REFUNDS

Quebec	$4,057 40	
Manitoba	1,559 28	
Saskatchewan	26 31	
		$5,642 99
Repayments over expenditure		$ 642 99

Statement of Net Expenditure by Provinces, Year 1942-43

FUR CONSERVATION

Province	Amount
	$ cts.
Quebec	10,092 45
Ontario	5,574 31
Manitoba	19,076 02
Saskatchewan	34,598 39
Alberta	1,566 51
British Columbia	340 48
Head Office	3,875 55
Total	75,123 71

Indian Trust Fund

Showing transactions in connection with the fund during the fiscal year ended March 31, 1943.

——	Debit	Credit
	$ cts.	$ cts.
Balance April 1, 1942		14,642,289 97
Collections on land sales, timber and stone dues, rents, fines, fees, etc.		748,364 31
Interest for the year ended March 31, 1943		742,857 21
Credit Transfers during the year		24,056 39
Expenditure during the year	1,116,869 32	
Transfers by Warrant, etc	12,927 00	
Balance March 31, 1943	15,027,771 56	
	16,157,567 88	16,157,567 88

SCHOOL STATEMENT

Statement showing enrolment by Provinces in the different classes of schools for the Fiscal Year ended March 31, 1943.

RESIDENTIAL SCHOOLS

Province	Number of Schools	Denominations				Number on Roll			Average Attendance	Percentage of Attendance	Grades								
		Church of England	Presbyterian	Roman Catholic	United Church	Boys	Girls	Total			I	II	III	IV	V	VI	VII	VIII	IX
Nova Scotia	1	.....	.....	1	.....	79	76	155	149	96·13	39	14	27	30	20	7	13	3	2
Quebec	2	1	.....	1	.....	27	43	70	62	88·57	25	10	10	15	6	4	.....	.....	.....
Ontario	13	5	1	6	1	765	871	1,636	1,502	91·80	408	276	258	223	165	126	96	68	16
Manitoba	9	1	1	4	3	507	588	1,095	1,008	92·05	355	197	154	137	131	61	27	15	18
Saskatchewan	14	3	.....	9	2	860	918	1,778	1,618	91·00	600	275	240	247	178	123	71	23	21
Alberta	19	5	.....	12	2	919	1,050	1,969	1,759	89·33	669	283	249	284	231	155	76	19	3
Northwest Territories	4	1	.....	3	.....	67	110	177	153	86·44	91	38	22	13	12	1	.....	.....	.....
British Columbia	13	2	.....	9	2	855	1,027	1,882	1,739	92·40	602	318	280	196	240	137	68	34	7
Yukon	2	2	.....	.....	.....	35	33	68	56	82·35	17	12	11	9	8	6	4	1	.....
Total—Residental Schools	77	20	2	45	10	4,114	4,716	8,830	8,046	91·12	2,806	1,423	1,251	1,154	991	620	355	163	67

DAY SCHOOLS

Province	Number of Schools	Number on Roll			Average Attendance	Percentage of Attendance	Grades								
		Boys	Girls	Total			I	II	III	IV	V	VI	VII	VIII	IX
Prince Edward Island	1	13	8	21	16	76·19	8	4	3	1	2	2	.....	1	.....
Nova Scotia	11	135	145	280	197	70·35	119	49	43	25	17	7	9	10	1
New Brunswick	10	151	170	321	240	74·76	90	73	55	29	27	28	12	5	2
Quebec	27	653	697	1,350	1,033	76·52	420	262	195	157	129	109	53	22	3
Ontario	82	1,142	1,264	2,406	1,678	69·74	712	425	315	257	255	159	144	119	20
Manitoba	42	556	567	1,123	642	57·16	655	215	91	88	44	21	6	3	.....
Saskatchewan	28	296	289	585	354	60·51	309	101	90	45	21	12	4	3	.....
Alberta	1	15	13	28	16	57·14	10	8	.....	4	2	.....	2	2	.....
Northwest Territories	4	14	24	38	27	71·05	18	6	10	2	.....	.....	2	.....	.....
British Columbia	59	844	865	1,709	1,064	62·25	796	293	221	170	115	66	27	18	3
Yukon	4	39	38	77	45	58·44	49	12	12	2	2	.....	.....	.....	.....
Total—Day Schools	269	3,858	4,080	7,938	5,312	66·92	3,186	1,448	1,035	780	614	404	259	183	29

COMBINED WHITE AND INDIAN SCHOOLS

Province	Number of Schools	Number on Roll			Average Attendance	Percentage of Attendance	Grades								
		Boys	Girls	Total			I	II	III	IV	V	VI	VII	VIII	IX
Quebec	1	9	7	16	13	81·25	4	3	5	1	2	1	.....	.....	.....
Ontario	2	36	27	63	54	85·71	18	8	6	9	7	6	5	4	.....
Manitoba	2	11	10	21	11	52·38	18	2	.....	.....	1	.....	.....	.....	.....
Saskatchewan	1	4	4	8	5	62·50	2	1	2	1	.....	1	1	.....	.....
Total—Combined White and Indian Day Schools	6	60	48	108	83	76·85	42	14	13	11	10	8	6	4	.....

SUMMARY OF SCHOOL STATEMENT

Province	Classes of Schools			Total Number of Schools	Number on Roll			Average Attendance	Percentage of Attendance	Grades								
	Day	Residential	Combined		Boys	Girls	Total			I	II	III	IV	V	VI	VII	VIII	IX
Prince Edward Island	1	.....	.....	1	13	8	21	16	76·19	8	4	3	1	2	2	.....	1	.....
Nova Scotia	11	1	.....	12	214	221	435	346	79·54	158	63	70	55	37	14	22	13	3
New Brunswick	10	.....	.....	10	151	170	321	240	74·76	90	73	55	29	27	28	12	5	2
Quebec	27	2	1	30	689	747	1,436	1,108	77·15	449	275	210	173	137	114	53	22	3
Ontario	82	13	2	97	1,943	2,162	4,105	3,234	78·78	1,138	709	579	489	427	291	245	191	36
Manitoba	42	9	2	53	1,074	1,165	2,239	1,661	74·18	1,028	414	245	225	176	82	33	18	18
Saskatchewan	28	14	1	43	1,160	1,211	2,371	1,977	83·38	911	377	332	293	199	136	76	26	21
Alberta	1	19	.....	20	934	1,063	1,997	1,775	88·88	679	291	249	288	233	155	78	21	3
Northwest Territories	4	4	.....	8	81	134	215	180	83·72	109	44	32	15	12	1	2	.....	.....
British Columbia	59	13	.....	72	1,699	1,892	3,591	2,803	78·05	1,398	611	501	366	355	203	95	52	10
Yukon	4	2	.....	6	74	71	145	101	69·65	66	24	23	11	10	6	4	1	.....
Totals	269	77	6	352	8,032	8,844	16,876	13,441	79·64	6,034	2,885	2,299	1,945	1,615	1,032	620	350	96

IMMIGRATION BRANCH

F. C. BLAIR, DIRECTOR

The work of this Branch continued with little variation from that of other war years. The arrival of immigrants in 1942 was lower than in any other year since records were kept. The admission of 7,445 immigrants last year presents a strange contrast to the all-time high of 382,841 in 1912-13. Small as the number was it included representatives of more than 40 racial origins. Of the total, 4,827 came from the United States; 200 from Europe and the Near East, and the remainder, 2,418, were mainly from the British Isles and Newfoundland.

Travel Restrictions

There have been few changes in the Immigration Act and Regulations in recent years and no changes at all since the outbreak of war except such as were made under the authority of the War Measures' Act. The most important of these, so far as immigration is concerned, are,

(1) An Order in Council, P.C. 2653, of the 14th September, 1939, which excludes persons of enemy alien citizenship.

(2) A regulation which controls by Exit Permit the sailing of women and girls of all ages and of boys under 16, to places outside the Western Hemisphere. The purpose of this regulation is to prevent an exodus from Canada to Great Britain of women and children whose services are not needed there and whose travelling would increase steamship congestion and create an unnecessary burden of housing and maintenance abroad. The regulation, put into effect early in June, 1940, was administered by the Department of External Affairs. It was revised and made more restrictive in March, 1942, and its administration transferred to this Branch.

(3) A regulation for the cancellation of Canadian domicile to be followed by deportation when that becomes possible, for aliens who, on being called up for military training or service, take refuge in their alien citizenship.

War conditions have necessitated other restrictions on travel. In Canada it is now necessary to comply with regulations of the Foreign Exchange Control Board relating to the transfer of funds out of the Dominion. Any British subject ordinarily resident in Canada who wishes to take temporary employment or to transfer his residence abroad must obtain a Labour Exit Permit from National Selective Service. If of an age and class subject to military call, he must also secure a clearance from the Chairman of his District Mobilization Board, regardless of the purpose for which he is leaving Canada. For many years border crossing between Canada and the United States, especially for those not transferring their permanent residence, was so free from regulations that many travellers do not now take kindly to the war limitations imposed and the travelling public often regard these limitations as unnecessary, annoying, and an interference with the rights of the individual.

In Great Britain all persons, both men and women between the ages of 16 and 60, are required to secure an Exit Permit as a condition of leaving that country and these Permits are not issued where the applicant's labour is regarded as valuable. Canada does not require British subjects (with a few minor exceptions) or United States citizens, whether entering for permanent residence or as visitors, to present passports as a condition of entry. Great Britain has for years required passports as a necessary condition of entry. In recent years a somewhat similar requirement has been enforced by the United States and such passports require a visé by an American Consular official in Canada.

Toward the close of the year under review a new plan was put into operation by which Canadian citizens, including all British subjects legally resident in the Dominion, may obtain what is known as a Border Crossing Card—without a passport. The new document is issued without charge or delay at American Consulates in the Dominion. It is then sent at once to the Canadian Immigration officer in the same centre for an endorsement that the holder is a legal resident of Canada and is entitled to return after any visit abroad. The Border Crossing Card then becomes valid for one year and may be used for any number of crossings provided that no one stay in the United States is for more than 29 days. The issue of this card requires, however, that the applicant must apply in person at a United States Consulate, hence it is more sought after in and near centres where there are United States Consulates than in districts involving a considerable rail or motor journey to reach a Consulate.

Between February 15, when the new Border Crossing Card was introduced, and March 31, 1943, a period of six weeks, 2,249 cards were endorsed by Canadian Immigration officers at the port of Montreal, and in the Eastern District (between the Quebec-Ontario Boundary on the East and Schreiber, Ont., on the West), 15,002 Border Crossing Cards were similarly endorsed.

So long as the restrictions referred to above remain in effect, a normal movement of immigrants or tourists to Canada can not be expected. The limitations to non-immigrant travel plus the restrictions on motor travel are bound to have a serious effect on the movement of tourists and other non-immigrant classes. The effect to date may be seen in the following statistics. While border crossing has fallen off greatly as compared with pre-war years, it will doubtless surprise many to learn that one year's crossing of non-immigrants still exceeds the total population of Canada. It does not mean, however, that fifteen million different individuals crossed during the year; some persons crossed many times who are included in these figures, but they do not include daily commuters.

Non-Immigrants entering Canada from Abroad

	Via Ocean Ports	From U.S.A.	Totals
Fiscal year ended March 31, 1938.....	47,832	31,179,807	31,227,639
" " " 1939.....	53,822	29,099,356	29,153,178
" " " 1940.....	42,126	28,295,332	28,337,458
" " " 1941.....	34,035	18,381,660	18,415,695
" " " 1942.....	28,395	17,983,877	18,012,272
" " " 1943.....	31,530	15,109,056	15,140,586

Residents of Canada returning after Visits Abroad

	Via Ocean Ports	From U.S.A.	Totals
Fiscal year ended March 31, 1939.....	30,446	12,098,397	12,128,843
" " " 1940.....	18,757	11,590,952	11,609,709
" " " 1941.....	10,687	5,224,356	5,235,043
" " " 1942.....	14,113	4,047,167	4,061,280
" " " 1943.....	15,294	4,394,613	4,409,907

The above figures have no relation to the following table of Returning Canadians nor are they included in the statistical tables appearing later in this Report. In the section relating to non-immigrants entering Canada from abroad all refugees are included whether they arrive at Canadian ocean ports or via the United States.

Returning Canadians

Since the beginning of the fiscal year 1924-25 efforts have been made to record the return to Canada of Canadian born, British born, and Canadian naturalized persons who left this country to reside abroad and returned to resume their permanent residence in Canada. The number has not varied materially for several years. The following table gives the record since 1924:—

Returning Canadians

—	Canadian Born	British Born Outside Canada	Canadians Naturalized	Totals
Fiscal year, 1924–25	36,473	4,487	2,815	43,775
Fiscal year, 1925–26	40,246	4,102	2,873	47,221
Fiscal year, 1926–27	49,255	5,326	2,376	56,957
Fiscal year, 1927–28	35,137	3,280	1,470	39,887
Fiscal year, 1928–29	30,008	2,795	995	33,798
Fiscal year, 1929–30	26,959	2,030	841	29,830
Fiscal year, 1930–31	26,811	2,111	1,287	30,209
Fiscal year, 1931–32	17,691	1,069	651	19,411
Fiscal year, 1932–33	16,320	757	548	17,625
Fiscal year, 1933–34	8,366	397	409	9,172
Fiscal year, 1934–35	5,811	937	870	7,618
Fiscal year, 1935–36	4,854	418	542	5,814
Fiscal year, 1936–37	4,522	319	223	5,064
Fiscal year, 1937–38	4,524	356	329	5,209
Fiscal year, 1938–39	3,825	360	386	4,571
Fiscal year, 1939–40	3,687	505	369	4,561
Fiscal year, 1940–41	4,910	177	53	5,140
Fiscal year, 1941–42	3,123	143	52	3,318
Fiscal year, 1942–43	3,056	167	30	3,253

British Evacuee Children

Approximately 6,000 British children and more than 1,000 British mothers came to Canada in 1940 to remain for the duration of the war. All the mothers came under private arrangement to stay with relatives or friends. Of the children some 1,532 came under the assisted scheme to which the United Kingdom Government contributed the cost of ocean transportation and Canada contributed rail transportation and aftercare. The remainder of the children came under private arrangement and the vast majority of these have continued to reside with and be maintained by relatives or friends.

A National Advisory Committee for Children from Overseas was set up in Canada in the summer of 1940 when it was expected that the movement would be very much larger than it actually was. The sinking of a ship in the autumn of 1940 carrying evacuated children, with a consequent loss of life, brought the assisted movement to an end. A few children continued to come under private arrangement, but the number was small. The National Advisory Committee continues to function through its executive. The Chairman of the National Advisory Committee and of the executive is Dr. R. C. Wallace, Principal of Queen's University. Expenditures incurred by the provinces and the provincial co-ordinating societies are paid by the Committee from donations received from persons and organizations, supplemented by grants from the Federal Government. The Independent Order of Oddfellows (Ontario Branch) has already made three very generous gifts totalling $23,300 and promised that more will follow.

Children who came at the age of 16 are now young men and women, and these are being advised through the Office of the United Kingdom High Commissioner, to enlist in the Canadian Forces or to return home for national service there. Among the older boys and girls there is a noticeable desire to return to Britain for service, although a number have enlisted in Canada.

Repatriation of Dependants of Canadian Personnel

Free transportation, ocean and rail, at minimum rates, is provided for dependants (wives, widows, and children) of Canadian personnel who serve with the Army, Navy, or Air Force overseas. Dependants who arranged their own passage before the free passage plan went into effect are being given refunds. Those dependants who were formly resident in Canada and are therefore returning to their homes or relatives here are being repatriated when they apply provided shipping accommodation is available. Assistance to dependants who have never been resident in Canada is being deferred until the return of the family heads. At the end of the year it was estimated that 8,000 members of the Canadian Army overseas had married there and that marriages were being contracted at the rate of about 2,600 per annum. The ratio of marriages in other Branches of the Service is believed to be lower, but in any case there will be many thousands of dependants of Canadian personnel to be brought back after the war. The regulation which restricts the sailing from Canada of wives, fiancees, or other dependants, means that there will be few Canadian born dependants to be brought home after the war.

Refugees

There has been some movement of refugees during the year, but the impossibility of persons leaving occupied areas in Europe, plus the cost and restrictions of travel, have greatly reduced the numbers. Of the refugees of 1942 the most important group consisted of some hundreds of Polish engineers and technicians who are now busily engaged in Canada's war effort. These were admitted for the duration.

A reference was made in last year's Report to the temporary release from refugee camps in Canada of a number of civilians who were interned in the United Kingdom in May, 1940, and transferred to Canada in July of that year as the wards of the United Kingdom Government. These were placed in refugee camps in Canada. They were all of enemy nationality, but few were regarded as having enemy sympathies. The combined releases of 1941 and 1942 totalled upwards of 1,000. A necessary condition of release was the approval of the Home Office in London. Approximately an equal number were returned to England. Of the relatively small number remaining in the camp, some have been refused release by the Home Office and the release of others cannot be granted because of physical, mental, or other defects or because they have no qualifications for placement in employment here.

During the year it was agreed to receive 1,000 Jewish refugee children from the unoccupied part of France who had been made orphans by the death or deportation of parents. These were to be placed in Jewish homes in Canada under the auspices of the United Jewish Refugee and War Relief Agencies of Canada. Unfortunately just as the movement was about to get under way the occupation of the part of France in which they were living, by German forces, has so far prevented their being moved.

Administrative and Inspectional Work

The organization of the Branch consists of a Head Office in Ottawa, four District offices in Canada, and an office in London, England, in charge of a Commissioner. The District offices in Canada are known as, (*a*) the Atlantic, which includes all territory east of the Ontario-Quebec boundary; (*b*) the Eastern, extending from the Quebec-Ontario boundary west to Schreiber, Ont.; (*c*) the Western, which extends from Schreiber to Kingsgate, B.C.; (*d*) the Pacific which includes all Canadian territory west of Kingsgate. The London office had formerly sub-offices at Liverpool, Glasgow, Belfast, Paris, Antwerp, Rotterdam, Hamburg, and Gdynia. There was also an office in Hong Kong looking after Chinese immigration matters.

The Superintendent of the Atlantic District, in reporting on the decrease in passenger traffic in his district, mentions that the number of persons examined in 1940-41 was 5,471,586; in 1941-42, 4,545,669; in 1942-43, 3,562,355. While highway travel has greatly fallen off by reason of gasoline restrictions, train travel is at some entry ports heavier than before the war. The comparative figures quoted do not take any account of Canadian Service personnel returning to Canada nor to other persons travelling on war duty. Concerning seamen, it is reported that in the Atlantic District steamship desertions decreased from 1,995 in 1941-42, to 1,463 in 1942-43. Deserters who were apprehended here were brought before Boards of Inquiry, most of them under the Merchant Seaman Order of 1941 and others under the Immigration Act, with a view to compelling their return to their ships.

A reference was made in the 1940-41 Report to the amount of work involved in the inspection of crew lists for seamen. In that year there were 11,556 ship entries in the Atlantic District. In 1941-42 the number increased to 12,253 and last year to 13,973. The Immigration Act provides that the master, agent, or owner of a vessel may be required to deposit with the Immigration officer at the port a sum of money to be held as security for the return of a deserter to his vessel or for his deportation, and to cover any costs of maintenance, etc., that may be incurred while the deserter remains in Canada. Under this provision approximately $400,000 was collected in deposits in the Atlantic District during the year. Special Port security control work in this District has necessitated the transfer of a number of Immigration Inspectors from border points to ocean ports.

It is in the Eastern District that a very large percentage of the border crossing occurs. The entry of persons in this District was 10,211,916 as compared with 11,733,489 in the previous year. The number of residents of Canada returning from business or other visits to the United States shows an increase from 2,344,664 in 1941-42 to 2,697,396 last year. These figures are just about half the movement of pre-war years. There has been a falling-off in international civilian air travel, more noticeable at the Malton Airport than elsewhere. The arrivals by air at Malton last year were 7,230 as against 11,497 the previous year. There has been a number of reductions in the staff of the Eastern District during the year, due mainly to enlistments, transfers, and retirements. There has been added work through the necessity of providing for a wartime canal inspection from the upper St. Lawrence to the Great Lakes.

In the Western and Pacific Districts there has been the same decrease in border crossings as is noticeable in other districts, except for the movement of members of the U.S. Army and civilian personnel entering in connection with the Alaska Highway project. This has meant greatly increased work at the Edmonton office.

For many years both Immigration and Customs inspection has been taken care of at many of the smaller ports of entry, particularly where the traffic is local, by Customs officers acting as Immigration Inspectors. During the year there was a further co-ordination of Immigration and Customs work at many of the larger ports. Under this arrangement a number of Customs officers have been released for other duties by Immigration Inspectors conducting primary Customs examination for pedestrian and automobile travel, and at other points Immigration officers have been released for other duties by Customs officers taking over primary Immigration inspection.

The work in the London, Eng., office during the war period is mainly concerned with distressed Canadians, refugees, Canadian seamen, the repatriation of dependants of members of the Canadian Forces overseas, the determination of Canadian status (domicile), and assisting with passage priority. All applications for priority are first examined by Immigration officers and where applicants are eligible and are permitted to leave the United Kingdom suitable information is submitted to the Canadian Passage Priority Committee. During the year 933 cases representing 1,243 souls were dealt with but these figures do not include persons moved in connection with war work. The sum of £1068.10.9 was expended in assisting distressed Canadians, including seamen. Owing to wartime regulations for the control of merchant seamen, the Commissioner of Emigration in London has had to deal with many cases of Canadian seamen who in ordinary times would not be a problem. In Canada there are Rest Centres for seamen arriving at principal Canadian ports. In England there are also Rest Houses in one of which there is a special ward for Canadian seamen. Some of these seamen have to be repatriated while others are able to work their way back to Canada. All applications for the repatriation of dependants of Canadian Service personnel are handled in the office of the Emigration Commissioner in London. This involves a considerable amount of time and effort before sailing arrangements can be made. Between April 8, 1942, when the first warrant was issued, up to March 31, 1943, 671 applications were received; 292 were approved and 258 were provided with return transportation.

Post-War Immigration

Many suggestions are being received as to post-war immigration. These are being carefully examined and filed for future reference. It is everywhere recognized that Canada must first of all deal with the re-establishment of her own Service personnel and their dependants and during that period turn the Canadian war industry to peacetime pursuits. The magnitude of this task cannot be known until the war is over.

Those best able to form an opinion agree that tens of thousands of the war-oppressed people of Europe will look to the Western World for new homes when war has ceased. Few of these are likely to have funds either for transportation or settlement and many may require to be built up physically before being fit for transfer from Europe. How many and what type of settlers, especially those without capital, will Canada be able to absorb with benefit to the newcomers and to the Dominion? Will the assistance given by the Allies to the suffering millions of Europe after the war include financial assistance for migration and settlement? Will Canada take steps to ensure that the major part of her post-war immigration is from British stock, and if so, how is this to be brought about? What will be the relationship of immigration to the Social Security plan that Canada may adopt as part of the new post-war order and what effect will this have on the encouragement or discouragement of immigration? These are some of the questions being asked. Canada should not make the mistake of substituting transportation for settlement—a weakness not unknown in the past. Some believe that the plans can be completed now and the figures inserted; others believe that only time and the economic development of the Dominion will supply the answers.

CHINESE IMMIGRATION

The present Chinese Immigration Act, which came into effect on June 30, 1923, provides for the entry to Canada of the following:—

(*a*) Members of the diplomatic corps, consuls, consular agents, and other Government representatives, their suites and servants;

(*b*) Children born in Canada of parents of Chinese origin or descent, who left Canada for educational or other purposes, on establishing their identity to the satisfaction of the controller at the port where they seek re-entry;

(*c*) (i) Merchants, as defined by regulations made by the Minister;

(ii) Students entering Canada for the purpose of attendance, and while in actual attendance, at any Canadian university or college authorized by statute or charter to confer degrees;

(*d*) Persons in transit through Canada.

There were no immigrant admissions during the year, but under the authority of Section 9 of the Act temporary entry was granted to 55 persons. Of these 8 took their departure within the year. The period of admission had not expired for the other 47 at the close of the year.

Chinese leaving Canada for visits abroad register outward so as to protect their return within a period of two years. Because of war conditions a regulation was made on December 31, 1941, providing that Chinese who registered outward between December 1, 1938, and the termination of the war may defer their return to Canada for a period of two years after the war.

The Chinese Immigration Act is administered under the direction of the Minister by the Chief Controller at Ottawa and controllers at Canadian ports of entry. The Department maintains a special staff on the Pacific Coast and until the fall of Hong Kong had a representative there dealing with Chinese matters.

For the purpose of comparison the following table relating to Chinese Immigration is furnished:—

	Exemptions	Paying Tax	Percentage of Total Arrivals Admitted Exempt	Registered for Leave	Total Revenue
					$ cts.
1923–24	49	625	7·27	5,661	334,039 00
1924–25				5,992	308,659 00
1925–26				3,947	25,969 00
1926–27				5,987	14,844 00
1927–28	1	2	33·33	5,087	25,679 00
1928–29	1		100·00	5,480	30,795 00
1929–30				5,582	30,799 00
1930–31				5,788	28,846 00
1931–32				4,387	11,584 00
1932–33	1		100·00	3,626	9,152 00
1933–34	2		100·00	2,156	7,237 00
1934–35				2,103	6,506 00
1935–36				2,138	6,501 00
1936–37	1		100·00	2,059	9,893 00
1937–38				792	2,359 00
1938–39				817	2,959 00
1939–40				933	4,066 00
1940–41				637	5,633 85
1941–42				265	9,655 00
1942–43				194	4,488 00
Totals	55	627	8·07	63,631	879,663 85

TABLE 1

Immigration to Canada from 1900 to 1943

	Via Ocean Ports			From U.S.A.				Grand Totals
	British Nationals	Others	Totals	U.S.A. Citizens	British Nationals	Others	Totals	
Six months ended June 30, 1900..	5,141	10,211	15,352	.....	.....	.....	8,543	23,895
Fiscal year ended June 30, 1901..	11,813	19,349	31,162	.....	.....	.....	17,987	49,149
" " 1902..	17,270	23,721	40,991	.....	.....	.....	26,388	67,379
" " 1903..	42,200	36,691	78,891	.....	.....	.....	49,473	128,364
" " 1904..	51,050	34,110	85,160	12,648	4,145	23,946	40,739	125,899
" " 1905..	65,967	36,756	102,723	15,477	2,263	22,190	39,930	142,653
" " 1906..	88,174	43,094	131,268	33,013	2,108	17,675	52,796	184,064
Nine months ended March31,1907..	59,272	30,736	90,008	20,479	1,309	10,369	32,157	122,165
Fiscal year ended March 31, 1908..	126,783	77,374	204,157	31,411	2,674	19,067	53,152	257,309
" " 1909..	55,463	31,613	87,076	33,474	2,894	17,926	54,294	141,370
" " 1910..	63,757	41,239	104,996	65,190	3,662	22,196	91,048	196,044
" " 1911..	126,170	63,463	189,633	77,353	5,007	22,524	104,884	294,517
" " 1912..	141,504	79,023	220,527	91,840	6,236	16,250	114,326	334,853
" " 1913..	152,373	111,050	263,423	92,061	7,398	19,959	119,418	382,841
" " 1914..	144,513	132,835	277,348	74,745	6,374	8,773	89,892	367,240
" " 1915..	44,117	40,893	85,010	34,745	3,541	3,482	41,768	126,778
" " 1916..	9,032	2,568	11,600	21,370	2,796	1,687	25,853	37,453
" " 1917..	9,980	4,005	13,985	43,261	3,324	4,558	51,143	65,128
" " 1918..	4,879	2,881	7,760	47,818	3,444	6,923	58,185	65,945
" " 1919..	10,701	6,286	16,987	28,280	1,725	1,950	31,955	48,942
" " 1920..	60,659	7,021	67,680	36,628	2,250	1,850	40,728	108,408
" " 1921..	75,783	24,635	100,418	33,891	2,768	1,651	38,310	138,728
" " 1922..	39,606	21,048	60,654	18,782	1,825	1,063	21,670	82,324
" " 1923..	36,360	14,520	50,880	14,095	1,641	830	16,566	67,446
" " 1924..	78,740	49,299	128,039	14,928	1,478	805	17,211	145,250
" " 1925..	54,943	40,601	95,544	13,171	1,794	853	15,818	111,362
" " 1926..	37,569	39,717	77,286	15,442	2,251	1,085	18,778	96,064
" " 1927..	50,378	72,586	122,964	17,820	2,239	966	21,025	143,989
" " 1928..	51,552	75,041	126,593	21,260	2,696	1,051	25,007	151,600
" " 1929..	59,497	77,666	137,163	26,539	3,061	960	30,560	167,723
" " 1930..	64,962	67,599	132,561	26,751	3,121	855	30,727	163,288
" " 1931..	28,144	35,799	63,943	20,723	2,938	619	24,280	88,223
" " 1932..	7,332	4,123	11,455	12,277	1,815	205	14,297	25,752
" " 1933..	3,283	3,303	6,586	11,172	1,806	218	13,196	19,782
" " 1934..	2,454	3,709	6,163	6,545	1,032	163	7,740	13,903
" " 1935..	2,408	3,768	6,176	5,104	769	87	5,960	12,136
" " 1936..	2,264	3,718	5,982	4,322	709	90	5,121	11,103
" " 1937..	2,521	4,389	6,910	4,301	742	70	5,113	12,023
" " 1938..	3,351	6,651	10,002	4,727	852	64	5,643	15,645
" " 1939..	3,831	7,634	11,465	4,685	917	61	5,663	17,128
" " 1940..	3,962	6,495	10,457	4,383	1,234	131	5,748	16,205
" " 1941..	3,428	625	4,053	5,295	2,064	84	7,443	11,496
" " 1942..	2,353	201	2,554	5,075	1,180	56	6,311	8,865
" " 1943..	2,524	94	2,618	3,457	1,344	26	4,827	7,445

TABLE 2

Immigration to Canada for the Period July 1, 1900, to March 31, 1910

Racial Origin	Fiscal Years										Totals
	1900–1	1901–2	1902–3	1903–4	1904–5	1905–6	Nine Months Ended March 31, 1907	1907–8	1908–9	1909–10	
English	9,331	12,783	32,087	36,003	48,847	65,135	41,156	90,380	37,019	40,416	413,157
Irish	933	1,311	2,236	3,128	3,998	5,018	3,404	6,547	3,609	3,940	34,124
Scotch	1,476	2,853	7,046	10,552	11,744	15,846	10,729	22,223	11,810	14,706	108,985
Welsh	70	312	423	691	770	797	502	1,032	463	728	5,788
Totals	11,810	17,259	41,792	50,374	65,359	86,796	55,791	120,182	52,901	59,790	562,054
African, South	.....	.....	.....	21	35	46	23	76	53	97	351
Arabian	98	70	46	58	48	19	31	50	4	14	438
Armenian	62	112	113	81	78	82	208	563	79	75	1,453
Australian	3	11	46	58	204	322	185	180	171	203	1,383
Austro-Hungarian	5,692	8,557	13,095	11,137	10,089	10,170	4,045	21,376	10,798	9,757	104,716
Brazilian	.....	.....	.....	2	1	2	5	1	4	.....	15
Bulgarian	.....	1	7	14	2	71	179	2,529	56	557	3,416
Chinese	7	2	.....	.....	.....	18	92	1,884	1,887	2,156	6,046
Doukhobor	.....	12	.....	.....	24	204	.....	.....	.....	.....	240
Dutch	25	35	223	169	281	389	394	1,212	495	741	3,964
East Indian	.....	.....	.....	.....	45	387	2,124	2,623	6	10	5,195
Egyptian	1	3	1	3	2	18	10	8	2	2	50
Finnish	682	1,292	1,734	845	1,323	1,103	1,049	1,212	669	1,457	11,366
French and Belgian	492	654	1,240	2,392	2,539	2,754	1,964	3,885	2,658	2,637	21,215
German	984	1,048	1,887	2,985	2,759	1,796	1,903	2,377	1,340	1,533	18,612
Greek	81	161	193	191	98	254	545	1,053	192	452	3,220
Hebrew	2,765	1,015	2,066	3,727	7,715	7,127	6,584	7,712	1,636	3,182	43,529
Italian	4,710	3,828	3,371	4,445	3,473	7,959	5,114	11,212	4,228	7,118	55,458
Japanese	6	.....	.....	.....	354	1,922	2,042	7,601	495	271	12,691
Malay	.....	5	.....	.....	.....	.....	.....	.....	.....	.....	5
Maltese	.....	.....	2	.....	.....	.....	.....	.....	.....	.....	2
Mennonite	.....	52	38	11	.....	.....	.....	.....	.....	.....	101
Negro	.....	.....	.....	.....	5	42	108	136	73	7	371
Newfoundland	.....	.....	335	519	190	340	1,029	3,374	2,108	3,372	11,267
New Zealand	.....	.....	2	23	57	89	30	70	65	82	418
Persian	.....	1	40	5	8	7	31	7	1	5	105
Polish	162	230	274	669	745	725	1,033	1,593	376	1,407	7,214
Portuguese	.....	.....	.....	.....	1	6	2	2	2	2	15
Roumanian	152	551	438	619	270	396	431	949	278	293	4,377
Russian	1,044	2,467	5,505	1,955	1,887	3,152	1,927	6,281	3,547	4,564	32,329
Scandinavian	1,750	2,451	5,448	4,203	4,118	3,859	2,296	4,073	2,082	3,782	34,062
Serbian	23	.....	2	10	7	19	4	48	31	76	220
Spanish	14	1	7	5	10	12	29	61	32	42	213
Swiss	30	17	73	128	150	172	112	195	129	211	1,217
Syrian	464	1,066	847	369	630	336	277	732	189	195	5,105
Turkish	37	17	43	29	30	357	232	489	236	517	1,987
U.S.A. citizens, via ocean ports	68	73	.....	58	109	123	89	133	94	186	933
West Indian	.....	.....	23	55	77	194	90	278	159	203	1,079
Total, Continental, etc.	19,352	23,732	37,099	34,786	37,364	44,472	34,217	83,975	34,175	45,206	394,378
From the United States	17,987	26,388	49,473	40,739	39,930	52,796	32,157	53,152	54,294	91,048	457,964
Total immigration	49,149	67,379	128,364	125,899	142,653	184,064	122,165	257,309	141,370	196,044	1,414,396

TABLE 3

Immigration to Canada for the Period April 1, 1910, to March 31, 1920

Racial Origin	Fiscal Years										Totals
	1910–1911	1911–1912	1912–1913	1913–1914	1914–1915	1915–1916	1916–1917	1917–1918	1918–1919	1919–1920	
English	84,707	95,107	108,082	102,122	30,807	5,857	5,174	2,477	7,954	45,173	487,460
Irish	6,877	8,327	9,706	9,585	3,525	818	958	174	336	2,751	43,057
Scotch	29,924	32,988	30,735	29,128	8,346	1,887	2,062	473	1,518	10,997	148,058
Welsh	1,505	1,699	2,019	1,787	598	102	88	54	106	682	8,640
Totals	123,013	138,121	150,542	142,622	43,276	8,664	8,282	3,178	9,914	59,603	687,215
African, South	86	144	22	56	23	11	1	4	.....	23	370
Albanian	.....	.....	.....	3	4	.....	.....	.....	.....	.....	7
Arabian	3	2	10	16	.....	.....	.....	.....	.....	.....	31
Argentinian	.....	.....	.....	2	5	.....	.....	.....	.....	2	9
Armenian	20	60	100	139	36	.....	3	2	.....	10	370
Australian	266	184	106	106	51	32	18	34	35	88	920
Austro-Hungarian	16,285	21,651	21,875	28,323	7,150	15	1	.....	2	8	95,310
Belgian	1,563	1,601	1,826	2,651	1,149	172	126	19	48	1,532	10,687
Brazilian	13	.....	.....	5	.....	2	.....	.....	.....	.....	20
Bulgarian	1,068	3,295	4,616	1,727	4,048	1	.....	.....	.....	1	14,756
Chinese	5,278	6,247	7,445	5,512	1,258	88	393	769	4,333	544	31,867
Cuban	.....	.....	.....	10	1	1	3	1	.....	2	18
Doukhobor	41	24	108	4	.....	.....	.....	.....	.....	.....	177
Dutch	931	1,077	1,524	1,506	605	186	151	94	59	154	6,287
East Indian	5	3	5	88	.....	1	.....	.....	.....	.....	102
Egyptian	3	.....	7	5	.....	.....	.....	.....	.....	.....	15
Finnish	2,132	1,646	2,391	3,183	459	139	249	113	2	44	10,358
French	2,041	2,094	2,755	2,683	1,206	180	199	114	222	1,584	13,078
German	2,533	4,664	4,953	5,537	2,472	27	9	1	1	12	20,209
Greek	777	693	1,390	1,102	1,147	145	258	45	4	39	5,600
Hebrew	5,146	5,322	7,387	11,252	3,107	65	136	32	22	116	32,585
Italian	8,359	7,590	16,601	24,722	6,228	388	758	189	49	1,165	66,049
Japanese	437	765	724	856	592	401	648	883	1,178	711	7,195
Macedonian	.....	.....	.....	17	132	.....	.....	.....	.....	.....	149
Maltese	.....	.....	128	402	19	4	109	144	2	405	1,213
Mexican	.....	3	9	9	.....	.....	.....	1	3	.....	25
Montenegrin	.....	.....	36	13	9	.....	1	.....	.....	.....	59
Negro	12	138	211	266	202	34	98	35	22	61	1,079
Newfoundland	2,229	2,598	1,036	496	338	255	1,243	1,199	512	443	10,349
New Zealand	116	61	39	24	21	18	12	13	15	31	350
Persian	19	19	20	19	7	3	.....	2	2	.....	91
Polish	2,177	5,060	9,945	9,793	1,976	8	12	.....	4	76	29,051
Portuguese	13	6	9	58	8	.....	1	1	.....	3	99
Roumanian	511	793	1,116	1,504	361	4	4	.....	.....	21	4,314
Russian	6,621	9,805	18,623	24,485	5,201	40	25	42	42	51	64,935
Scandinavian—											
Danish	535	628	798	871	326	167	145	74	44	233	3,821
Icelandic	250	205	231	292	145	15	9	3	12	11	1,173
Norwegian	2,169	1,692	1,832	1,647	788	232	303	235	91	179	9,168
Swedish	3,213	2,394	2,477	2,435	916	177	332	156	101	241	12,442
Serbian	50	209	366	193	220	6	1	.....	1	12	1,058
Spanish	197	191	296	1,138	755	11	76	28	12	15	2,719
Swiss	270	230	246	269	209	42	30	12	11	100	1,419
Syrian	124	144	232	278	79	3	9	2	.....	18	889
Turkish	469	632	770	187	33	.....	5	.....	.....	1	2,097
U.S.A. citizens, via ocean ports	203	143	121	121	41	15	20	28	21	55	768
West Indian	455	393	495	719	389	47	315	307	223	66	3,409
Others	.....	.....	.....	2	18	1	.....	.....	.....	20	41
Total, Continental, etc.	66,620	82,406	112,881	134,726	41,734	2,936	5,703	4,582	7,073	8,077	466,738
From the United States	104,884	114,326	119,418	89,892	41,768	25,853	51,143	58,185	31,955	40,728	678,152
Total, immigration	294,517	334,853	382,841	367,240	126,778	37,453	65,128	65,945	48,942	108,408	1,832,105

TABLE 4

Immigration to Canada for the Period April 1, 1920, to March 31, 1925

Racial Origin	Fiscal Years					Totals
	1920-21	1921-22	1922-23	1923-24	1924-25	
English	47,687	23,225	19,188	37,030	26,466	153,596
Irish	6,384	3,572	3,668	9,719	9,379	32,722
Scotch	19,248	11,596	11,071	25,057	16,174	83,146
Welsh	943	627	581	1,113	1,159	4,423
Totals	74,262	39,020	34,508	72,919	53,178	273,887
African, South	63	32	41	60	87	283
Albanian	6	6	1	7	2	22
Arabian	8	5	2			15
Argentinian	4		4			8
Armenian	85	70	59	486	304	1,004
Australian	90	76	67	112	162	507
Austrian	26	14	23	82	75	220
Belgian	1,645	503	316	1,662	1,300	5,426
Bermudian	8	2	7	4	4	25
Brazilian					1	1
Bulgarian	4	27	19	267	69	386
Chilean					3	3
Chinese	2,435	1,746	711	674		5,566
Cuban				1		1
Czecho-Slovakian	308	152	101	2,787	2,084	5,402
Dutch	595	183	119	1,149	1,637	3,683
East Indian	10	13	21	40	46	130
Egyptian	9	2		3	3	17
Esthonian			12	51	49	112
Finnish	1,401	274	1,171	7,640	4,261	14,747
French	861	332	281	370	326	2,170
German	137	178	216	1,769	2,215	4,515
Greek	357	209	177	292	237	1,272
Hebrew	2,763	8,404	2,783	4,255	4,459	22,674
Hungarian	23	48	23	364	1,052	1,510
Italian	3,880	2,413	2,074	6,379	2,349	17,095
Jamaican	18	13	30	24	8	93
Japanese	532	471	369	448	501	2,321
Jugo-Slavian	89	180	136	1,306	1,620	3,331
Latvian			1	11	20	32
Lettish				6	2	8
Lithuanian		19	106	236	125	486
Luxemburg	16	5	3	85	35	144
Maltese	140	34	57	148	26	405
Mexican	1			1		2
Negro	144	42	42	42	39	309
Newfoundland	1,042	367	1,582	5,346	1,258	9,595
New Zealand	40	25	33	50	107	255
Persian	1	9	1	5	18	34
Polish	4,061	2,707	2,921	4,211	2,734	16,634
Portuguese	4		2		3	9
Roumanian	969	759	427	1,431	2,056	5,642
Russiana	1,077	321	222	3,058	5,411	10,089
Scandinavian—						
Danish	511	541	382	1,355	1,830	4,619
Icelandic	50	31	21	27	49	178
Norwegian	429	480	507	2,424	2,550	6,390
Swedish	715	442	948	3,536	2,138	7,779
Spanish	202	6	15	39	3	265
Swiss	235	187	152	1,585	680	2,839
Syrian	443	123	91	286	210	1,153
Turkish	8	3	3	27	29	70
Ukrainian	491	89	36	832	26	1,474
U.S.A. citizens, via ocean ports	110	67	32	134	96	439
Venezuelan			1	6		7
West Indian	110	24	44	37	37	252
Total, Continental, etc.	26,156	21,634	16,372	55,120	42,366	161,648
From the United States	38,310	21,670	16,566	17,211	15,818	109,575
Total immigration	138,728	82,324	67,446	145,250	111,362	545,110

TABLE 5

Immigration to Canada for the Period April 1, 1925, to March 31, 1930

Racial Origin	Fiscal Years					Totals
	1925-26	1926-27	1927-28	1928-29	1929-30	
English	19,689	24,890	25,991	30,355	32,278	133,203
Irish	5,993	9,187	8,756	9,199	10,159	43,294
Scotch	10,295	14,296	14,341	16,137	18,640	73,709
Welsh	1,053	1,411	1,784	3,189	3,005	10,442
Totals	37,030	49,784	50,872	58,880	64,082	260,648
Albanian	14	17	30	28	26	115
Arabian	10	4	6	1	7	28
Armenian	85	65	44	17	14	225
Belgian	1,053	2,059	2,171	1,222	696	7,232
Bohemian	8	22	7	8	20	65
Bulgarian	47	126	249	282	296	1,000
Chinese			3	1		4
Croatian	1,086	1,085	902	990	771	4,754
Czech	805	721	714	846	434	3,520
Dalmatian	1			1	7	9
Dutch	1,180	1,674	1,928	1,599	1,755	8,136
East Indian	62	60	56	52	58	288
Esthonian	28	92	110	92	117	439
Finnish	1,617	5,180	4,765	3,651	4,565	19,778
French	698	548	868	745	697	3,356
German	7,431	12,941	12,638	13,215	14,718	60,943
Greek	217	340	583	736	634	2,510
Hebrew	3,587	4,471	4,296	3,301	3,544	19,199
Herzegovinian		3	4			7
Italian	1,638	3,301	3,593	792	1,277	10,601
Japanese	421	475	478	445	194	2,013
Jugo-Slavian	1,604	2,084	1,450	2,824	921	8,883
Korean		1				1
Lettish	24	60	77	74	70	305
Lithuanian	165	842	1,037	1,608	964	4,616
Magyar	4,112	4,863	5,318	6,242	5,688	26,223
Maltese	21	33	39	18	40	151
Mexican		1				1
Montenegrin		5				5
Moravian	6	36	33	4	23	102
Negro	53	51	88	96	195	483
Persian	11	6	4	1	1	23
Polish	2,535	6,505	6,733	8,269	6,610	30,652
Portuguese	3	14	7	12	13	49
Roumanian	265	292	237	284	383	1,461
Russian	925	1,127	948	908	765	4,673
Ruthenian	4,259	9,995	10,128	15,571	11,291	51,244
Scandinavian—						
Danish	1,112	2,080	3,835	3,311	2,685	12,973
Icelandic	53	30	28	24	6	141
Norwegian	1,072	3,384	4,327	2,434	2,256	13,473
Swedish	1,335	2,628	3,134	3,297	2,918	13,312
Serbian	454	865	411	390	375	2,515
Slovak	2,046	4,274	3,714	4,303	2,879	17,216
Spanish	12	29	28	18	26	113
Spanish American		6		3		9
Swiss	320	568	614	490	473	2,465
Syrian	134	218	82	75	61	570
Turkish	17	8	4	3	6	38
Total, Continental, etc.	40,256	73,180	75,721	78,283	68,479	335,919
From the United States	18,778	21,025	25,007	30,560	30,727	126,097
Total immigration	96,064	143,989	151,600	167,723	163,288	722,664

TABLE 6

Immigration to Canada for the Period April 1, 1930, to March 31, 1935

Racial Origin	Fiscal Years					Totals
	1930-31	1931-32	1932-33	1933-34	1934-35	
English	14,662	4,275	1,940	1,375	1,380	23,632
Irish	4,233	791	323	283	291	5,921
Scotch	7,872	1,843	764	547	472	11,498
Welsh	817	179	70	55	55	1,176
Totals	27,584	7,088	3,097	2,260	2,198	42,227
Albanian	25	5	.....	1	3	34
Arabian	2	.....	2	.....	1	5
Armenian	21	4	1	7	1	34
Belgian	255	47	37	41	61	441
Bohemian	11	.....	7	.....	.....	18
Bulgarian	295	15	3	12	5	330
Chinese	.....	.....	1	2	.....	3
Croatian	482	106	96	108	155	947
Czech	235	69	65	52	77	488
Dutch	344	33	33	27	44	481
East Indian	90	47	62	33	33	255
Esthonian	63	6	.....	2	2	73
Finnish	2,297	92	30	51	59	2,529
French	347	87	88	74	86	682
German	7,840	727	518	401	301	9,787
Greek	388	20	37	34	35	514
Hebrew	2,908	202	346	599	335	4,390
Italian	1,007	414	255	267	325	2,268
Japanese	204	195	115	104	93	711
Jugo-Slavian	364	57	56	63	120	660
Lettish	28	4	.....	4	.....	36
Lithuanian	466	45	57	37	37	642
Magyar	2,401	397	364	509	362	4,033
Maltese	13	5	2	.....	.....	20
Montenegrin	3	.....	.....	.....	.....	3
Moravian	2	.....	3	.....	.....	5
Negro	120	15	9	19	5	168
Persian	2	.....	1	.....	.....	3
Polish	3,997	554	360	374	406	5,691
Portuguese	5	2	1	2	2	12
Roumanian	179	22	26	27	52	302
Russian	879	74	62	61	60	1,132
Ruthenian	6,413	502	414	421	586	8,337
Scandinavian—						66
Danish	820	53	55	43	21	9
Icelandic	25	.....	1	.....	1	65
Norwegian	740	70	44	31	37	9
Swedish	730	79	17	19	10	807
Serbian	140	31	26	37	26	293
Slovak	1,967	337	252	395	595	3,525
Spanish	8	9	7	7	7	27
Spanish American	1	2	.....	4	.....	53
Swiss	211	24	17	19	22	26
Syrian	54	15	19	14	13	136
Turkish	7	1	.....	2	.....	38
Total, Continental, etc.	36,359	4,367	3,489	3,903	3,978	52,096
						19
From the United States	24,280	14,297	13,196	7,740	5,960	65,410
Total immigration	88,223	25,752	19,782	13,903	12,136	159,796

TABLE 7

Immigration to Canada for the Period April 1, 1935, to March 31, 1943

Racial Origin	Fiscal Years								Totals
	1935-36	1936-37	1937-38	1938-39	1939-40	1940-41	1941-42	1942-43	
English	1,286	1,445	1,949	2,247	2,489	2,408	1,852	1,992	15,668
Irish	249	262	364	387	375	235	122	170	2,164
Scotch	434	519	604	665	643	406	179	230	3,730
Welsh	30	38	55	74	59	55	29	26	366
Totals	2,049	2,264	2,972	3,373	3,566	3,104	2,182	2,418	21,928
Albanian	1	4	8	10	4	.....	.....	.....	27
Arabian	.....	.....	4	4	.....	.....	.....	.....	8
Armenian	4	3	4	5	2	2	.....	1	21
Belgian	72	93	123	187	100	30	10	.....	615
Bohemian	1	1	5	2	332	3	.....	.....	344
Bulgarian	22	18	28	29	15	1	.....	.....	113
Chinese	.....	1	.....	.....	.....	.....	.....	.....	1
Croatian	157	240	277	265	106	7	.....	1	1,053
Czech	106	134	188	169	290	49	17	6	959
Dalmatian	.....	1	.....	1	.....	.....	.....	.....	2
Dutch	111	90	119	237	264	51	11	10	893
East Indian	20	13	14	14	11	6	3	.....	81
Esthonian	2	5	2	12	3	1	1	1	27
Finnish	43	49	79	58	57	2	1	.....	289
French	95	135	134	138	152	129	104	69	956
German	209	367	523	586	1,021	39	23	15	2,782
Greek	53	75	115	127	115	26	3	1	515
Hebrew	655	391	317	621	1,321	284	111	31	3,731
Italian	341	299	408	365	186	43	1	.....	1,643
Japanese	83	103	139	46	36	44	1	.....	452
Jugo-Slavian	106	106	116	250	55	1	.....	.....	634
Lettish	3	2	11	4	3	1	.....	1	25
Lithuanian	22	42	37	39	49	6	.....	1	196
Magyar	314	328	622	532	329	35	4	.....	2,164
Maltese	.....	4	2	1	.....	.....	1	.....	8
Mexican	.....	6	1	2	.....	.....	.....	.....	9
Montenegrin	.....	.....	2	8	.....	.....	.....	.....	10
Moravian	.....	.....	3	9	52	2	.....	.....	66
Negro	3	5	9	7	7	45	13	5	94
Persian	.....	1	2	.....	1	.....	.....	.....	4
Polish	362	432	615	586	297	25	5	5	2,327
Portuguese	4	2	1	1	1	4	5	3	21
Roumanian	33	65	77	102	20	6	2	.....	305
Russian	84	79	120	134	134	9	11	6	577
Ruthenian	418	855	1,356	1,837	1,509	3	.....	.....	5,978
Scandinavian—									
Danish	21	22	40	49	71	22	4	3	232
Icelandic	6	.....	3	.....	.....	.....	.....	1	10
Norwegian	31	25	27	21	40	21	14	19	198
Swedish	26	16	47	15	13	6	1	6	130
Serbian	29	35	53	70	17	7	.....	.....	241
Slovak	432	520	1,249	1,450	206	5	2	4	3,868
Spanish	6	10	14	6	9	19	5	2	71
Spanish American	.....	.....	3	.....	.....	2	2	5	12
Swiss	32	49	87	75	49	12	15	3	322
Syrian	26	19	15	18	14	1	2	.....	95
Turkish	.....	1	1	.....	.....	.....	.....	1	3
Total, Continental, etc.	3,933	4,646	7,030	8,092	6,891	949	372	200	32,113
From the United States	5,121	5,113	5,643	5,663	5,748	7,443	6,311	4,827	45,869
Total immigration	11,103	12,023	15,645	17,128	16,205	11,496	8,865	7,445	99,910

TABLE

Immigration to Canada, by Origins, via Ocean Ports, and from

Racial Origin	1933–34			1934–35			1935–36			1936–37		
	Via Ocean Ports	From U.S.A.	Totals	Via Ocean Ports	From U.S.A.	Totals	Via Ocean Ports	From U.S.A.	Totals	Via Ocean Ports	From U.S.A.	Totals
English	1,375	2,623	3,998	1,380	2,053	3,433	1,286	1,744	3,030	1,445	1,738	3,183
Irish	283	905	1,188	291	727	1,018	249	626	875	262	617	879
Scotch	547	1,038	1,585	472	734	1,206	484	677	1,161	519	639	1,158
Welsh	55	77	132	55	55	110	30	56	86	38	69	107
Totals	2,260	4,643	6,903	2,198	3,569	5,767	2,049	3,103	5,152	2,264	3,063	5,327
Belgian	41	23	64	61	18	79	72	9	81	93	13	106
Danish	43	47	90	21	28	49	21	33	54	22	44	66
Dutch	27	137	164	44	104	148	111	97	208	90	102	192
Finnish	51	16	67	59	21	80	43	24	67	49	16	65
French	74	1,130	1,204	86	809	895	95	724	819	135	711	846
German	401	755	1,156	301	656	957	209	471	680	367	529	896
Icelandic	.....	10	10	1	12	13	6	6	12	.....	2	2
Norwegian	31	108	139	37	93	130	31	94	125	25	74	99
Swedish	19	110	129	10	83	93	26	89	115	16	73	89
Swiss	19	30	49	22	21	43	32	18	50	49	16	65
Totals	706	2,366	3,072	642	1,845	2,487	646	1,565	2,211	846	1,580	2,426
Albanian	1	.....	1	3	.....	3	1	.....	1	4	.....	4
Arabian	.....	.....	.....	1	.....	1	.....	2	2	.....	.....	.....
Armenian	7	3	10	1	4	5	4	1	5	3	1	4
Bohemian	.....	10	10	.....	9	9	1	6	7	1	13	14
Bulgarian	12	2	14	5	.....	5	22	2	24	18	1	19
Chinese	2	.....	2	.....	.....	.....	.....	.....	.....	1	.....	1
Croatian	108	6	114	155	.....	155	157	.....	157	240	.....	240
Czech	52	7	59	77	4	81	106	1	107	134	4	138
Dalmatian	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	1
East Indian	33	.....	33	33	.....	33	20	1	21	13	.....	13
Esthonian	2	2	4	2	.....	2	2	.....	2	5	.....	5
Greek	34	26	60	35	17	52	53	19	72	75	20	95
Hebrew	599	344	943	335	289	624	655	225	880	391	228	619
Italian	267	109	376	325	56	381	341	49	390	299	58	357
Japanese	104	1	105	93	.....	93	83	.....	83	103	.....	103
Jugo-Slavian	63	3	66	120	2	122	106	3	109	106	3	109
Lettish	4	.....	4	.....	.....	.....	3	.....	3	2	3	5
Lithuanian	37	2	39	37	5	42	22	3	25	42	10	52
Magyar	509	18	527	362	20	382	314	22	336	328	11	339
Maltese	.....	.....	.....	.....	.....	.....	.....	.....	.....	4	1	5
Mexican	.....	.....	.....	.....	.....	.....	.....	1	1	6	.....	6
Montenegrin	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Moravian	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Negro	19	57	76	5	16	21	3	20	23	5	17	22
North American Indian	.....	8	8	.....	6	6	.....	2	2	.....	2	2
Persian	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	1
Polish	374	50	424	406	40	446	362	42	404	432	35	467
Portuguese	2	4	6	2	3	5	4	3	7	2	.....	2
Roumanian	27	7	34	52	5	57	33	4	37	65	2	67
Russian	61	16	77	60	25	85	84	13	97	79	19	98
Ruthenian	421	8	429	586	15	601	418	8	426	855	15	870
Serbian	37	10	47	26	3	29	29	.....	29	35	3	38
Slovak	395	6	401	595	12	607	432	11	443	520	7	527
Spanish	7	6	13	7	7	14	6	5	11	10	11	21
Spanish American	4	.....	4	.....	.....	.....	.....	.....	.....	.....	1	1
Syrian	14	26	40	13	7	20	26	10	36	19	5	24
Turkish	2	.....	2	.....	1	1	.....	.....	.....	1	.....	1
Totals	3,197	731	3,928	3,336	546	3,882	3,287	453	3,740	3,800	470	4,270
Grand Totals	6,163	7,740	13,903	6,176	5,960	12,136	5,982	5,121	11,103	6,910	5,113	12,023

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the United States, for the Period April 1, 1933, to March 31, 1943.

1937–38			1938–39			1939–40			1940–41			1941–42			1942–43		
Via Ocean Ports	From U.S.A	Totals	Via Ocean Ports	From U.S.A	Totals	Via Ocean Ports	From U.S.A	Totals	Via Ocean Ports	From U.S.A	Totals	Via Ocean Ports	From U.S.A	Totals	Via Ocean Ports	From U.S.A	Totals
1,949	1,870	3,819	2,247	1,824	4,071	2,489	1,878	4,367	2,408	2,841	5,249	1,852	2,234	4,086	1,992	1,703	3,695
364	686	1,050	387	726	1,113	375	710	1,085	235	953	1,188	122	926	1,048	170	592	762
604	737	1,341	665	707	1,372	643	702	1,345	406	1,013	1,419	179	888	1,067	230	718	948
55	48	103	74	60	134	59	75	134	55	91	146	29	88	117	26	62	88
2,972	3,341	6,313	3,373	3,317	6,690	3,566	3,365	6,931	3,104	4,898	8,002	2,182	4,136	6,318	2,418	3,075	5,493
123	22	145	187	15	202	100	23	123	30	20	50	10	17	27	.....	11	11
40	43	83	49	34	83	71	39	110	22	63	85	4	42	46	3	22	25
119	113	232	237	139	376	264	147	411	51	187	238	11	192	203	10	136	146
79	14	93	58	14	72	57	20	77	2	30	32	1	18	19	.....	22	22
134	774	908	138	860	998	152	794	946	129	849	978	104	632	736	69	580	649
523	571	1,094	586	507	1,093	1,021	510	1,531	39	359	398	23	371	394	15	256	271
3	5	8	.....	8	8	.....	4	4	.....	4	4	.....	5	5	1	4	5
27	91	118	21	84	105	40	89	129	21	79	100	14	96	110	19	84	103
47	95	142	15	90	105	13	80	93	6	117	123	1	72	73	6	53	59
87	18	105	75	22	97	49	32	81	12	42	54	15	36	51	3	18	21
1,182	1,746	2,928	1,366	1,773	3,139	1,767	1,738	3,505	312	1,750	2,062	183	1,481	1,664	126	1,186	1,312
8	1	9	10	.....	10	4	.....	4	.....	.....	.....	.....	.....	.....	.....	1	1
4	.....	4	4	2	6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
4	3	7	5	1	6	2	1	3	2	3	5	.....	.....	.....	1	4	5
5	6	11	2	10	12	332	9	341	3	12	15	.....	11	11	.....	6	6
28	2	30	29	.....	29	15	.....	15	1	1	2	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
277	4	281	265	3	268	106	2	108	7	6	13	.....	3	3	1	2	3
188	3	191	169	4	173	290	3	293	49	18	67	17	10	27	6	2	8
.....	.....	.....	1	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
14	.....	14	14	.....	14	11	.....	11	6	.....	6	3	.....	3	.....	.....	.....
2	1	3	12	.....	12	3	1	4	1	.....	1	1	.....	1	1	.....	1
115	11	126	127	10	137	115	10	125	26	20	46	3	27	30	1	14	15
317	267	584	621	269	890	1,321	302	1,623	284	342	626	111	277	388	31	239	270
408	69	477	365	58	423	186	64	250	43	85	128	1	66	67	.....	43	43
139	.....	139	46	.....	46	36	.....	36	44	1	45	1	.....	1	.....	1	1
116	9	125	250	3	253	55	6	61	1	6	7	.....	5	5	.....	3	3
11	.....	11	4	.....	4	3	2	5	1	6	7	.....	2	2	1	2	3
37	6	43	39	6	45	49	5	54	6	8	14	.....	4	4	1	4	5
622	24	646	532	22	554	329	37	366	35	21	56	4	29	33	.....	27	27
2	.....	2	1	5	6	.....	.....	.....	.....	4	4	1	.....	1	.....	1	1
1	.....	1	2	.....	2	.....	.....	.....	.....	.....	.....	.....	2	2	.....	1	1
2	.....	2	8	.....	8	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
3	.....	3	9	.....	9	52	.....	52	2	.....	2	.....	.....	.....	.....	.....	.....
9	17	26	7	24	31	7	22	29	45	30	75	13	31	44	5	53	58
.....	11	11	.....	13	13	.....	4	4	.....	16	16	.....	15	15	.....	6	6
2	1	3	.....	.....	.....	1	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....
615	46	661	586	68	654	297	51	348	25	100	125	5	102	107	5	71	76
1	2	3	1	2	3	1	3	4	4	2	6	5	4	9	3	2	5
77	11	88	102	2	104	20	8	28	6	4	10	2	5	7	.....	3	3
120	22	142	134	14	148	134	47	181	9	31	40	11	35	46	6	22	28
1,356	13	1,369	1,837	19	1,856	1,509	16	1,525	3	19	22	.....	19	19	.....	15	15
83	4	87	70	5	75	17	4	21	7	5	12	.....	9	9	.....	5	5
1,249	13	1,262	1,450	19	1,469	206	22	228	5	23	28	2	20	22	4	19	23
14	2	16	6	4	10	9	10	19	19	14	33	5	7	12	2	5	7
3	.....	3	.....	.....	.....	.....	1	1	2	2	4	2	4	6	5	2	7
15	8	23	18	10	28	14	15	29	1	16	17	2	7	9	.....	13	13
1	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	1
5,848	556	6,404	6,726	573	7,299	5,124	645	5,769	637	795	1,432	189	694	883	74	566	640
10,002	5,643	15,645	11,465	5,663	17,128	10,457	5,748	16,205	4,053	7,443	11,496	2,554	6,311	8,865	2,618	4,827	7,445

TABLE 9

Immigration via Ocean Ports, Showing Country of Birth by Racial Origin, for the Fiscal Year 1942-43

Country of Birth	Totals	Slovak	Hebrew	English	Irish	Scotch	Welsh	Spanish-American	Croatian	Czech	French	German	Greek	Dutch	Polish	Russian	Danish	Icelandic	Norwegian	Swedish	Swiss	Esthonian	Lettish	Lithuanian	Portuguese	Spanish	Negro	Armenian	Turkish
Africa (British)	11			6		1					1	2		1															
Africa (Not British)	1				1																								
Argentine	15			10	2	3																							
Atlantic Ocean Is. (British)	2			2																									
Australia	15			8	2	5																							
Austria	2		2																										
Bahamas	13			7	3		2																			1			
Barbados	2			2																									
Belgium	2		2																										
Bermuda	7			6																					1				
Brazil	3			1			1																		1				
Canada	3					1						2																	
Chili	2					2																							
China	12			8	1	2														1									
Costa Rica	1			1																									
Cuba	3					2								1															
Czecho-Slovakia	11	4	1							6																			
Denmark	3																3												1
Egypt	4			1		2																							
Eire	12			2	10																								
England	577		3	524	17	15	6				6	1	1								1		1	1			1		
Esthonia	1																					1							
Fiji Islands	2			2																									
France	10			5							5																		
Germany	15		7									8																	
Guatemala	1			1																									
Guiana (British)	8			5							1			1													1		
Hawaiian Islands	1					1																							
Holland	10		7											3															
Honduras (British)	2			2																									
Hong Kong	1			1																									
Iceland	1																	1											
India (British)	13			9	1	1								2															
Ireland (Northern)	16			4	12																								
Jamaica	16		1	8		1					3														1		2		
Japan	5			4		1																							
Java	2			1										1															
Jugo-Slavia	4		4																										
Korea	1			1																									
Labrador	4			4																									
Lesser British Isles	1			1																									

Mexico	3			2	1																								
Newfoundland	1,527			1,315	115	36	9				45	1							2	3							1		
New Zealand	5			3		1	1																						
Norway	17																		17										
Peru	15			8		6						1																	
Poland	7		2												5														
Porto Rico	1			1																									
Roumania	1		1																										
Russia	5															4													
St. Pierre and Miquelon	6			1	1						4																	1	
Scotland	157			6	4	145										2													
South America N.E.S.	7			1		2		4																					
Spain	1			1																									
Straits Settlements	4			4																									
Sweden	2																			2									
Switzerland	3			1							1										1								
Trinidad	18			13		2		1			2																		
United States	10			5		1			1		1			1							1								
Venezuela	1			1																									
Wales	12		1	4			7																						
West Indies (Not British)	1																										1		
Totals	2,618	4	31	1,992	170	230	26	5	1	6	69	15	1	10	5	6	3	1	19	6	3	1	1	1	3	2	5	1	1

TABLE 10

Immigration from the United States, Showing Country of Birth by Racial Origin, for the Fiscal Year 1942-43

Country of Birth	Totals	Bohemian	Slovak	Hebrew	English	Irish	Scotch	Welsh	N.A. Indian	Mexican	Spanish-American	Croatian	Serbian	Belgian	Czech	Finnish	French	German	Greek	Dutch	Magyar	Italian	Jugo-Slavian	Polish	Roumanian	Russian	Danish	Icelandic	Norwegian	Swedish	Swiss	Ruthenian	Albanian	Lettish	Lithuanian	Maltese	Portuguese	Spanish	Negro	Armenian	Syrian	Japanese
Africa (British)	6				2		2	1																																1	
Argentine	1																	1																							
Australia	8				6	1	1																																	
Austria	5			1														3					1																	
Barbados	1						1																																	
Belgium	6													6																										
Bermuda	4				4																																			
Born at Sea	1				1																																			
Canada	434			9	162	68	84	1									80	10		11		1			1				2		1							2		2	
Canary Islands	1																																				1			
China	11				8		2																													1					
Costa Rica	1										1																													
Cuba	3				1						1																											1		
Czecho-Slovakia	6		4	1											1																									
Egypt	1						1																																	
Eire	26				2	23																																		
England	366			11	333	4	13	2												1										1					1					
Finland	8															8																								
France	13				2		1										8	2																						
Germany	28			3														24														1								
Greece	7																		7																					
Guiana (British)	2				1		1																																	
Hawaiian Islands	2				2																																			
Holland	7														1					6																				
Hungary	7													1							6																			
Iceland	1																											1												
India (British)	9				6		2											1																						
Ireland (Northern)	30					27	3																																	
Italy	9				1																	8																		
Jamaica	7				4																																	3		
Japan	2						1										1																							1
Jugo-Slavia	5		2										1					2																						
Latvia	1			1																																				
Lesser British Isles	5				4												1																							
Lithuania	3			3																																				
Malta	1																																		1					
Newfoundland	28				21	4	3																																	
New Zealand	5				3	1																			1															
Norway	10																												10											
Poland	31			22														1						6		1					1									
Roumania	3				1																			2																

Russia	33	...	...	22	...	...	...	...	...	...	...	...	...	...	...	...	...	2	...	...	...	...	...	...	...	7	...	...	...	...	...	1	...	1	...	...	...	...	...	...	...	...
Scotland	176	...	...	...	8	3	164	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Spain	4	...	...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	...	...	...	...
Sweden	9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	9	...	...	...	...	...	...	...	...	...	...	...	...
Switzerland	3	...	...	...	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...
Syria	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	...
Trinidad	2	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...
Turkey	1	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
United States	3,469	6	13	165	1,117	461	439	47	6	1	...	2	3	4	1	14	490	208	7	117	21	34	2	65	...	13	22	3	72	43	17	11	1	1	3	...	1	2	44	4	8	1
Venezuela	4	...	...	...	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Wales	15	...	...	...	4	...	...	11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
West Indies (British)	4	...	...	...	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	...	...	...
Totals	4,827	6	19	239	1,703	592	718	62	6	1	2	2	5	11	2	22	580	256	14	136	27	43	3	71	3	22	22	4	84	53	18	15	1	2	4	1	2	5	53	4	13	1

TABLE

Origin, Sex, Occupation and Destination of Immigrant Arrivals

Racial Origin	Sex				Totals	Trade or								
	18 Years and Over		Under 18 Years			Farming Class			Labouring Class			Mechanics		
	Males	Females	Males	Females		Males	Females	Children	Males	Females	Children	Males	Females	Children
Armenian	1				1									
British—														
English	562	948	226	256	1,992	8	2	9	101	21	7	164	44	58
Irish	64	76	15	15	170	3		2	15	5	2	21	5	5
Scotch	70	110	23	27	230	2	1		4	5		21	9	10
Welsh	8	12	3	3	26							3		2
Croatian		1			1									
Czech	3	3			6				1			1	1	
Dutch	2	7	1		10	1								
Esthonian	1				1				1					
French	13	33	9	14	69					2	1	3		
German	1	11	1	2	15				1				1	
Greek		1			1									
Hebrew	11	13	2	5	31	1	1		1	1		5	4	5
Lettish		1			1									
Lithuanian		1			1									
Negro	4	1			5				1			2		
Polish	1	4			5									
Portuguese	1	2			3							1		
Russian	1	3	1	1	6									
Scandinavian—														
Danish	1	2			3	1								
Icelandic		1			1									
Norwegian	7	4	1	7	19				4	3	8	1		
Swedish	2	4			6							1		
Slovak	4				4							4		
Spanish	1	1			2									
Spanish-American	1	1	1	2	5							1		3
Swiss		3			3									
Turkish		1			1									
Totals	759	1,244	283	332	2,618	16	4	11	129	37	18	228	64	83

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at Ocean Ports, for the Fiscal Year ended March 31, 1943

Occupation											Destination								
Trading and Clerical Classes			Mining Class			Female Domestic Servants		Other Classes											
Males	Females	Children	Males	Females	Children	18 Years and Over	Under 18 Years	Males	Females	Children	Nova Scotia	New Brunswick	Prince Edward Island	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia
								1							1				
57	69	24	11	5	3	254	40	221	553	341	675	53	6	315	726	29	20	40	128
6	10					16		19	40	21	54	7		44	51	3		3	8
13	7	4		1		4		30	83	36	41	3	1	39	84	8	7	9	38
3	2	2				1		2	9	2	2	2		7	11	1			3
									1						1				
	1							1	1		1				4			1	
1									7	1				1	6	1		1	1
																		1	
1	2	2				14	1	9	15	19	33		1	21	10	3	1		
	1								9	3	1			4	6				4
	1														1				
3	1	2						1	6			2		8	17				4
	1														1				
									1							1			
						1		1						1	4				
								1	4					2	2	1			
	1								1					1	2				
					2	1		1	2					2	4				
						1			1					1	2				
									1							1			
			1					1	1		1			1	1				16
1						2			2		1			2	1			1	1
															4				
								1	1					2					
									1						5				
	1								2					3					
									1					1					
85	97	34	12	6	5	294	41	289	742	423	809	67	8	455	944	48	28	56	203

TABLE

Origin, Sex, Occupation and Destination of Immigrant Arrivals

Racial Origin	Sex				Totals	Trade or								
	18 Years and Over		Under 18 Years			Farming Class			Labouring Class			Mechanics		
	Males	Females	Males	Females		Males	Females	Children	Males	Females	Children	Males	Females	Children
Albanian		1			1					1				
Armenian	1	1	1	1	4						1	1		
Belgian	4	4	1	2	11	2	1	1				1		
Bohemian	2	4			6									
British—														
English	502	754	230	217	1,703	50	21	22	34	14	15	109	38	19
Irish	147	284	91	70	592	13	6	5	16	8	6	25	15	9
Scotch	236	307	78	97	718	29	4	8	15	11	3	42	10	12
Welsh	21	26	6	9	62	2		2	2		2	5	1	2
Croatian		2			2									
Czech		2			2									
Dutch	40	61	21	14	136	5	1	4	4	3	1	6		
Finnish	6	13	1	2	22	1	1		1					
French	144	256	92	88	580	24	11	23	16	10	5	43	11	3
German	61	160	16	19	256	4	6	5	3	1	5	11	5	1
Greek	4	6		4	14				1					
Hebrew	63	116	32	28	239							12	5	5
Italian	11	22	4	6	43				3	2	1	2		
Japanese		1			1									
Jugo-Slavian		2		1	3					1				
Lettish		2			2					1				
Lithuanian	2	2			4				1				1	
Magyar	3	21	1	2	27	2	2						1	
Maltese	1				1									
Mexican				1	1						1			
Negro	14	31	4	4	53				4	1		2	1	1
North American Indian	2	1		3	6				1		1			
Polish	15	39	8	9	71	1	1	2	2			1	2	2
Portuguese	1	1			2									
Roumanian		3			3									
Russian	5	14	2	1	22	1			1					
Ruthenian	5	6	1	3	15				1			1		
Scandinavian—														
Danish	5	10	5	2	22	2	2							
Icelandic	1	1	1	1	4							1		
Norwegian	30	37	12	5	84	3	2		1	1		6	1	
Swedish	14	30	5	4	53	4	3	1	1		1	1	1	
Serbian	1	3		1	5				1					
Slovak	3	12	3	1	19	2		1						
Spanish	2	2		1	5	1								
Spanish-American	1	1			2				1					
Swiss	4	9	3	2	18									
Syrian	3	7	3		13				1			1		
Totals	1,354	2,254	621	598	4,827	146	61	74	110	54	42	270	92	54

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from the United States, for the Fiscal Year ended March 31, 1943

Occupation											Destination								
Trading and Clerical Classes			Mining Class			Female Domestic Servants		Other Classes											
Males	Females	Children	Males	Females	Children	18 Years and Over	Under 18 Years	Males	Females	Children	Nova Scotia	New Brunswick	Prince Edward Island	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia
																			1
									1	1				1	3				
								1	3	2				3	5	1	2		
								2	4					1	4				1
58	74	19	2			32	1	249	575	371	93	97	11	233	866	30	18	72	283
16	26	5				11		77	218	136	22	23	10	72	333	12	10	22	88
25	37	4	1			13	1	124	232	147	53	31	9	77	357	23	9	47	112
1	2	1						11	23	8	1	3		6	38	1		2	11
									2						2				
	1								1						1			1	
9	6	4				3		16	48	26	7	3		9	73	6	6	18	14
	1		1	1				3	10	3				1	17			2	2
11	26	1	1			14	1	49	184	147	12	47	2	315	162	4	6	9	23
8	11			1		3		35	133	24	9	1		29	137	20	7	15	38
3							1		6	3				4	6			4	
27	11	7				1		24	99	48	6	2		79	123	11		5	13
1	2							5	18	9		2		5	30				6
									1										1
									1	1					2		1		
									1					1	1				
								1	1					1	3				
								1	18	3				1	22	1	3		
								1							1				
															1				
3	2	2				4		5	23	5				8	41	2			2
								1	1	2				1					5
2	3	1				2		9	31	12	2			7	47	9	1	2	3
								1	1						2				
	1					1			1						3				
1	1	1				1		2	12	2				3	10	3	1		5
	1	1						3	5	3				1	10	1	1	2	
						1		3	7	7	2	1		2	1	1	1	12	2
		1							1	1						1	1	1	1
2			2					16	33	17	1			5	22	7	24	10	15
	1					2		8	23	7		1		8	14	6	2	9	13
									3	1					3				2
						1		1	11	3				4	13			2	
								1	2	1					3				2
									1		1			1					
1	1							3	8	5				1	11	2	2		2
		1						1	7	2				3	10				
168	207	48	7	2		89	4	653	1,749	997	209	211	32	882	2,377	141	95	235	645

TABLE 13

Immigration, Showing Nationality and Sex, for the Fiscal Year ended March 31, 1943

Nationality	Via Ocean Ports					From the United States					Grand Totals
	Totals	18 Years and Over		Under 18 Years		Totals	18 Years and Over		Under 18 Years		
		M.	F.	M.	F.		M.	F.	M.	F.	
British	2,524	724	1,208	277	315	1,344	407	715	118	104	3,868
U.S.A. Citizens	11	1	10	.....	.....	3,457	936	1,527	502	492	3,468
Peruvian	1	1	.....	.....	.....	.....	.....	.....	.....	.....	1
Central American	.....	.....	.....	.....	.....	1	1	.....	.....	.....	1
South American	5	1	1	1	2	.....	.....	.....	.....	.....	5
Argentinian	1	.....	1	.....	.....	.....	.....	.....	.....	.....	1
Brazilian	2	1	.....	1	.....	.....	.....	.....	.....	.....	2
San Dominican	1	1	.....	.....	.....	1	1	.....	.....	.....	2
Belgian	.....	.....	.....	.....	.....	3	.....	1	1	1	3
Czecho-Slovakian	9	7	2	.....	.....	.....	.....	.....	.....	.....	9
Finnish	.....	.....	.....	.....	.....	1	.....	1	.....	.....	1
French	5	.....	4	.....	1	1	.....	1	.....	.....	6
German	11	3	3	2	3	1	.....	.....	.....	1	11
Dutch	11	4	4	1	2	.....	.....	.....	.....	.....	11
Jugo-Slavian	5	2	1	.....	2	1	.....	1	.....	.....	6
Polish	4	1	3	.....	.....	6	3	3	.....	.....	10
Roumanian	2	1	1	.....	.....	.....	.....	.....	.....	.....	2
Russian	1	1	.....	.....	.....	1	.....	1	.....	.....	2
Danish	3	1	2	.....	.....	.....	.....	.....	.....	.....	3
Norwegian	17	6	3	1	7	3	2	1	.....	.....	20
Swedish	1	1	.....	.....	.....	1	.....	1	.....	.....	2
Swiss	2	1	1	.....	.....	2	1	1	.....	.....	4
Esthonian	1	1	.....	.....	.....	.....	.....	.....	.....	.....	1
Latvian	.....	.....	.....	.....	.....	1	1	.....	.....	.....	1
Spanish	.....	.....	.....	.....	.....	3	2	1	.....	.....	3
Persian	1	1	.....	.....	.....	.....	.....	.....	.....	.....	1
Totals	2,618	759	1,244	283	332	4,827	1,354	2,254	621	598	7,445

TABLE 14

Rejections, at Ocean Ports, by Causes and Nationalities, from 1902-3 to 1942-43

—	Fiscal Years																						
	1902–3 to 1912–3	1913–4 to 1922–3	1923–1924	1924–1925	1925–1926	1926–1927	1927–1928	1928–1929	1929–1930	1930–1931	1931–1932	1932–1933	1933–1934	1934–1935	1935–1936	1936–1937	1937–1938	1938–1939	1939–1940	1940–1941	1941–1942	1942–1943	Totals
By Causes																							
Medical causes	4,162	1,029	130	83	40	95	104	94	78	39	26	16	17	9	13	11	8	7	10	11	20	16	6,018
Civil causes	5,094	5,604	862	948	226	594	215	266	243	444	298	213	177	206	183	236	202	170	167	225	129	122	16,824
Totals	9,256	6,633	992	1,031	266	689	319	360	321	483	324	229	194	215	196	247	210	177	177	236	149	138	22,842
By Nationalities																							
British	1,240	978	187	199	109	209	150	154	160	251	180	126	123	150	123	138	86	94	124	95	90	89	5,055
American	175	134	6	11	.....	5	2	3	8	6	4	13	11	13	7	7	4	9	5	4	1	1	429
Other countries	7,841	5,521	799	821	157	475	167	203	153	226	140	90	60	52	66	102	120	74	48	137	58	48	17,358
Totals	9,256	6,633	992	1,031	266	689	319	360	321	483	324	229	194	215	196	247	210	177	177	236	149	138	22,842

TABLE 15

Deportations, after having been Admitted, by Causes, Nationalities, and Provinces, from 1902-3 to 1942-43

—	Fiscal Years																						
	1902-3 to 1912-3	1913-4 to 1922-3	1923-1924	1924-1925	1925-1926	1926-1927	1927-1928	1928-1929	1929-1930	1930-1931	1931-1932	1932-1933	1933-1934	1934-1935	1935-1936	1936-1937	1937-1938	1938-1939	1939-1940	1940-1941	1941-1942	1942-1943	Totals
By Causes																							
Medical causes	2,296	2,213	649	420	410	470	519	650	600	789	697	476	301	144	81	47	42	36	29	12	14	20	10,915
Public charges	2,853	4,517	775	543	506	354	430	444	2,106	2,245	4,507	4,916	2,991	464	125	110	46	45	18	8	1	.....	28,004
Criminality	1,083	3,989	511	520	453	447	426	441	591	868	1,006	836	493	267	207	117	101	114	110	83	69	100	12,832
Other civil causes	530	793	93	58	189	149	257	194	107	200	270	277	250	172	163	240	203	229	237	322	371	121	5,425
Accompanying deported persons	145	262	78	145	158	165	254	235	559	274	545	626	439	81	34	57	21	10	5	3	3	3	4,102
Totals	6,907	11,774	2,106	1,686	1,716	1,585	1,886	1,964	3,963	4,376	7,025	7,131	4,474	1,128	610	571	413	434	399	428	458	244	61,278
By Nationalities																							
British	4,358	5,226	1,377	985	899	808	1,047	1,083	2,983	3,099	4,248	4,251	2,718	385	157	202	134	135	127	108	135	82	34,547
American	1,066	4,566	417	321	330	351	297	294	228	279	260	331	319	199	146	167	138	145	147	124	107	104	10,336
Other countries	1,483	1,982	312	380	487	426	542	587	752	998	2,517	2,549	1,437	544	307	202	141	154	125	196	216	58	16,395
Totals	6,907	11,774	2,106	1,686	1,716	1,585	1,886	1,964	3,963	4,376	7,025	7,131	4,474	1,128	610	571	413	434	399	428	458	244	61,278
By Provinces																							
Maritime Provinces	147	409	38	32	43	48	48	70	93	148	252	244	260	62	42	61	27	40	61	136	150	96	2,507
Quebec	1,589	2,197	301	206	233	233	240	255	480	509	984	1,343	596	163	106	129	102	112	103	139	178	48	10,246
Ontario	2,896	4,243	547	675	620	581	646	600	1,115	1,788	2,828	2,626	1,827	347	167	127	123	121	96	80	82	59	22,194
Manitoba	.....	1,310	802	242	195	177	279	403	1,296	625	1,014	858	408	71	43	32	21	22	8	14	4	5	18,822
Saskatchewan	1,783	691	110	115	113	118	197	173	277	414	767	490	261	91	36	26	14	28	9	.....	1	9	
Alberta	.....	1,041	102	134	178	169	260	187	396	511	631	738	467	184	79	77	40	19	32	9	9	7	
British Columbia	491	1,876	206	282	334	259	216	276	306	381	549	832	655	210	137	119	86	92	90	50	34	20	7,501
Yukon Territory	1	7	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	8
Totals	6,907	11,774	2,106	1,686	1,716	1,585	1,886	1,964	3,963	4,376	7,025	7,131	4,474	1,128	610	571	413	434	399	428	458	244	61,278

Honourable T. A. CRERAR,
Minister of Mines and Resources,
Ottawa.

SIR,—I have the honour to submit a report of Soldier Settlement activities for the fiscal year ended March 31, 1943.

Included in this report are sections relating to the Three Thousand British Family Scheme, and the New Brunswick Five Hundred British Family Scheme, also field services performed by Soldier Settlement for other Departments of the Dominion Government.

Your obedient servant,

G. MURCHISON,
Director of Soldier Settlement.

Ottawa, August 5, 1943.

SOLDIER SETTLEMENT OF CANADA

Soldier Settlement has under administration 15,774 farm properties representing a net investment of $24,126,355.81 as of March 31, 1943.

A condensed balance sheet covering loan operations since inception and schedules giving analyses by districts of the present position of loans, collections, repaid loans, legislative concessions, properties on hand, and debt adjustment under the Farmers' Creditors Arrangement Act are found on pages 199 to 205.

The main items to report for the fiscal year are: the best collection year since 1929-30 from the standpoint of aggregate payments received; further decrease in loan administration costs; increase in investigation services directly related to the war; provision for further concessions to settlers as a result of report to the House of Commons by the Special Committee on Land Settlement of Veterans.

Collections

Collections on account of loan and purchase contracts totalled $2,471,293.42 for the fiscal year. The continued betterment is due primarily to excellent co-operation by the great majority of settlers in the Department's collection policy, coupled with improved prices.

Restricted Use of Motor Cars

During the fiscal year motor car mileage was reduced 64·7 per cent, a decrease of 1,054,526 miles compared with the previous year. The net result of this curtailment in use of motor cars was a saving of 53,529 gallons of gasoline, and a corresponding saving in the wear and tear of cars and vital rubber supplies.

Services Directly Related to the War

Shortly after the outbreak of war Soldier Settlement staff undertook rural investigations for the Dependents' Allowance Board and special field work for the Department of National Defence. Assignments from National Defence are given priority over all other work. During the year a further 13,089 investigations were made for the Dependents' Allowance Board, bringing the total to 33,421 as at March 31, 1943. During the fiscal year 2,222 investigations were made for the Dependents' Board of Trustees.

Further Concessions to Settlers (P.C. 10472)

The last annual report, page 158, made special reference to adjustments which took place under the Farmers' Creditors Arrangement Act prior to 1939, particularly in those parts of Western Canada subject to recurrent climatic hazards.

Order in Council P.C. 10472, dated November 19, 1942, is in accord with the tenor of the 5th report made to the House of Commons on July 17, 1942, by the Special Committee on Land Settlement of Veterans of the present war. By Order of Reference dated June 16, 1942, the Special Committee considered adjustments it deemed necessary to the Soldier Settlement Act. The basis upon which P.C. 10472 was developed is a matter of public record.

Briefly, the order makes provision for:—

(*a*) Reduction in rate of interest from 5 per cent to 3½ per cent with respect to persons indebted to the Director of Soldier Settlement enlisted for active service in the present war.

(*b*) Extension of terms of agreement between a soldier settler and the Director, such extension not to exceed 20 years as from the standard date in 1942.

(*c*) Reduction of indebtedness of soldier settlers by Treasury Board on the Recommendation of the Director. The order provides that the recommendation made by the Director shall be based upon the amount which in his judgment constitutes the present and prospective productive value of the land.

Provisions (*b*) and (*c*) above outlined are applicable to a settler as defined by Section 2 of the Soldier Settlement Act 1919, whose agreement with the Soldier Settlement Board or the Director of Soldier Settlement has not been terminated, rescinded, or assigned. Applications for extension of agreement and debt reduction may be made up to December 31, 1943.

At the close of the fiscal year notice of the benefits provided by P.C. 10472 had been mailed to all soldier settlers.

Condensed Balance Sheet as at March 31, 1943

ASSETS

Current Loans—			
Soldier Settlement:			
Soldier settlers	$9,655,962 56		
Civilian purchasers	6,983,649 86		
Indian soldier settlement	173,955 83		
		$16,813,568 25	
Less deferred bonus		32,087 40	
			$16,781,480 85
Three Thousand British Family Scheme:			
British families	$2,446,580 17		
Canadian civilians	1,092,109 60		
		$ 3,538,689 77	
Less deferred bonus		1,404 62	
			$ 3,537,285 15
New Brunswick British Family Scheme:			
British families	$ 163,152 23		
Canadian civilians	68,286 73		
		$ 231,438 96	
Less deferred bonus		398 61	
			$ 231,040 35
			$20,549,806 35
Security held for Resale at Book Debt:			
Soldier settlers	$2,150,582 43		
Civilian purchasers	604,568 22		
British families—Canadian land	660,464 28		
		$ 3,415,614 93	
United Kingdom government loans		160,934 53	
			$ 3,576,549 46
Total			$24,126,355 81

Financial Statement as at March 31, 1943

District	Active Loans		Security on Hand at Book Debt		Total	
	No.	Amount	No.	Amount	No.	Amount
		$ cts.		$ cts.		$ cts.
Vancouver	1,876	2,367,139 08	29	79,880 72	1,905	2,447,019 80
Edmonton	2,653	4,021,567 31	245	589,141 32	2,898	4,610,708 63
Calgary	1,708	2,867,640 60	95	237,626 46	1,803	3,105,267 06
Saskatoon	4,134	6,552,328 95	647	1,613,114 08	4,781	8,165,443 03
Winnipeg	1,527	2,100,183 87	305	910,371 58	1,832	3,010,555 45
Toronto	1,000	1,276,199 06	49	121,129 42	1,049	1,397,328 48
Sherbrooke	212	232,652 79	.....	.....	212	232,652 79
Saint John	1,045	958,138 86	25	25,285 88	1,070	983,424 74
Indian Soldier Settlers	224	173,955 83	.....	.....	224	173,955 83
Total	14,379	20,549,806 35	1,395	3,576,549 46	15,774	24,126,355 81

Collections—1942-43

Soldier Settlers

District	Amount Due		Total Cash Received					Total
	Instalment Due 1942	Total Due Including Arrears	Due Payment	Per Cent of Current Instalment	Per Cent of Total Due	Pre-Payments	Leases	
	$ cts.	$ cts.	$ cts.			$ cts.	$ cts.	$ cts.
Vancouver	99,405 22	157,538 32	109,955 17	110·6	69·8	56,164 47	976 65	167,096 29
Edmonton	186,296 24	621,345 34	158,927 98	85·3	25·6	31,224 10	11,914 78	202,066 86
Calgary	172,482 29	469,695 16	131,729 42	76·3	28·0	44,972 28	5,366 27	182,067 97
Saskatoon	311,215 56	1,191,593 20	217,290 61	69·8	18·2	39,011 31	39,411 49	295,713 41
Winnipeg	97,722 82	271,509 99	94,829 44	97·0	34·9	21,807 35	21,607 71	138,244 50
Toronto	63,957 62	91,947 20	69,019 83	107·9	75·1	35,824 47	3,136 44	107,980 74
Sherbrooke	7,538 06	12,610 83	9,614 71	127·5	76·2	9,055 90	66 68	18,737 29
Saint John	44,395 73	107,565 28	49,743 09	112·0	46·2	19,694 49	84 29	69,521 87
Total	983,013 54	2,923,805 32	841,110 25	85·6	28·8	257,754 37	82,564 31	1,181,428 93

Civilian Settlers

Vancouver	124,580 56	165,073 38	138,111 91	110·8	83·6	95,315 64	.....	233,427 55
Edmonton	164,871 90	398,411 88	157,170 98	95·3	39·4	57,060 86	.....	214,231 84
Calgary	79,707 45	173,526 57	76,770 07	96·3	44·2	21,870 54	.....	98,640 61
Saskatoon	207,006 42	549,108 26	164,956 29	79·6	30·0	45,789 43	.....	210,745 72
Winnipeg	97,012 96	211,648 10	105,201 61	108·4	49·6	37,978 88	.....	143,180 49
Toronto	54,326 68	71,803 74	55,122 37	101·5	76·8	33,817 19	.....	88,939 56
Sherbrooke	18,246 37	24,967 06	20,582 26	112·8	82·4	15,717 63	.....	36,299 89
Saint John	40,800 05	71,016 53	44,064 18	108·0	62·0	25,993 44	.....	70,057 62
Total	786,552 39	1,665,555 52	761,979 67	96·9	45·7	333,543 61	.....	1,095,523 28

British Family Settlement

Vancouver	10,361 07	18,181 58	11,674 42	112·6	64·2	8,614 43	.....	20,288 85
Edmonton	41,838 41	132,604 39	27,733 28	66·3	20·9	5,816 86	.....	33,550 14
Calgary	38,336 55	115,635 86	26,888 56	70·1	23·2	4,714 04	.....	31,602 60
Saskatoon	42,831 73	139,331 16	21,897 04	51·1	15·7	1,355 15	.....	23,252 19
Winnipeg	22,047 52	59,180 78	19,033 53	86·3	32·2	1,936 60	.....	20,970 13
Toronto	12,036 83	20,372 81	12,102 97	100·5	59·4	4,511 33	.....	16,614 30
Sherbrooke	2,507 49	3,462 88	2,924 31	116·6	84·4	1,054 14	.....	3,978 45
Saint John	12,588 57	27,497 80	16,415 07	130·4	59·7	5,551 24	.....	21,966 31
New Brunswick	13,846 47	29,029 96	15,245 45	110·1	52·5	6,872 79	.....	22,118 24
Total	196,394 64	545,297 22	153,914 63	78·4	28·2	40,426 58	.....	194,341 21

SUMMARY

Soldier Settlers	983,013 54	2,923,805 32	841,110 25	85·6	28·8	257,754 37	82,564 31	1,181,428 93
Civilian Purchasers	786,552 39	1,665,555 52	761,979 67	96·9	45·7	333,543 61	.....	1,095,523 28
British Family Settlement	196,394 64	545,297 22	153,914 63	78·4	28·2	40,426 58	.....	194,341 21
Total	1,965,960 57	5,134,658 06	1,757,004 55	89·4	34·2	631,724 56	82,564 31	2,471,293 42

Repaid Loans from Inception to March 31, 1943

District	Soldier Settlers			Civilian Purchasers			British Families			Total
	By Cash	By Time Sale	Total	By Cash	By Time Sale	Total	By Cash	By Time Sale	Total	
Vancouver	625	262	887	445	150	595	7	4	11	1,493
Edmonton	626	188	814	352	173	525	8	9	17	1,356
Calgary	295	103	398	190	48	238	5	10	15	651
Saskatoon	670	192	862	446	122	568	2	3	5	1,435
Winnipeg	255	48	303	387	70	457	2	4	6	766
Toronto	551	81	632	205	72	277	5	2	7	916
Sherbrooke	75	22	97	122	35	157	2	3	5	259
Saint John	344	61	405	208	47	255	20	11	31	691
Total	3,441	957	4,398	2,355	717	3,072	51	46	97	7,567

LIABILITIES

Gross Advances for Loans—

Soldier land settlement	$109,118,872 32		
Three thousand British family scheme	13,017,011 01		
New Brunswick 500 British family scheme	950,930 31		
		$123,086,813 64	
Replacements		3,115,827 54	
Interest charges		40,284,742 67	
			$166,487,383 85

Deduct—

Repayments:			
Soldier land settlement		$ 64,178,470 17	
Three thousand British family scheme		3,842,346 24	
New Brunswick 500 British family scheme		227,481 67	
Replacements		3,115,827 54	
			$ 71,364,125 62
			$ 95,123,258 23

Deduct—

Legislative reductions:			
Soldier land settlement		$ 48,089,620 45	
Three thousand British family scheme		7,788,568 73	
New Brunswick 500 British family scheme		658,717 07	
			$ 56,536,906 25
			$ 38,586,351 98

Deduct—

Losses on security already sold:			
Soldier land settlement		$ 25,400,953 96	
Three thousand British family scheme		2,279,277 16	
New Brunswick 500 British family scheme		187,266 76	
		$ 27,867,497 88	
Less Farmers' Creditors Arrangement Act—			
Amounts charged back to previous settlers and shown in Legislative reductions		3,138,392 84	
			$ 24,729,105 04
			$ 13,857,246 94

Add—

Interest Exemption Act 1922—Not charged to settlers	10,269,108 87
Total	$ 24,126,355 81

Legislative Reductions as at March 31, 1943

	Soldier Land Settlement			3,000 British Family Scheme			N.B. 500 British Family Scheme	Total all Schemes
	Soldier Settlers	Civilian Purchasers	Total	British Families	Civilian Purchasers	Total	British Families	
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Live Stock Reduction June 27/25—								
40%	2,573,036 14	.....	2,573,036 14	.....	.....	.....	.....	2,573,036 14
20%	354,773 85	.....	354,773 85	.....	.....	.....	.....	354,773 85
Total	2,927,809 99	.....	2,927,809 99	.....	.....	.....	.....	2,927,809 99
Interest Exemption June 28/22—Estimated	10,269,108 87	.....	10,269,108 87	.....	.....	.....	.....	10,269,108 87
Land Revaluation April 14/27—Principal	7,479,344 75	.....	7,479,344 75	.....	.....	.....	.....	7,479,344 75
80% Reduction—May 30/30								
Principal	8,645,184 43	.....	8,645,184 43	1,871,272 45	.....	1,871,272 45	137,862 64	10,654,319 52
Interest	2,656,943 13	.....	2,656,943 13	1,439,688 34	.....	1,439,688 34	161,592 96	4,258,224 43
Total	11,302,127 56	.....	11,302,127 56	3,310,960 79	.....	3,310,960 79	299,455 60	14,912,543 95
Interest Remission May 23/33	1,308,492 16	585,493 48	1,893,985 64	368,163 62	32,409 45	400,573 07	49,805 31	2,344,364 02
Dollar for Dollar Bonus prior to March 31/38	2,886,930 27	1,413,996 92	4,300,927 19	316,874 72	69,061 69	385,936 41	11,798 22	4,698,661 82
Dollar for Dollar Bonus since March 31/38	539,363 16	95,331 45	634,694 61	24,737 35	3,609 35	28,346 70	1,921 84	664,963 15
Total Dollar for Dollar Bonus—								
Principal	1,934,939 45	839,769 27	2,774,708 72	141,076 98	35,352 11	176,429 09	7,722 02	2,958,859 83
Interest	1,466,422 07	662,403 61	2,128,825 68	199,459 26	36,990 14	236,449 40	5,599 43	2,370,874 51
Deferred Bonus	24,931 91	7,155 49	32,087 40	1,075 83	328 79	1,404 62	398 61	33,890 63
Total	3,426,293 43	1,509,328 37	4,935,621 80	341,612 07	72,671 04	414,283 11	13,720 06	5,363,624 97
Farmers' Creditors Arrangement Act July 3/34								
Principal	3,472,860 36	1,415,548 92	4,888,409 28	2,274,269 21	102,771 49	2,377,040 70	222,682 12	7,488,132 10
Interest	3,281,990 92	1,111,221 64	4,393,212 56	1,201,018 54	84,692 52	1,285,711 06	73,053 98	5,751,977 60
Total	6,754,851 28	2,526,770 56	9,281,621 84	3,475,287 75	187,464 01	3,662,751 76	295,736 10	13,240,109 70
Total Legislative Reductions	43,468,028 04	4,621,592 41	48,089,620 45	7,496,024 23	292,544 50	7,788,568 73	658,717 07	56,536,906 25

Number of Settlers as at March 31, 1943

District	Current Loans					Security on Hand			Grand Total
	Soldier Land Settlement			British Family Settlement	Total	Soldier Land Settlement	British Family Settlement	Total	
	Soldier	Civilian	Total						
Vancouver	855	942	1,797	79	1,876	22	7	29	1,905
Edmonton	1,222	1,200	2,422	231	2,653	188	57	245	2,898
Calgary	963	520	1,483	225	1,708	76	19	95	1,803
Saskatoon	2,139	1,705	3,844	290	4,134	556	91	647	4,781
Winnipeg	598	806	1,404	123	1,527	227	78	305	1,832
Toronto	475	461	936	64	1,000	30	19	49	1,049
Sherbrooke	55	141	196	16	212	.....	.....	.....	212
Saint John	389	427	816	229	1,045	6	19	25	1,070
Indian Soldier Settlement	224	.....	224	.....	224	.....	.....	.....	224
Total	6,920	6,202	13,122	1,257	14,379	1,105	290	1,395	15,774

Farmers' Creditors Arrangement Act Applications as at March 31, 1943

District	Soldier Settlers				Civilian Settlers (Including British Civilians)				British Families				Totals		
	Number of Applications	Pending	Settled—Reduction	Settled—No Reduction	Number of Applications	Pending	Settled—Reduction	Settled—No Reduction	Number of Applications	Pending	Settled—Reduction	Settled—No Reduction	Pending	Settled	Applications
Vancouver	674	.....	438	236	355	.....	271	84	98	.....	93	5	.....	1,127	1,127
Edmonton	669	11	544	114	391	10	312	69	270	3	260	7	24	1,306	1,330
Calgary	738	.....	640	98	212	1	176	35	256	.....	252	4	1	1,205	1,206
Saskatoon	1,367	20	1,182	165	551	4	475	72	353	.....	335	18	24	2,247	2,271
Winnipeg	401	.....	341	60	223	.....	170	53	149	.....	135	14	.....	773	773
Toronto	340	.....	181	159	139	.....	98	41	93	.....	80	13	.....	572	572
Sherbrooke	43	.....	23	20	50	.....	38	12	21	.....	20	1	.....	114	114
Saint John	190	.....	155	35	78	.....	62	16	139	.....	125	14	.....	407	407
New Brunswick	.....	.....	.....	.....	.....	.....	.....	.....	178	.....	165	13	.....	178	178
Total	4,422	31	3,504	887	1,999	15	1,602	382	1,557	3	1,465	89	49	7,929	7,978

Farmers' Creditors Arrangement Act as at March 31, 1943

Soldier Settlers

District	Cases with Reduction	Debt	Reduction	Average Reduction	Percentage of Reduction
		$ cts.	$ cts.	$	
Vancouver	438	1,508,150 32	712,404 90	1,627	47·2
Edmonton	544	2,064,699 93	990,805 29	1,821	48·0
Calgary	640	2,798,726 86	1,430,096 57	2,235	51·1
Saskatoon	1,152	4,775,301 73	2,446,517 60	2,070	51·2
Winnipeg	341	1,431,527 16	794,980 64	2,324	55·5
Toronto	181	544,980 22	173,386 06	958	31·8
Sherbrooke	23	71,057 39	34,382 18	1,495	48·4
Saint John	155	382,219 07	172,278 04	1,111	45·1
Total	3,504	13,576,662 68	6,754,851 28	1,928	49·8

Civilian Settlers

Vancouver	233	774,971 76	341,377 06	1,465	44·1
Edmonton	285	928,440 90	454,605 20	1,595	49·0
Calgary	160	606,116 72	328,927 96	2,056	54·3
Saskatoon	457	1,728,355 92	963,681 83	2,109	55·8
Winnipeg	159	485,143 45	242,233 66	1,523	49·9
Toronto	83	244,397 50	101,868 48	1,227	41·7
Sherbrooke	36	112,857 01	52,815 53	1,467	46·8
Saint John	46	101,591 67	41,260 84	897	40·6
Total	1,459	4,981,874 93	2,526,770 56	1,731	50·7

British Families

Vancouver	93	407,653 24	219,590 43	2,361	53·9
Edmonton	260	1,292,064 11	735,298 14	2,828	56·9
Calgary	252	1,361,680 89	703,322 58	2,791	51·7
Saskatoon	335	1,713,569 39	1,024,313 06	3,087	60·4
Winnipeg	135	686,759 79	398,117 53	2,949	58·0
Toronto	80	338,935 13	125,899 60	1,574	37·1
Sherbrooke	20	69,714 27	34,626 89	1,731	49·7
Saint John	125	414,418 66	224,119 52	1,793	54·1
New Brunswick	165	539,195 67	295,736 10	1,792	54·8
Total	1,465	6,823,991 15	3,771,023 85	2,574	55·3

British Families—Civilians

Vancouver	38	134,128 23	57,775 46	1,520	43·1
Edmonton	27	90,975 66	34,010 74	1,260	37·4
Calgary	16	62,137 02	30,010 67	1,876	48·3
Saskatoon	18	58,983 86	27,069 11	1,504	45·9
Winnipeg	11	34,742 10	14,407 70	1,310	41·5
Toronto	15	42,862 07	14,121 27	941	32·9
Sherbrooke	2	5,023 03	1,358 40	679	27·0
Saint John	16	23,896 93	8,710 66	544	36·5
Total	143	452,748 90	187,464 01	1,311	41·4
Grand Total	6,571	25,835,277 66	13,240,109 70	2,015	51·2

Field Work for Other Departments of Government as at March 31, 1943, and Comparison with Three Preceding Fiscal Years

Class of Work	Vancouver	Edmonton	Calgary	Saskatoon	Winnipeg	Toronto	Sherbrooke	Saint John	Totals 1942-43	1941-42	1940-41	1939-40
Department of National Defence—												
Dependents' Allowance Board—Field Supervisors' Investigations	364	221	242	240	575	1,330	2	1,775	4,749	8,173	5,819	1,447
Dependents' Allowance Board—Local Representatives' Investigations	546	592	413	1,806	450	2,885	.....	1,648	8,340	3,372	1,276	245
Dependents' Board of Trustees—Field Supervisors' Investigations	8	85	87	122	.....	1	.....	332	635	12	.....	.....
Dependents' Board of Trustees—Local Representatives' Investigations	.....	216	238	916	.....	.....	.....	217	1,587	.....	.....	.....
Real Estate Branch—Land Appraisals	.....	.....	23	.....	.....	18	.....	.....	41	360	.....	.....
Property Damage—R.C.A.F. Investigations	.....	.....	2	.....	.....	3	9	.....	14	6	1	.....
Department of Pensions and National Health—												
War Veterans' Allowance Board—Field Supervisors' Initial Investigations	65	26	20	27	40	86	14	55	333	856	1,173	2,430
War Veterans' Allowance Board—Local Representatives' Initial Invest'ns	18	13	6	33	5	64	.....	12	151	.....	.....	.....
War Veterans' Allowance Board—Field Supervisors' Check Investigations	673	244	169	225	301	542	90	399	2,643	5,058	4,504	3,993
War Veterans' Allowance Board—Local Representatives' Check Investig'ns	84	128	45	395	42	666	.....	83	1,443	.....	.....	.....
Relief of Pensioners—Field Supervisors Investigations	15	.....	2	5	35	50	4	.....	111	706	1,387	2,130
Relief of Pensioners—Local Representatives Investigations	1	1	2	4	18	22	.....	.....	48	.....	.....	.....
P.C. 7633—Field Supervisors Investigations	5	12	16	20	48	70	3	12	186	115	.....	.....
P.C. 7633—Local Representatives Investigations	.....	20	11	23	30	47	.....	4	135	.....	.....	.....
Canadian Pension Commission—Field Supervisors' Investigations	5	24	9	50	.....	3	14	1	106	133	91	146
Canadian Pension Commission—Local Representatives' Investigations	.....	36	6	34	.....	.....	.....	.....	76	.....	.....	.....
Department of Finance—												
Boards of Review—Farmers' Creditors Arrangement Act—Land Appraisals	.....	95	77	240	.....	.....	.....	.....	412	1,142	1,546	3,024
Department of Mines and Resources—												
Lands, Parks and Forests Branch—Investigations	.....	.....	.....	.....	.....	7	19	.....	26	28	28	80
Seed Grain Lien Adjustments—Land Inspections	.....	.....	.....	95	.....	.....	.....	.....	95	121	74	56
Seed Grain—Adjustments of Liens	.....	.....	.....	287	.....	.....	.....	.....	287	243	178	310
Secretary of State—												
Enemy Alien Estates—Investigations	.....	1	.....	.....	.....	1	.....	.....	2	9	28	14
Japanese Farms—Investigations	1,007	.....	.....	.....	.....	.....	.....	.....	1,007	.....	.....	.....
Alaska Highway	.....	803	.....	.....	.....	.....	.....	.....	803	.....	.....	.....
Relief Land Settlement—Investigations	.....	.....	.....	.....	.....	.....	45	.....	45	194	200	118

NOTE:—District Superintendents Edmonton and Winnipeg were members of Committees which adjusted 219 seed grain liens in Alberta and 13 in Manitoba.

Honourable T. A. CRERAR,
Minister of Mines and Resources,
Ottawa.

SIR,—

I have the honour to submit a brief report of activities under the Veterans' Land Act for the fiscal year ended March 31, 1943.

Your obedient servant,

G. MURCHISON,
Director, the Veterans' Land Act.

Ottawa, August 9, 1943.

THE VETERANS' LAND ACT

The Veterans' Land Act was passed August 1, 1942. Minutes of Proceedings and Evidence taken by the Special Parliamentary Committee on Land Settlement of Veterans of the present war are of public record.

The Director, the Veterans' Land Act, was appointed in accordance with Section 3 of the Act with effect from November 25, 1942.

Regulations governing the granting of loans to veterans were made and established December 8, 1942, by His Excellency the Governor General in Council.

Handbook No. 1 giving a summary of aims, scope, and main details of the Act was published December, 1942, for the information of the armed forces.

At the close of the fiscal year ended March 31, 1943, initial plans had been made to set up minimum administrative establishment at Ottawa and in the several provinces in accordance with the Act and Regulations. Contacts had been established with the Dominion and Provincial Departments of Agriculture and the Soils Survey Divisions of the Dominion Experimental Farm, Universities, and Agricultural Colleges as a preliminary to the acquirement of lands for veteran settlement. The interest and evidence of practical co-operation of these institutions is gratefully acknowledged.

The keynote of organization and operations for the period covered by this report is clearly expressed in an extract from the foreword to Handbook No. 1 on the Veterans' Land Act, issued under the authority of the Minister of Mines and Resources:—

> "At this stage of the war actual settlement operations in volume will not be attempted, notwithstanding that a large number of men have already been discharged from the active service forces. Abundant employment opportunities at good rates of pay are available to all men who have been discharged from the forces and who are able to work, and this condition will doubtless continue for the duration of the war. Building materials necessary for operations under this Act are needed for the war effort, and farm machinery is under restricted manufacture. There is in addition the important consideration that members of the active forces serving overseas in various parts of the world should not be at a disadvantage in participating in the benefits of the Act."