

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, 1942



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

1942

CONTENTS

	PAGE
Report of Deputy Minister.....	7
Mines and Geology Branch.....	11
Mining Roads Division.....	12
Bureau of Geology and Topography.....	12
Geological Survey.....	13
Topographical Survey.....	17
Development Division.....	19
Draughting and Reproducing Division.....	21
National Museum of Canada.....	22
Anthropological Division.....	22
Biological Division.....	23
Ornithological Division.....	24
Educational Work.....	25
Bureau of Mines.....	26
Economics Division.....	27
Metallic Minerals Division.....	29
Industrial Minerals Division.....	34
Division of Fuels.....	40
Explosives Division.....	43
Publications.....	45
Lands, Parks and Forests Branch.....	47
Bureau of Northwest Territories and Yukon Affairs.....	48
Northwest Territories.....	48
Yukon Territory.....	55
Land Registry.....	58
National Parks Bureau.....	62
Events of Interest.....	63
Public Relations.....	65
Direct Revenue.....	68
Maintenance and Improvements.....	68
Conservation.....	71
National Historic Sites and Parks.....	75
Migratory Birds Convention Act.....	78
Dominion Forest Service.....	80
Forest Economics.....	80
Silvicultural Research.....	83
Forest Protection.....	84
Forest Products Laboratories.....	88
Surveys and Engineering Branch.....	97
Dominion Observatories.....	99
Dominion Observatory, Ottawa.....	99
Dominion Astrophysical Observatory, Victoria, B.C.....	103
Dominion Water and Power Bureau.....	105
Water and Power.....	105
Dominion Hydrometric Service.....	107
International Waterway Matters.....	109
Revenue.....	109
Publications.....	110
Engineering and Construction Service.....	110
Highways.....	111
Engineering Work in National Parks.....	112
Engineering Work for Indian Affairs.....	114
Geodetic Service of Canada.....	115
Triangulation.....	115
Levelling.....	116
Geodetic Astronomy and Isostasy.....	117
Geodetic Research.....	117
Triangulation Adjustments.....	117
Levelling Adjustments.....	117
International Boundary Commission.....	118
Hydrographic and Map Service.....	119
Hydrographic Service.....	119
Tides and Currents.....	123
Chart Construction.....	124
Map Service.....	124

	PAGE
Indian Affairs Branch.....	130
Indian Health Service.....	135
Welfare and Training Service.....	135
Reserves and Trusts Service.....	140
Summary of Indian Affairs by Provinces and Territories.....	144
 TABULAR STATEMENTS—	
Table No. 1—Census of Indians arranged under Provinces and Territories, 1939.....	150
Table No. 2—Land; private and public buildings and property.....	151
Statement of expenditure for the year 1941-42.....	152
Open account—Indian Act Revolving Fund.....	153
Net expenditure by provinces, 1941-42—Fur Conservation.....	153
Indian Trust Fund.....	153
School statements.....	154
Immigration Branch.....	156
Director of Immigration.....	156
British Evacuee Children.....	159
Chinese Immigration.....	161
 INDEX OF STATISTICAL TABLES—	
Table No. 1—Immigration from 1900 to 1942.....	163
" 2—Immigration for the period July 1, 1900, to March 31, 1910.....	164
" 3—Immigration for the period April 1, 1910, to March 31, 1920.....	165
" 4—Immigration for the period April 1, 1920, to March 31, 1925.....	166
" 5—Immigration for the period April 1, 1925, to March 31, 1930.....	167
" 6—Immigration for the period April 1, 1930, to March 31, 1935.....	168
" 7—Immigration for the period April 1, 1935, to March 31, 1942.....	169
" 8—Immigration via ocean ports and from the United States, by racial origin, April 1, 1932, to March 31, 1942.....	170
" 9—Immigration via ocean ports, showing country of birth, by racial origin....	172
" 10—Immigration from the United States, showing country of birth, by racial origin.....	174
" 11—Origin, sex, occupation, and destination of immigrant arrivals for Canada, at ocean ports.....	176
" 12—Origin, sex, occupation, and destination of immigrant arrivals from the United States.....	178
" 13—Immigration, showing nationality and sex.....	180
" 14—Rejections at ocean ports, by causes and nationalities, from 1902-3 to 1941-42	181
" 15—Deportations after having been admitted, by causes, nationalities, and provinces from 1902-3 to 1941-42.....	182
Soldier Settlement of Canada.....	183

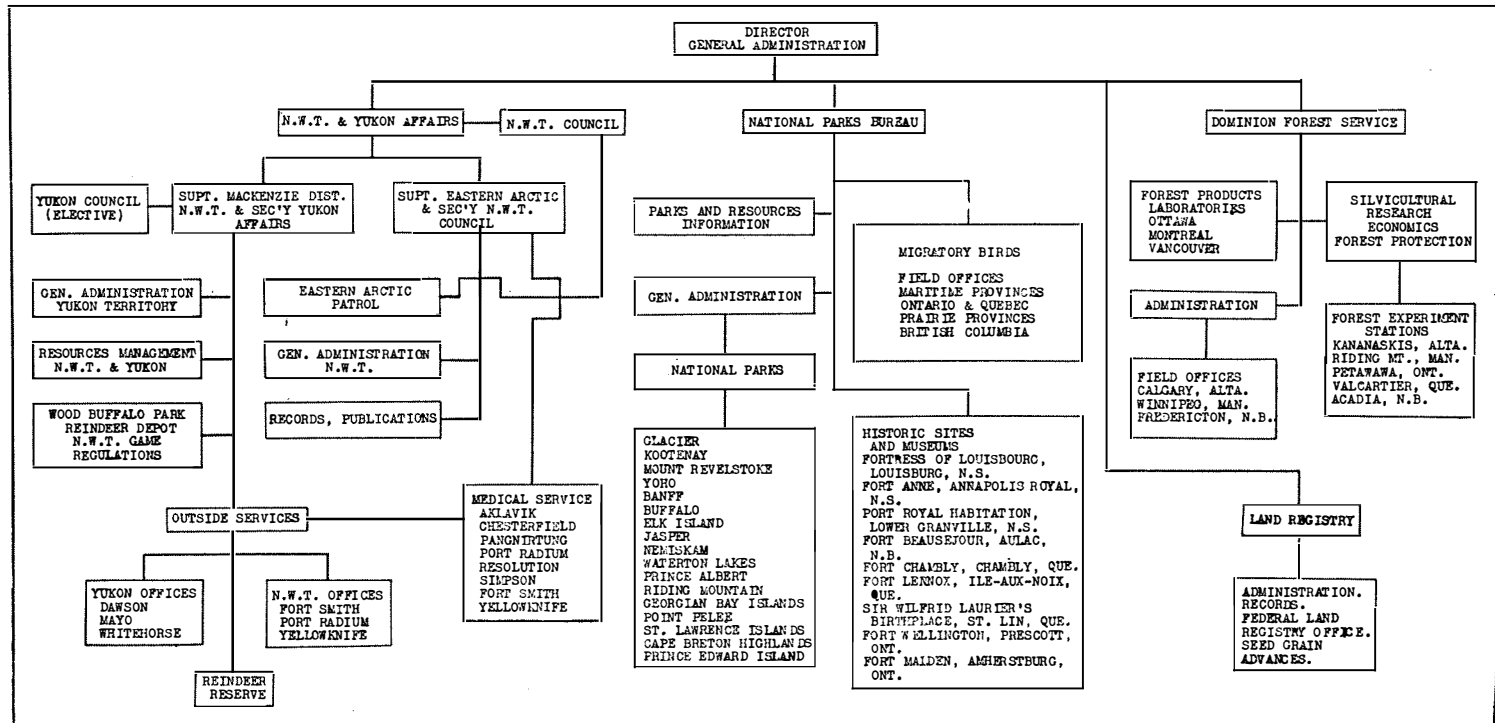
*To His Excellency the Right Honourable the Earl of Athlone, K.G., P.C., G.C.B.,
G.C.M.G., G.C.V.O., D.S.O., Governor General and Commander-in-Chief
of the Dominion of Canada.*

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, 1942.

Respectfully submitted,

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



Organization Chart, Lands, Parks and Forests Branch.

LANDS, PARKS AND FORESTS BRANCH

R. A. GIBSON, DIRECTOR

In this year substantially larger revenues were collected without any serious increases in rates. The cost of administration, care and maintenance of national properties was reduced by planning and economy. Important technical services were sustained. This was accomplished despite severe losses of staff because of enlistment of experienced and active young men for service in the Armed Forces and the loan of trained executives to War Departments.

The Northwest Territories and the Yukon Territory are becoming of increasing interest and certain defence schemes under way will provide readier means of transportation to country which has been little explored. The radium mines at Great Bear Lake, Northwest Territories, are being re-opened. Gold production in the Yellowknife field increased by \$958,896 for the year but in the placers of the Yukon production fell off a little owing to unfavourable weather. While the gold mines are having special problems in wartime, operators in these same mining districts are exploring the possibility of increasing production of scheelite for tungsten.

Fur prices have been good and there has been less need for indigent relief among the natives and half-breeds. The administration is studying the question of nutrition and investigations under the supervision of nutrition specialists are being inaugurated.

The wild life resources of the Northwest Territories are reserved for the natives and half-breeds and for those whites who have been trapping there for years. Large game preserves are set aside for the benefit of the native population with a view to improving their economic and health conditions.

The attendance at the National Parks has been very good and it is noted particularly that a large number of those in the defence forces have spent their holidays in the parks. However, there are indications that there will be a sharp falling off in the number who are able to visit the parks during wartime because of the restrictions which the Government has found it necessary to impose on the sale of gasoline and tires.

Wood is becoming of rapidly increasing interest as a result of the war and the Dominion Forest Service has been able to supply a great deal of useful information about the forest resources, also concerning the means by which the available resources can be utilized most efficiently to meet present requirements.

The necessary work of the Branch has been sustained adequately with the reduced staff, most of whom are well above military age. Moreover, important work relating to the war has been undertaken in addition to usual responsibilities. This has involved considerable overtime duty and the foregoing of holiday leave on the part of many members of the staff.

Acknowledgment is made—first, to those who have assumed their duty in the Armed Forces—our best wishes to them wherever they may be; second, to those in other Government services who have given this Branch useful co-operation; third, to the members of the staff of the Branch who have not spared themselves in their endeavour to sustain the necessary work in an efficient manner.

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. The 1941 Census figures released to date give an unclassified population of 10,849.

The Northwest Territories Act provides for the appointment of a Commissioner of the Northwest Territories and vests in him those executive powers that were exercisable by the Lieutenant Governor of the Northwest Territories prior to the constitution of the Provinces of Saskatchewan and Alberta in 1905—so far as such powers are applicable. The Act also provides that the Commissioner shall administer the government of the Territories under instructions of the Governor in Council and the Minister of Mines and Resources and provides for the appointment of a Council of six members to aid the Commissioner in such administration. The Commissioner in Council has the same power to make ordinances for the government of the Territories as was formerly vested in the Legislative Assembly 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. W. McGill,
S. T. Wood, H. L. Keenleyside

Secretary—D. L. McKeand

WORK OF COUNCIL

Fifteen regular and 5 special sessions of Council were held during the year. Assent was given to ordinances respecting the sale of unwrought metals, the operation and inspection of steam boilers, sanitary control, the prevention of disease, and the general welfare of camps and settlements. Amendments were made to the following ordinances: Territorial Liquor; Motor Vehicle; Businesses, Callings, Trades and Occupations; Local Administrative District, and Unwrought Metals Sales.

There was also discussion of matters of policy relating to Eskimo affairs; hunting and trapping; forest protection; transportation systems; reindeer; hospital and medical services; liquor regulations; By-laws of Yellowknife Administrative District; Eastern Arctic Patrol; applications for permit under Scientists and Explorers Ordinance; and private 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

Sheriff. The Mining Recorder, Agent of Dominion Lands, and Crown Timber Agent for the Yellowknife Mining District, which includes what was formerly the Great Bear Lake Mining District, is stationed at Yellowknife.

MEDICAL OFFICERS

The Northwest Territories has been divided into 8 medical districts over which medical doctors of the Department have jurisdiction. These officials have their headquarters at Fort Smith, Resolution, Simpson, Norman, Aklavik, Yellowknife, Chesterfield, and Pangnirtung.

All doctors have been appointed Coroners and Medical Health Officers under the Public Health Ordinance. These appointments give them full authority to enforce health and sanitary regulations. Most of the doctors make extensive patrols to outlying areas and all prescribe treatment through the medium of the radio telegraph service. Under emergency conditions medical advice is also sent over the wireless by the Director of Medical Services, Department of Pensions and National Health.

A Medical Officer also accompanies the annual Eastern Arctic Patrol. He acts as Ship's Doctor, examines and treats the natives en route, and submits reports of his findings.

HOSPITALS

During the year there were 11 hospitals in operation in the Territories, 10 conducted by the Roman Catholic or Anglican Missions at Fort Smith, Resolution, Hay River, Simpson, Norman, Aklavik (2), Rae, Chesterfield, and Pangnirtung, respectively, and one by mining interests at Yellowknife.

The Department pays the Mission hospitals \$2.50 per diem for the treatment of indigent whites, Eskimos and half-breeds. Special arrangement was made for the care of aged and infirm indigents and chronic invalids on the basis of \$200 per annum under what is known as the Industrial Home arrangement. During the year the sum of \$27,134.31 was paid under these headings, representing approximately 9,479 days of care. No treatment or care of indigents is undertaken except on the recommendation of the resident Medical Officer.

Fourteen patients were treated in provincial institutions at a cost of \$4,466.14.

The above figures do not include amounts paid by the Indian Affairs Branch for similar services to Indians only.

SCHOOLS

During the year the Anglican and Roman Catholic Missions operated residential and day schools in the principal settlements of the Territories. One hundred and twenty-eight indigent white, Eskimo, and half-breed children were maintained in the residential schools and 276 pupils attended the day schools. (In addition, 2 public schools were operated by the residents of the settlements at Fort Smith and Yellowknife, respectively.) Grants totalling \$24,695.50 were paid toward the maintenance of schools, plus a small amount for school supplies.

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 sale of liquor in the Northwest Territories is governed by the Territorial Liquor Ordinance assented to April 27, 1939, and amendments. The Saskatchewan Liquor Board is Territorial Liquor Agent and stocks and operates a liquor store at Yellowknife under the direction of the Northwest Territories Administration. The net profits arising from the operation of the store and the proceeds of fines under the Territorial Liquor Ordinance are placed in a special account for Territorial purposes.

The net profits from the liquor store during the fiscal year ended March 31, 1942, amounted to \$49,302.38, and fines under the Territorial Liquor Ordinance to \$345, making a total of \$49,647.38. Other revenue derived from liquor control amounted to \$129, being \$79 from the sale of permits issued at Ottawa, and \$50 from fines for liquor offences under the Northwest Territories Act.

During the calendar year 1941, 57 permits were issued at Ottawa, authorizing the importation into the Northwest Territories (mainly to Eastern Arctic) of 75½ gallons of spirits, 5 gallons of wine, and 4 barrels of beer. Five hundred and twenty-six annual permits and 4,225 local daily permits for the purchase of liquor were issued at Yellowknife during the same period. The sales at the Yellowknife store in the calendar year were spirits 2,606 gallons, wine 1,063 gallons, and beer (including ale and stout) 20,557 gallons.

AIDS TO NAVIGATION

Under the direction of the District Agent, existing aids were maintained at points on the Mackenzie River between the delta of Athabaska River and Great Bear Lake for the Department of Transport.

LANDS AND TIMBER

Surveyed Lands.—One lot was sold and patented in Arctic Red River Settlement, and one lot in Fort Smith Settlement was covered by a time sale. At Port Radium Settlement, 9 surface leases are in force, and at Yellowknife Settlement, which lies about 615 miles by air north of Edmonton, 172 such leases have been issued. These leases are for five-year periods.

On November 11, 1941, Salt Plains Indian Reserve No. 195, comprising 110.4 acres on both sides of the Salt River, was placed under the operation of the Indian Act by Order in Council.

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 number of such leases in force is 27.

Eighteen permits to occupy land during the pleasure of the Department have been granted. There are 6 grazing leases in force, and, during the year, 5 hay permits were issued under which 101 tons of hay were cut.

During the year 18 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 164, authorizing the cutting of 26,284 linear feet of timber, 200,000 feet board measure of saw timber, 2,035 fence posts, 615 roof poles, and 13,930 cords of fuel wood. Thirty-eight of these permits were issued free of dues to educational, religious, and charitable institutions, to settlers for domestic use, and to Government departments. Twelve timber permit berths were granted.

The revenue derived from lands, timber, grazing, and hay was \$17,092.34, being an increase of \$5,434.84 over the previous year.

MINING

The production of minerals in the Yellowknife area was increased during the year with the coming into production of the properties of Ptarmigan Mines, Limited, Thompson-Lundmark Gold Mines, Limited and Slave Lake Gold Mines, Limited. There were six gold mines in production with a combined output for the year valued at \$3,166,723. Several important mineral discoveries were made in the district, including deposits of scheelite.

During the year 131 miner's licences, 230 renewal licences, and 362 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 there were 3,165 mineral claims in good standing. Leases have been issued comprising an area of 11,383.68 acres. The total revenue obtained from fees payable under the Quartz Mining Regulations amounted to \$11,700.03, including \$5,015.83 collected as licence fees.

At the "Con" mine of the Consolidated Mining and Smelting Company of Canada, Limited, the main shaft is down to a depth of 1,091 feet and there are seven levels opened up with lateral work in excess of five miles. The output of the mill was increased during the year from 170 tons to 180 tons per 24 hours and 33,140 ounces of gold and 7,986 ounces of silver were produced. This brings the combined total value of the gold and silver produced by this mine since operations commenced in September, 1938, to \$4,258,000. The company replaced their six-bed hospital by a new two-story well-equipped hospital with 16 beds. 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 4,661 ounces of gold and 1,055 ounces of silver.

A 2,500-foot drive connects the "Rycon" and "Con" mines and ore from the former is hauled along this drive to the No. 1 shaft of the "Con" and hoisted to a separate bin in the "Con" mill.

Production from the "Negus" mine for the year amounted to 18,496 ounces of gold and 3,381 ounces of silver. This property came into production in February, 1939, and the value of the output since that time exceeds \$2,251,600. The mine has been opened to a depth of 734 feet with seven levels and more than two miles of workings. An 80-ton mill is in operation. The Thompson-Lundmark gold mine began production in September, 1941, and by the end of March gold to the value of \$534,000 was produced from the 100-ton mill. The mine has been opened to a depth of 834 feet. In January, 1942, the Ptarmigan Mines, Limited, property came into production and by the end of March 3,956 ounces of gold and 836 ounces of silver had been produced. The underground workings have reached a depth of 924 feet and amount to more than 6,000 feet. The mill has a capacity of 100 tons but is run at a rate of 90 tons per 24 hours. The mine of Slave Lake Gold Mines, Limited, at Outpost Island, was re-opened in January, 1941, and production during the year amounted to 8,150 ounces of gold, 35,473 pounds of copper-gold concentrates, and 95,462 pounds of tungsten concentrates. The shaft has a depth of 445 feet with approximately 3,500 feet of lateral work. A small mining plant and mill have been transported to the Ruth property east of Yellowknife Bay. In March a small crew began the work of preparing the property of Eldorado Gold Mines Limited at Great Bear Lake for re-opening in 1942. Royalties collected for the calendar year ended December 31, 1941, amounted to \$18,868.91.

The first hydro-electric power development in the Northwest Territories was completed in January, 1941, when the 4,200-horse-power Prosperous Lake power plant began generating electricity for transmission over the two 33,000-volt transmission lines, 22 and 26 miles in length, to the mines.

Coal.—Three coal mining leases are in force, comprising an area of 373 acres. Revenue from fees, rentals, and royalties in connection with coal mining rights during the year amounted to \$303.38.

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. Petroleum produced from the wells of the Northwest Company, Limited, below Norman on Mackenzie River, amounted to 23,776 barrels. The refinery unit erected on the company's property continued to operate and produced during the year aviation gasoline, aviation base gasoline, motor gasoline, and light and heavy diesel oil. One oil and gas permit is in force, comprising an area of 212.10 acres.

Dredging.—Two dredging leases are in force in the Northwest Territories, comprising in all 2 five-mile stretches of Grizzly and Bennett Creeks. Revenue from these leases for the year amounted to \$60.

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.

Legislation.—Only one item of legislation affecting game was enacted during this fiscal year. P.C. 6838, August 29, 1941, permitted the shooting by Yellowknife residents of game birds on an area of approximately 210 square miles, around the mouth of the Yellowknife River, which lies within the Yellowknife Native Game Preserve.

Wood Buffalo Park.—The wardens maintained their regular patrols to check on the range and welfare of the buffalo. Reports indicate that the health of the herds is satisfactory. A few animals were drowned when they attempted to cross the ice of the Slave River before it had frozen sufficiently to bear their weight. A certain amount of predatory control was maintained.

The fur conservation project in the Dempsey Creek area is showing satisfactory results in increased muskrat population.

Fur and Game.—The catch of white fox, particularly by those trappers operating east and north of Reliance, was unusually satisfactory. The number of muskrats taken in the Mackenzie Delta was also large and this, combined with high price levels for these and other species resulted in better conditions for those who hunt for a living in the Territories. Other species of fur-bearers, with the exception of beaver and mink, were on the decline during the year.

Of the 8 fur farms licensed to operate in the Territories in the last fiscal year, 1 has relinquished its licence. A new mink farm located near Yellowknife has been licensed during the year. The Hudson's Bay Company did not

held any beaver on their Charlton Island Preserve during the year, in order to permit the breeding population to increase. A limited number of live animals were captured and transferred to other preserves to accelerate restocking of those areas. It was found impossible to secure a census of the beaver population on the Akimiski and Charlton Islands Preserves this year.

Comparative figures of the number of big game animals and birds taken during the licence years ending June 30, 1940 and 1941, and the average for the 5 years ended June 30, 1940, follow:

	Year ended June 30		5-year average 1936-40
	1941 ²	1940 ¹	
Big Game—			
Caribou.....	18,159	22,241	14,134
Deer.....	77	63	36
Moose.....	1,211	1,072	796
Sheep.....	51	86	50
Game Birds—			
Ducks.....	11,393	12,995	7,735
Geese.....	838	1,009	730
Grouse.....	535	909	357
Partridge.....	2,608	4,078	1,402
Prairie chicken.....	1,836	1,600	1,029
Ptarmigan.....	10,682	7,154	4,832

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 1937-41
	1942	1941	
Hunting and Trapping—			
Resident.....	539	488	499
Non-resident bird licence.....	8	20	13
Trading and Trafficking—			
Resident.....	115	103	128
Non-resident.....	3	8	8

	Permits Year ended June 30		5-year average 1937-41
	1942 ²	1941 ¹	
To establish trading posts.....	17	12	23
To take mammals.....	4	4	3
To hunt and trap in Wood Buffalo Park.....	341	333	346
To take migratory birds.....	16	12	16
To take scientific specimens.....	4	7	9
To take quota (15) of beaver.....	1,147	1,595	1,441

¹ These figures may differ slightly from those recorded in the Annual Report for 1940-41 because of additional returns received after that report was printed.

² Subject to revision as additional returns are received.

Revenue under Northwest Game Act for fiscal years ended March 31, 1941 and 1942 and average for five years 1937-41.

	Fiscal Year		5-year average 1937-41			
	1942	1941				
	\$	cts.	\$	cts.	\$	cts.
Hunting licences.....	1,060	01	1,153	84	1,554	40
Trading licences.....	1,524	29	1,899	90	2,115	80
Bird licences.....	155	00	100	00	52	00
Fur farm licences.....	26	00	23	07	19	21
Trading post permits.....	17	00	12	00	31	60
Sale of furs.....	700	60	454	32	467	62
Fur export tax.....	103,736	39	75,819	16	79,660	01
Fines and forfeitures.....	682	56	559	12	273	18
Sub-totals.....	107,901	85	80,021	41		
Revenue under Businesses, Callings, Trades and Occupations Ordinance.....	5,942	50	4,599	50		
Totals.....	113,844	35	84,620	91		

Infractions of Game Laws.—There were 38 prosecutions for infraction of the game laws. Convictions were secured in 35 of these cases.

REINDEER

There are three reindeer herds in the northern Mackenzie District, comprising about 8,000 head. A complete roundup of the main herd on the reserve near the Mackenzie Delta was prevented by adverse weather conditions but it was estimated that there were nearly 5,000 animals, including 1,100 fawns. The two herds under native management near the Anderson and Horton Rivers were reported to contain 2,093 and 1,083 head, respectively.

The slaughter of surplus stock in the main herd took place on Richards Island in September and near the main station on the winter range in December and March. The total number of deer from this herd slaughtered for meat purposes during the fiscal year was about 300. One hundred carcasses were allotted as a free issue to the missions operating hospitals and residential schools in the Mackenzie Delta area. The remaining meat was used by the reindeer staff, for relief of indigents, and by the medical officer. A limited quantity was sold. The revenue from meat sold (including a few hides) was \$1,924.90.

The training of young natives as apprentice herders continued, and arrangements proceeded for the establishment of additional native herds.

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 October 12. The work of the patrol was considerably heavier than in previous years as the Government radio stations on Resolution and Nottingham Islands were serviced for the first time.

D. L. McKeand, Officer in Charge of the Government party, reported that the Eskimos of the Eastern Arctic generally were in good health. Medical examinations were conducted at the various ports of call, and natives requiring hospital treatment were taken to Chesterfield or Panguirtung. Dental treatment was extended to natives where necessary. Dr. Warren S. Smith of Montreal acted as Ship's Doctor from Montreal to Churchill where Dr. John Melling took over the duties for the remainder of the voyage.

Game was reported as plentiful, and indications were that the white fox, the principal fur-bearer, would reach the peak of its cycle of abundance in the 1941-42 season.

Supplies and mail were delivered at the various posts, and the transfer of relief medical officers, radio operators, and Royal Canadian Mounted Police carried out. During the patrol, arrangements were made for the taking of the census of the Eastern Arctic and the distribution of identification discs to the Eskimos. Victory bonds were sold to the white people stationed at the northern posts, who oversubscribed the quota allotted them by 15 per cent.

YELLOWKNIFE ADMINISTRATIVE DISTRICT

The Local Trustee Board of 5 members held 19 Board Meetings and passed 6 by-laws, covering various subjects. The annual grant made by the Dominion Government to the Yellowknife Public School Board was increased to \$1,500 as from November 3, 1941.

PUBLIC IMPROVEMENTS

Winter landing fields, seaplane bases, and roads were maintained. During the year the Northwest Territories Administration purchased a substantial quantity of additional fire-fighting equipment and with the assistance of the Royal Canadian Mounted Police, volunteer fire brigades were organized in most of the settlements.

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. The 1941 census figures released to date give an unclassified population of 4,687.

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 a local and private nature in the Territory.

Territorial Council

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

Seat of Government—Dawson, Y.T.

The following is the Yukon Council elected November 25, 1940; Dawson District, Andrew T. Taddie; Whitehorse District, Willard Leroy Phelps; Mayo District, Richard Gordon Lee.

WORK OF COUNCIL

The Yukon Council met on April 24, 1941. This was the first session of the twelfth wholly elective Council of the Territory. The Council was prorogued on April 26, 1941, after passing the annual supply bill but no new legislation.

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; the administration of the Yukon Placer and Quartz Mining Acts; and for the collection of revenue.

For local purposes the Territorial Government raised \$176,658.03. The Dominion grant to the local government was \$47,500. The total expenditure by the Territorial Government was \$225,076.82.

LANDS AND TIMBER

One agricultural lease and 2 hay permits were granted; 5 renewal leases were issued, and 1 permit to occupy was cancelled. There are now in force 22 homestead entries, 9 agricultural leases, 24 waterfront leases, 2 miscellaneous leases, and 16 permits to occupy. The revenue derived from lands amounted to \$5,846.57.

Eighty-nine permits were issued authorizing the cutting of 300,000 feet board measure of saw timber and 12,847 cords of wood. Three permits to cut wood for mining purposes were issued free of dues. Nine licence timber berths were cancelled, leaving 15 in force, for which licences were issued. Assignments of 3 berths were registered. Eight timber seizures were made. The total revenue collected from timber was \$5,726.58.

MINING

Placer mining operations produced 87,442.60 ounces of gold, the value of which, at \$35 per ounce, is \$3,060,491. Compared with the previous year, this is a decrease of 10,695.91 ounces, due mainly to water shortage during the summer and early freeze-up in the autumn. Entries were granted for 156 placer and 44 quartz mining claims and 2,923 such claims were renewed for another year. As no leases of quartz mining claims were granted or cancelled the area held under lease remains 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, 1942, was \$5,266,716.83, of which amount \$32,791.28 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, comprising a total river stretch of about 14½ miles. The total rental from this source up to March 31, 1942, amounted to \$210,641.17, of which \$144.30 was collected during the year. These leases comprise portions of the bed of Klondike River. For the purpose of gold recovery 11 dredges engaged in mining in Yukon Territory, most of which are being 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. There are still 4 hydraulic mining locations held under lease, comprising a total stretch of approximately 16 linear miles. Rentals amounting to \$211,141.50 have been collected on account of such locations, the amount received during the fiscal year being \$2,398.

Coal Leases.—Two coal mining leases are in good standing comprising in all an area of 52 acres in the Moose River district.

PLACER MINING CLAIMS

The total number of placer claims in good standing at the close of the year was 2,616, most of which are held by the Yukon Consolidated Gold Corporation, Limited. Ten dredges were operated by this company during the year and these produced 60,527 fine ounces of gold and 4,624 fine ounces of silver. The company employed an average of 390 men, the peak during the operating season being 702, and expended \$1,163,000 for salaries, wages, and power. A further sum of \$933,000 was expended for equipment, supplies, and freight.

The greater part of the 87,442.60 ounces of gold produced during the year was from the Dawson District, the Mayo District producing 2,550.75 ounces and the Whitehorse District, 932.37 ounces.

LODE MINING

Dawson District.—Entries were granted for 20 quartz claims staked during the year and development work was conducted on 101 claims previously staked.

Mayo District.—Twenty-three claims were located during the year and development work was undertaken on 340 others. Operations in this area were conducted mainly by Treadwell Yukon Corporation, Limited, on the Calumet claim, the mill being operated for a period of six months ended October 22, 1941. The ore mined amounted to 23,369 dry tons, 124 tons of which were sorted for shipment and the remainder milled. Concentrates recovered were 2,129 tons, the amount shipped being 1,476 tons. The concentrates shipped contained 763,055 ounces of silver and 1,552,162 pounds of lead and had a market value of \$359,282.50.

PROSPECTING LEASES

Prospecting leases representing a total stretch of 236 miles were issued during the year, comprising locations on several water courses, an increase of 38 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 1,098 samples of rock for assay were received from all parts of the Territory, and 1,752 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, 1,098; lead, 649; copper, 4; and tungsten, 1.

ROADS AND BRIDGES

Expenditures on the maintenance of the road system out of Territorial funds were \$57,316.80, an increase of \$7,266.23 over the previous year. Work was confined to maintenance of roads most used though a small amount was expended on new construction of roads to Haggart and Hight Creeks, respectively, in the Mayo District.

DEVELOPMENT OF AIRCRAFT LANDING FACILITIES

The sum of \$3,183.60 was expended from Territorial funds on improvements to Dawson and Mayo landing fields and the Braeburn and Flat Creek emergency fields.

AGRICULTURE

The summer 1941 was free from early and late frosts, but it was extremely dry and for this reason all crops were light. Owing to the lack of rain seeds for root crops did not germinate. In Dawson, production of tomatoes under glass was particularly good.

PUBLIC WELFARE

The general health of the public of the Territory was good. Hospitals were operated at Dawson, Mayo, and Whitehorse, grants for their maintenance being provided by the Yukon Council. The numbers of hospital days of patients for the year were: Dawson, 13,776; Mayo, 1,817; Whitehorse, 2,878; the numbers of hospital days for indigents were: Dawson, 10,178; Mayo, 569; Whitehorse, 102.

EDUCATION

Schools were maintained during the year at Dawson, Whitehorse, Carcross, Mayo, and at the "Elsa" camp on Galena Hill. The enrolment of pupils for the year was 273 and the number of teachers employed was 10.

LAW AND ORDER

Law and order have been maintained throughout the Territory by the Royal Canadian Mounted Police, and the local administration has received the co-operation of the police at all times. The Yukon Act having been amended to provide for the appointment of Stipendiary Magistrates to exercise the powers, authorities, and functions vested in the Judge of the Court, Mr. J. E. Gibben was appointed a Stipendiary Magistrate for the Yukon Territory on August 14, 1941.

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

In this inventory there are 5,890 parcels of land listed. The record shows the situation and area of each parcel, and the controlling Department.

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. During the year investigations of 14 parcels were made in Quebec, 11 parcels in Ontario, and 1 each in Nova Scotia and Alberta. General investigations of lands in British Columbia were continued. A survey was made at Levis, Quebec. There were 18 leases and permits issued during the year and 17 sales effected. The revenue from Ordnance lands amounted to \$34,701.66.

PUBLIC LANDS

Three parcels of land were transferred to this Department for administration during the year and four properties were disposed of by sale. The revenue from sales and leases amounted to \$8,288.19.

SOLDIER SETTLEMENT CHARGED LANDS

The unpatented lands on the security of which advances have been made under the Soldier Settlement Act remain vested in the Crown in the right of the Dominion. There are 163 parcels comprising approximately 20,000 acres remaining of such lands, spread over the four western provinces. When entrants have completed their duties in accordance with the terms of the Dominion Lands Act and have paid their indebtedness to the Soldier Settlement of Canada, Letters Patent are issued in their favour. If the indebtedness is still unpaid when the duties are completed, Letters Patent are issued in favour of the Director of Soldier Settlement.

TIMBER AND GRAZING

Timber.—Eleven licence timber berths within the boundaries of National Parks cover a total area of 65.90 square miles; 2 of these berths are in the Province of Manitoba and 9 in British Columbia. During the year licences in duplicate were issued for these berths and the revenue amounted to \$3,036.95.

On the Dominion Government Coal Block near Hosmer, B.C., one permit timber berth was relinquished, while the area of the only other remaining berth was increased by Order in Council from 272 acres to 1,032 acres. The revenue from these berths was \$663.91.

Grazing.—During the year 10,695 acres were covered by 6 annual grazing permits on quarantine reserves along the southern boundary of Saskatchewan and Alberta. This was an increase of 1,095 acres as compared with last year. In the summer grazing season of 1941 there were 190 cattle, 172 horses, and 310 sheep grazing on these lands. The revenue, consisting of ground rent, amounted to \$213.90.

Letters of inquiry from prospective settlers regarding the obtaining of lands in the western provinces, both for settlement and cattle grazing purposes, which are now under the jurisdiction of the provincial governments, continue to reach this Administration and are placed in their proper channels. Also considerable research work was undertaken having relation to both land settlement and timber berth transactions which took place many years ago.

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 1,338 cases. Their recommendations were ratified by Orders in Council and 1,109 discharges and releases of liens were issued, resulting in writing off the amount of \$146,498.35. There were 2,055 inquiries received from the provinces for statements of indebtedness outstanding relative to the issue of land grants, and 141 certificates of indebtedness were issued to be attached to title. There were also 4,920 inquiries received from the different Debt Adjustment Boards in the western provinces. Gross collections for the fiscal year amounted to \$16,990.58, which represents an increase of \$1,051.85 over the previous year. The sum of \$615.70 was refunded leaving a net revenue of \$16,374.88.

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, 1942:

	Principal	Interest	Total
DEBITS			
	\$ cts.	\$ cts.	\$ cts.
Balance outstanding, March 31, 1941.....	2,827,034 61	3,407,863 08	6,234,897 69
Accrued interest, April 1, 1941 to March 31, 1942.....		165,634 11	165,634 11
Total Debits.....	2,827,034 61	3,573,497 19	6,400,531 80
CREDITS			
Net Revenue—April 1, 1941 to March 31, 1942	10,126 38	6,248 50	16,374 88
Amount written off—as loss by Orders in Council (Sec. 1, Chap. 51, 17 George V.).	58,406 84	88,091 51	146,498 35
Amount collected and retained by Province of Saskatchewan as Commission Clause 18, Natural Resources Agreement with Province of Saskatchewan.....	1 00	17 65	18 65
Total Credits.....	68,534 22	94,357 66	162,891 88
Amount outstanding March 31, 1942.....	2,758,500 39	3,479,139 53	6,237,639 92

SUMMARY

PROVINCE OF MANITOBA

	Principal	Interest	Total
DEBITS			
	\$ cts.	\$ cts.	\$ cts.
Amount outstanding, March 31, 1941.....	14,512 87	19,522 36	34,035 23
Accrued interest, April 1, 1941 to March 31, 1942.....		768 97	768 97
Total Debits.....	14,512 87	20,291 33	34,804 20
CREDITS			
Net Revenue—April 1, 1941 to March 31, 1942	414 96	106 10	521 06
Amount written off as loss by Orders in Council.	182 34	542 53	724 87
Total Credits.....	597 30	648 63	1,245 93
Amount outstanding March 31, 1942.....	13,915 57	19,642 70	33,558 27

SUMMARY—Concluded

PROVINCE OF SASKATCHEWAN

	Principal	Interest	Total
DEBITS			
	\$ cts.	\$ cts.	\$ cts.
Amount outstanding March 31, 1941.....	1,771,272 67	2,081,660 16	3,852,932 83
Accrued interest April 1, 1941 to March 31, 1942.....		103,412 36	103,412 36
Total Debits.....	1,771,272 67	2,185,072 52	3,956,345 19
CREDITS			
Net Revenue—April 1, 1941 to March 31, 1942.	6,133 45	5,722 38	11,855 83
Amount written off as loss by Orders in Council	8,779 82	16,669 39	25,449 21
Amount collected and retained, as commission..	1 00	17 65	18 65
Total Credits.....	14,914 27	22,409 42	37,323 69
Amount outstanding March 31, 1942.....	1,756,358 40	2,162,663 10	3,919,021 50

PROVINCE OF ALBERTA

	Principal	Interest	Total
DEBITS			
	\$ cts.	\$ cts.	\$ cts.
Amount outstanding, March 31, 1941.....	1,041,224 07	1,306,648 06	2,347,872 13
Accrued interest April 1, 1941 to March 31, 1942.....		61,451 53	61,451 53
Total Debits.....	1,041,224 07	1,368,099 59	2,409,323 66
CREDITS			
Net Revenue—April 1, 1941 to March 31, 1942.	3,577 97	420,02	3,997 99
Amount written off as loss by Orders in Council.	49,444 68	70,879 59	120,324 27
Total Credits.....	53,022 65	71,299 61	124,322 26
Amount outstanding March 31, 1942.....	988,201 42	1,296,799 98	2,285,001 40

PROVINCE OF BRITISH COLUMBIA

Amount outstanding March 31, 1942.....	25 00	33 75	58 75
--	-------	-------	-------

LETTERS PATENT

During the year 12 Letters Patent, covering a total of 1,553 acres, were issued for lands in the four western provinces and the Northwest Territories. There were 237 certified copies of Letters Patent issued for which \$525 was received.

NATIONAL PARKS BUREAU

During the year the national parks continued to function as morale-building areas for a nation at war; as substantial contributors—through tourist travel—to Canada's supply of foreign exchange; and as places of sanctuary for native animal and bird life of the Dominion. War restrictions on travel did not come into effect in time to prevent attendance at the national parks reaching the highest figure on record.

Necessary maintenance and development work was carried on, having always in view the reduction of expenditures to the lowest point consistent with provident management. While the parks are not operated primarily as revenue-producers, it is worthy of note that revenue for the fiscal year exceeded all previous annual figures.

Measures were taken to protect park forests against damage by fire, insects, and depredation; wild life was protected; steps were taken to improve the fishing in park waters; historic sites were preserved and new sites marked; and a general publicity and educational campaign was carried on to acquaint Canadians with the resources they possess in their national parks, and to attract travel from other countries.

A new feature arising out of the war was the employment of Mennonites and other conscientious objectors on forest conservation and protection in the national parks.

Co-operation was extended to the Navy League of Canada in providing a site for a cadet training camp on Beausoleil Island, which is situated in Georgian Bay Islands National Park, Ontario.

ADMINISTRATION

The National Parks are administered under the authority and provisions of the National Parks Act (20-21 George V, Chap. 33), sundry Provincial Agreements, and the National Parks Regulations. The Act also covers the National Historic Parks, set aside to commemorate historic events or to preserve national sites and monuments. The Bureau is advised in the marking of historic sites by the Historic Sites and Monuments Board of Canada, an honorary body composed of a number of recognized historians.

In addition to the care and control of wild life within the parks, the Bureau administers the Migratory Birds Convention Act and the Game Export Act (assented to 14th June, 1941) which is a Dominion Statute in aid of Provincial game legislation.

HIGHLIGHTS OF THE YEAR

The official opening of Cape Breton Highlands National Park, Nova Scotia, on July 1, 1941, was an event of outstanding importance. The ceremonies were carried out at the park entrance near Ingonish Beach with John M. Campbell, M.L.A., as chairman. Brief but appropriate addresses were delivered by Hon. T. A. Crerar, Minister of Mines and Resources, and Hon. A. S. MacMillan, Premier of Nova Scotia, after which a plaid ribbon stretched across the park highway was cut by Hon. Mr. MacMillan.

Another event of interest was the official opening of the Port Royal Habitation, Port Royal National Historic Park, Lower Granville, Nova Scotia, on July 4, 1941. This group of buildings, constructed as nearly as possible as a replica of the original Habitation erected in 1605, commemorates the first permanent European settlement in Canada. The program included addresses by Hon. T. A. Crerar, Minister of Mines and Resources, who acted as chairman; Hon. E. Fabre-Surveyer of the Superior Court of Quebec; and Professor D. C.

Harvey, Archivist for the Province of Nova Scotia. Mr. Justice Fabre-Surveyer and Professor Harvey are members of the Historic Sites and Monuments Board of Canada. Greetings from and to the Order of 1606, Boston, Mass., and the Associates of Port Royal in the United States were read, and vocal selections in French and English were delivered by local artists. A record of the ceremonies was later broadcast by the Canadian Broadcasting Corporation.

On November 20, 1941, the house at Saint Lin, Quebec, in which Sir Wilfrid Laurier was born, was formally dedicated as a national historic site by Right Honourable W. L. Mackenzie King, Prime Minister of Canada. The dedication ceremonies were held on the hundredth anniversary of Sir Wilfrid's birth and were attended by many prominent in the political, social, and business life of the Dominion. Following a brief address the Prime Minister declared the house formally opened, and later officiated at the unveiling of a bronze tablet erected on the grounds to the memory of Sir Wilfrid.

Addresses were also delivered by Major-General Sir Eugene Fiset, Lieutenant Governor of Quebec; Honourable Adelard Godbout, Premier of Quebec; Honourable Bernard Bissonnette, Speaker of the Legislative Assembly of Quebec; Honourable Pierre F. Casgrain, Secretary of State for Canada; Honourable E. Fabre-Surveyer, member of the Historic Sites and Monuments Board of Canada; C. E. Ferland, M.P., and Philias Piche, Mayor of Saint Lin. Numerous messages and telegrams were also received from persons unable to attend the ceremonies, including His Excellency the Governor General, and Right Honourable Ernest Lapointe, Minister of Justice.

EVENTS OF INTEREST

The national parks continued to serve as centres for outdoor recreation, and numerous events sponsored by public and private organizations were successfully carried out. The annual five-day outing of the Trail Riders of the Canadian Rockies was held in Banff National Park and adjacent areas from July 25 to 29. The route from Banff to Mount Assiniboine traversed White Man and Assiniboine Passes, return being made via Sunshine Valley. The annual Sky Line Trail Hikers' meet was held in Kootenay National Park from August 1 to 4, and had the largest attendance in the history of the organization. The main camp was pitched at Prolific Meadow, near the headwaters of Numa Creek.

Approximately 120 mountaineers from Canada, United States, and other countries attended the annual camp of the Alpine Club of Canada in Glacier National Park, British Columbia, from July 20 to August 3. The site of the old Glacier House Hotel was used as a base of operations from which many spectacular climbs were carried out.

Winter sports events held in the parks were well attended. The annual Banff Winter Carnival held from February 12 to 15 attracted visitors from many points. A two-day skating carnival in Jasper was very successful, and the annual men's and women's curling bonspiels were well patronized. Many skiers enjoyed the opportunities for downhill skiing in Banff, Jasper, Yoho, and Mount Revelstoke National Parks.

A new attendance record was set at the Banff School of Fine Arts which held its ninth annual summer course in Banff from August 1 to 30. This project, sponsored by the Department of Extension, University of Alberta, offers special courses in art, music and drama. A party of 34 photographers, representing nearly every state in the United States, attended a school of photography in Jasper National Park from June 18 to 25.

During the latter part of June a large party of travel editors and feature news writers from the United States visited Banff, Jasper, and Waterton

Lakes National Parks. The excursion was sponsored by the Pacific Northwest Tourist Association, and the itinerary included a trip over the Banff-Jasper Highway.

His Excellency the Governor General and Her Royal Highness the Princess Alice visited Banff National Park in April. During the summer the Duke of Kent and party spent several days in Banff and Jasper National Parks.

The extensive use made of camping and picnic grounds in the parks was evidenced by the season's registrations. A total of 27,919 persons made use of the camping facilities at Tunnel Mountain camp-ground in Banff National Park, in addition to 8,850 persons utilizing the Central Park picnic grounds in the townsite of Banff. Public camp-grounds in Jasper, Kootenay, Yoho, Waterton Lakes, Elk Island, Prince Albert, Riding Mountain, and Point Pelee National Parks were also extensively used during the summer tourist season.

Bath-houses and swimming pools operated at the hot mineral springs in the parks were well patronized. The bathing establishment at the Upper Hot Springs, Banff, was used by 55,100 persons, and at the Cave and Basin Springs 48,845 persons were registered. At Radium Hot Springs in Kootenay Park a total of 29,471 persons used the swimming pool, and 14,952 persons made use of the swimming pool and baths at Miette Hot Springs in Jasper National Park.

The popularity of golf was reflected by increased use of many of the park courses. The annual tournament held at the Wasagaming Golf Club in Riding Mountain National Park attracted a record entry of 128. In Prince Albert National Park the annual "Lobstick" tournament was one of the popular events of the season. The number of players using the new Green Gables links in Prince Edward Island exceeded previous records, and increased use was made of the links in Cape Breton Highlands National Park. Annual tournaments were staged on the courses in Waterton Lakes and Elk Island National Parks, and on the courses operated in connection with Banff Springs Hotel and Jasper Park Lodge.

Annual regattas held in Prince Albert National Park and Riding Mountain National Park were well attended.

The park museum at Banff was visited by 33,482 people, an increase of 3,478 over the previous year. Exhibits on display in the museums at Riding Mountain and Prince Albert National Parks also attracted many visitors.

Information bureaus maintained in the larger parks during the summer tourist season found favour with the travelling public. A total of 22,371 inquiries were handled at Banff, 9,600 at Jasper, and 7,500 at Waterton Lakes National Parks.

TRAVEL TO THE PARKS

Visitors to the national parks and national historic parks numbered 1,000,563, an increase of approximately six per cent over the previous year. New attendance records were established at several parks, including Banff, Waterton Lakes, and Riding Mountain. Details as to the attendance at individual parks are given in the accompanying table.

A change in the method of compiling attendance figures for Banff, Jasper, Kootenay, and Yoho Parks—contiguous areas in the Rocky Mountains—was instituted during the year. Under the system adopted, inter-park traffic is no longer included in the totals. For purposes of comparison, the figures for 1940-41 in the following table have accordingly been revised.

Attendance at National Parks

National Parks	1941-42	1940-41*
Banff.....	278,286	240,900
Cape Breton Highlands.....	23,694	20,151
Elk Island.....	36,606	49,977
Georgian Bay Islands.....	4,061	3,157
Glacier.....	320	941
Jasper.....	24,761	32,017
Kootenay.....	33,812	31,233
Mount Revelstoke.....	5,783	9,025
Nemiskam.....	11	14
Point Pelee.....	104,442	107,833
Prince Albert.....	28,833	30,090
Prince Edward Island.....	40,470	35,665
Riding Mountain.....	176,161	163,230
St. Lawrence Islands.....	16,396	16,650
Waterton Lakes.....	135,774	114,578
Yoho.....	34,975	27,925
National Historic Parks		
Fort Anne.....	7,595	11,321
Fort Beausejour.....	6,379	12,488
Fort Chambly.....	5,835	9,345
Fortress of Louisbourg.....	6,690	10,879
Fort Malden.....	11,821	.....
Fort Wellington.....	8,771	8,852
Port Royal.....	9,087	6,662
Total.....	1,000,563	942,933

* Revised figures.

PUBLIC RELATIONS

Attention was directed to the value of national parks and the recreational opportunities afforded by them through the media of press, motion picture film, lantern slide, photo and mat services, educational exhibits, and public and radio addresses. Co-operation was extended to the Canadian Travel Bureau, transportation companies, advertising services, and other agencies engaged in the promotion of tourist travel. Special publicity was devoted to the official opening of Cape Breton Highlands National Park, and Port Royal National Historic Park, and to the dedication of the birthplace of Sir Wilfrid Laurier as a national historic site.

PRESS SERVICES

The inauguration of a new mat service met with a ready response from the press of Canada. More than 475 daily and weekly newspapers and a number of periodicals were furnished on request with this type of material. Many mats were accompanied by specially prepared articles describing the attractions of the national parks. Articles and illustrations were also supplied to a number of publications in the United States where they received generous publicity. In addition, nearly 300 half-tones and line-cuts were lent to editors, publishers, and advertising services.

Press publicity was also obtained through the medium of the Canadian Resources Bulletin, a news-sheet issued weekly by the Department. This sheet

carries news items and facts of interest relating to the parks and associated services, and is mailed to a large number of newspapers in Canada and the United States, as well as to writers, news services, and travel agencies.

PARKS LITERATURE

Requests for literature descriptive of national parks and historic sites continued, and to meet the demand 393,535 copies of publications were printed. Included was "Canada's Mountain Playgrounds", the third in a series of illustrated booklets describing the national parks in groups according to geographical location. An illustrated folder descriptive of Riding Mountain National Park was lithographed in natural colour, and a new folder describing Canada's national park system, was also produced.

Material forwarded to tourist agencies, transportation companies, automobile associations, boards of trade, educational institutions, and individuals during the year included 539,922 copies of parks literature, 1,746 copies of the Canada Descriptive Atlas, and approximately 15,500 copies of maps and other literature published by private enterprise. A considerable part of this material was distributed in the national parks from tourist information bureaus operated during the season.

A list of publications printed for general distribution follows:—

Banff National Park (general information folder)	55,800
Canada's Mountain Playgrounds (descriptive booklet)	100,000
Fort Chambly National Historic Park (leaflet) (English edition)....	10,000
Fort Chambly National Historic Park (leaflet) (French edition)....	10,000
Jasper National Park (general information folder).....	25,885
Kootenay-Yoho-Glacier-Mount Revelstoke National Parks (general information folder)	35,150
National Parks of Canada (illustrated folder)	100,000
Riding Mountain National Park (folder in natural colour).....	30,000
Waterton Lakes National Park (general information folder).....	25,700
Catalogue of Motion Picture Films.....	1,000
Total	393,535

A leaflet describing the Habitation at Port Royal National Historic Park, and new editions of general information folders on Banff, Cape Breton Highlands, Jasper, Prince Albert, and Riding Mountain National Parks were also prepared, but at the close of the fiscal year had not been delivered by the printer.

FILMS AND LANTERN SLIDES

The popularity of motion pictures as a medium of publicity and education was evidenced by a circulation of 3,038 films depicting the attractions of the national parks. These films were shown by travel organizations, educational institutions, conservation societies, field officers, and lecturers in different parts of Canada, the United States, Newfoundland, the West Indies, Great Britain, Brazil, Argentina, New Zealand, and Australia. The reported total attendance at showings of these films at home and abroad was 1,032,004.

A total of 183 new prints was added to the film library during the year. The library now contains 96 subjects in 16-mm. size and 86 prints in 35-mm. size. New kodachrome film was purchased, cut, and edited for five new subjects which have not yet been released. Assistance was furnished in re-editing the film "Radium Mining in Canada's Sub-Arctic" for another Branch of the Department, and in cutting and re-editing the film "Greenland". The services of the Motion Picture Division were also extended in the field of entertainment to various groups of the National War Services by provision of an operator for more than 200 film showings after office hours.

The demand for lantern slides as a publicity and educational medium continued, and 2,254 slides, accompanied by lecture notes, were lent to lecturers, educators, and others. Additions to the library stock included 156 new slides.

ILLUSTRATION MATERIAL

An increased demand for photographs of the scenery, wild life, and recreational facilities of the parks by editors, publishers, advertising services, lithographers, and writers was met by the free distribution of 4,171 prints and enlargements. Additions to the photographic library included 50 new negatives and 2,176 prints and enlargements. Thirty-five transmits were also obtained for display purposes.

INFORMATION SERVICE

Requests for information from editors, publishers, and individuals were dealt with, and text matter, maps, and captions for illustrations in encyclopedias, almanacs, year books, highway maps, and tourist guides were checked and revised as required. Numerous inquiries for detailed travel information were also given individual attention.

PARKS EXHIBITS

Excellent publicity was obtained from exhibits arranged at expositions and sportsmen's and travel shows in Canada and the United States. The National Parks Bureau again participated in the Canadian National Exhibition at Toronto. A new exhibit with artistically designed background depicting the recreational advantages and wild life resources of the national parks was displayed in the Railway Building, and was awarded a gold medal by the Exhibition Commission. A travel information service was maintained in connection with the exhibit.

In co-operation with the Canadian Travel Bureau, mounted wild life specimens, photographs, transmits and other national park exhibits were placed on view in resort, travel, and sportsmen's shows at New York, Boston, Philadelphia, Chicago, Detroit, Indianapolis, Milwaukee, Walla Walla, and Los Angeles. Material was also lent for showing at the Royal Agricultural Exhibit in Sydney, Australia.

New exhibition material obtained included mounted specimens of wild animals native to the national parks. Assistance was extended to the Canadian Exhibition Commission in the selection of specimens required to complete a representative collection of Canadian mammals.

GENERAL

The Superintendent of Publicity and Information attended travel conferences held at Edmonton, Alberta, and Spokane, Washington. Addresses, both to the public direct and over the radio, were delivered on various occasions. Publicity contacts were established at Minneapolis, St. Paul, Chicago, and Detroit which have had favourable results in acquainting Americans with Canada's war effort and in keeping before them the attractions which this country presents to vacationists.

Publicity for the official opening of Cape Breton Highlands National Park, including radio broadcasts and motion pictures, was personally supervised, as was also that for the opening of the Habitation in Port Royal National Historic Park and the dedication of Sir Wilfrid Laurier's birthplace at St. Lin, P.Q., as a national historic site.

DIRECT REVENUE

The gross revenue from the National Parks and from administration of the Migratory Birds Convention Act for the fiscal year 1941-42 amounted to \$470,572 and \$941.36 respectively, exceeding all previous records. Compared with figures of \$393,012.55 and \$534.12 respectively for the previous year, the combined net increase was \$77,966.69.

MAINTENANCE AND IMPROVEMENTS

Maintenance of motor highways and secondary roads, trails, bridges, buildings, and recreational facilities in the parks was continued. In the park townships streets and sidewalks were maintained and repaired; electric light, telephone, water, and sewage systems operated; collection and disposal of refuse attended to, and mosquito control measures carried out.

NEW CONSTRUCTION

A number of important projects were commenced or completed during the year. New steel highway bridges were constructed over Pipestone River in Banff Park, Sinclair Creek in Kootenay Park, Athabaska River in Jasper Park, and Pass Creek in Waterton Lakes Park. These bridges replaced original timber structures that had become unsafe for traffic and could not be economically repaired. A contract was let and construction commenced on a new fish hatchery in Jasper Park. The construction of a new breakwater in Prince Albert Park was commenced as a joint undertaking with the Department of Public Works. Approximately 20 miles of the Trans-Canada Highway in Banff Park, including a short spur road to Chateau Lake Louise, were hard-surfaced, and three miles of highway between the Town of Jasper and Jasper Park Lodge were given similar treatment.

ROADS AND BRIDGES

New highway construction was carried out in Cape Breton Highlands Park where 1.8 miles of the Cabot Trail at the eastern entrance were re-aligned and brought up to park standard. In addition, half a mile of new road leading from the main highway to the recreational area at Ingonish Beach was built.

Considerable work was also carried out in extending and grading secondary roads and trails in Kootenay, Yoho, Glacier, Elk Island, Banff, Jasper, Prince Albert, and Riding Mountain National Parks. These roads serve a dual purpose in opening up new scenic areas and permitting easy access of fire protection equipment.

COMMUNICATION SYSTEMS

A total of 20 miles of forest telephone lines was constructed during the year. This mileage included 10 miles of new construction in Banff Park and 6 miles in Riding Mountain Park. Three miles of line were reconstructed in Jasper Park. In addition, 2 miles of telephone wire were replaced in Waterton Lakes Park.

Portable transmitter-receiving wireless sets were installed in Banff and Jasper Parks for forest protection and inter-park communication purposes. This type of communication has proven very satisfactory in Prince Albert, Riding Mountain, and Cape Breton Highlands Parks where similar types of sets were previously installed.

The following table shows the mileage of roads, trails, and telephone lines within the national parks as of March 31, 1942:—

National Park	Roads			Trails	Telephone Lines
	Motor	Secondary	Total		
Banff.....	171.7	11.6	183.3	755.0	266.5
Cape Breton Highlands.....	50.8	1.6	52.4	21.0	.....
Elk Island.....	16.0	.....	16.0	14.0	16.0
Glacier.....	.....	6.0	6.0	115.0	1.5
Jasper.....	155.0	9.0	164.0	554.0	411.0
Kootenay.....	61.1	8.0	69.1	152.7	60.0
Mount Revelstoke.....	18.0	.....	18.0	30.5	10.75
Point Pelee.....	6.5	2.8	9.3	.....	.....
Prince Albert.....	69.0	185.9	254.9	248.0	162.0
Prince Edward Island.....	7.1	2.5	9.6	.....	.....
Riding Mountain.....	60.3	46.9	107.2	119.0	146.0
Waterton Lakes.....	47.8	13.5	61.3	244.1	60.2
Yoho.....	46.0	6.0	52.0	199.0	51.0
Total.....	709.3	293.8	1,003.1	2,452.3	1,184.95

BUILDINGS

Buildings completed in Banff Park included new warden cabins on the north side of Lake Minnewanka, on Stoney Creek, and at Fortune warden station in the Spray Lakes district. Fire lookout stations were constructed on Beehive and Tunnel Mountains, a comfort station was erected on the Administration Building grounds at Banff, and two staff residences were transferred from Lake Minnewanka to the Town of Banff and altered for isolation hospital purposes.

A new horse stable, fire shed, and patrol cabin were constructed in Glacier Park. In Kootenay Park two work camps were built along the Banff-Windermere Highway. Kitchen shelters, together with water and sanitary conveniences, were provided at three new public camp-grounds in Jasper Park. A modern barn was erected in Elk Island Park to replace a structure destroyed by fire. In addition a small pump-house and an ice-house were built.

Farm buildings near the golf links in Cape Breton Highlands Park were moved and remodelled for use as a golf club-house and a storage building. A grandstand was also built at the athletic field at Ingonish Beach.

GENERAL IMPROVEMENTS

Additional guard rails, embankment protection works, and rustic signs were provided in many parks for the protection of highway traffic. The intake of the water system at Radium Hot Springs in Kootenay Park was extended up Sinclair Creek to provide a higher pressure for both fire protection and domestic requirements. Small dams were built in the Sturgeon River in Prince Albert Park and at the outlet of Whirlpool Lake in Riding Mountain Park to assist in regulating the flow of water and maintain higher levels. The cultivation of a black walnut plantation in Point Pelee Park was continued. Special attention was devoted to the maintenance of cribs and dykes constructed for the protection of park highways in Cape Breton Highlands National Park from the action of the sea during storms.

EXTENSION OF TOURIST ACCOMMODATIONS

Facilities for the accommodation of tourists in Banff Park were improved by the addition of approximately 40 new bungalow cabins, erected by private enterprise. In Jasper Park, a new bungalow camp situated near Sunwapta Falls on the Banff-Jasper Highway was opened. A new central building with lounge

was added to a bungalow camp in Riding Mountain Park, and additional tourist conveniences were provided by a bungalow camp operator in Waterton Lakes Park. Two four-room bungalows were added to the Keltic Lodge development at Ingonish in Cape Breton Highlands Park.

LAKE MINNEWANKA POWER DEVELOPMENT

Under authority of the War Measures Act, permission was granted by Order in Council to the Calgary Power Company to increase the storage facilities of Lake Minnewanka and to construct a hydro-electric development at Anthracite, both areas being in Banff National Park. This action was subsequently ratified by concurrent legislation of the Dominion of Canada and the Province of Alberta (Natural Resources Transfer Agreement Act, 1941, Chapter 22). The additional power to be provided is intended to augment existing energy for war industry in the City of Calgary.

Work on the project was commenced early in 1941, and considerable progress has been made. As of March 31, 1942, construction of the main dam, power canal, tail race, and wood-stave pipeline was completed. The sub-structure of the power-house was also finished and turbine installed. Nearly completed were a steel penstock, surge tank, railway and highway culverts, control dam, and rip-rapping for the power canal. Necessary clearing and grubbing along the canal and around Lake Minnewanka was carried out, and a new trail built along the north shore of the lake.

The project also calls for the construction of a new scenic motor road from Anthracite to Lake Minnewanka which will provide a link in a loop drive from Banff, and the development of an area at the western end of Lake Minnewanka which will contain sites for a bungalow camp and a public camp-ground. While the progress made by the Calgary Power Company on these developments has not been up to expectations, it is hoped that all work will be completed by the end of the 1942 season.

USE OF ALTERNATIVE SERVICE WORKERS

By authority of the National Resources Mobilization Act and the War Measures Act, the National War Service Regulations were amended in 1941 to permit Mennonites and other conscientious objectors exempted from military service to perform alternative service work for a period of four months in Banff, Jasper, Kootenay, Prince Albert, and Riding Mountain Parks. During the period June 1, 1941-March 31, 1942, a total of 1,277 men of the 21- to 25-year-old class as of July 1, 1940, reported for work. Of these 74 were subsequently discharged for medical or other reasons, and 16 enlisted for active service.

Projects on which workers were employed included construction or improvement of fire roads and trails, telephone lines, fences, dams, trail bridges, and culverts. Silviculture, the control of forest insect infestation, salvage of fire-killed timber, and the harvesting of hay for park use were also carried out.

New construction completed by alternative service workers included 1.7 miles of highway, 28.25 miles of secondary road, and 2,000 rods of fencing. In addition 50 miles of highway, 120 miles of secondary road, and 8.6 miles of pony trail were improved, and 10 miles of telephone line rebuilt. Tourist camp-ground facilities were improved in several parks, and a number of permanent buildings constructed. The construction of a large breakwater was partly completed in Prince Albert Park, and dams and flumes were built in other parks to improve the supply of water available for park purposes.

Practically all workers willingly carried out tasks assigned to them. At most camps the return of work in man-days equalled that usually performed by regular park labourers at prevailing rates, and much useful work of a forest con-

servations nature, which would not have been possible under regular appropriations, was accomplished.

HEALTH AND MEDICAL SERVICES

During the year, constant supervision was maintained over all matters relating to public health in the national parks. 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 and first aid kits were obtained for use in the parks, and medical services were also provided for alternative service workers' camps.

CONSERVATION

FOREST PROTECTION

Losses by fire during the 1941 season were considerably lower than in 1940. Increased precipitation in the mountain parks assisted in keeping the fire hazard at a low point. A total of 64 fires occurred, which burned an area of 60,487 acres inside the national parks, as compared with 104 fires and a burned area of 186,362 acres in 1940. The greater part of this loss was sustained in Prince Albert Park, where fires swept in from settled areas to the south and west, and burned some 59,000 acres within the park. Only one fire—in the marsh area of Point Pelee Park—occurred in the eastern parks.

An analysis of the cause of these fires showed that lightning was responsible for 26 per cent of the total. Approximately 20 per cent of the fires resulted from carelessness on the part of campers, and smokers accounted for 17 per cent.

Fire losses by parks in the fiscal year ended March 31, 1942, compared with losses for the preceding year, are given in the following table:—

Fire Losses in the National Parks

Park	Number of Fires	Area Burned Acres		Cost of Suppression	
		1940	1941	1940	1941
				\$ cts.	\$ cts.
Banff.....	26	8,885	68	20,133 58	610 56
Buffalo.....		125		24 50	
Elk Island.....	3		650		195 29
Glacier.....	1	Spot	1		61 25
Jasper.....	11	"	33	23 65	271 51
Kootenay.....		"		53 07	
Mount Revelstoke.....	5	2,904	7	6,725 58	266 32
Point Pelee.....	1		500		20 00
Prince Albert.....	14	123,705	59,056	20,299 54	10,777 02
Riding Mountain.....	1	50,718	10	9,358 11	18 60
Waterton Lakes.....		Spot		91 35	
Yoho.....	2	25	162	780 98	532 16
Total.....	64	186,362	60,487	57,490 36	12,752 71

IMPROVEMENT IN FIRE PREVENTION EQUIPMENT

An important requirement for forest protection in the mountain parks of Western Canada is an adequate lookout system to detect fires while they are small and controllable. With this fact in view a preliminary survey was carried out in 1940 to select potential sites for lookouts. This survey was continued in the summer of 1941, and sites for lookout stations were located in Banff, Jasper, Kootenay, Yoho, and Waterton Lakes Parks.

As a result of this survey, a 30-foot steel tower with pre-fabricated wooden cabin was erected on Tunnel Mountain, and a reinforced concrete cabin was constructed on Little Beehive Mountain, both in Banff Park. In Jasper Park material was bought for a 40-foot tower and pre-fabricated wooden cabin which will be erected in 1942.

Fire protection communication system in Banff and Jasper Parks were improved by installation of twelve trans-receiver radio sets to supplement the existing forest telephone systems. Fire trails, sufficiently wide to allow passage of light trucks, were improved in Banff, Jasper, Prince Albert, and Riding Mountain Parks.

FIRE HAZARD STUDIES

Fire hazard studies commenced in 1939 to determine the relationship between weather and fire-hazard conditions were continued. A new fire-weather station was established in the Ottertail region of Yoho Park, which complements stations already established in Banff, Jasper, Waterton Lakes, Prince Albert, and Riding Mountain Parks.

INSECT CONTROL

Measures for the control of the lodgepole pine bark-beetle (*Dendroctonus monticola*) were continued in Banff and Kootenay Parks under the supervision of an entomologist of the Department of Agriculture. Following a survey of an affected area in Banff Park, all infested trees were marked, cut and burnt. In this work, care was taken to burn around stumps so that no bark remained to harbour grubs.

In Kootenay Park, where infestation first occurred several years ago, dead trees were removed from affected areas on each side of the Banff-Windermere Highway. Using alternative service workers, the necessary logging and saw-mill operations were carried out, and as a result, approximately 500,000 board feet of lumber were salvaged for official use.

Further examinations of areas showing evidence of beetle infestation are planned, and, where necessary, control measures will be inaugurated promptly to prevent the disease from reaching epidemic stage.

During the year the Bureau continued to co-operate with the Division of Entomology, Department of Agriculture, in collecting specimens for the annual "Forest Insect Survey".

WILD LIFE MANAGEMENT

The national parks continued to function as living museums, where examples of Canada's native wild life flourish in an ideal environment. When the parks were first established, most of them contained depleted wild animal populations, but under sanctuary conditions, one species after another is attaining the maximum population that the area can support. Even in Banff, oldest of Canada's park units, this development is still going on. In this area the white-tailed deer, common a century ago, has reappeared and is increasing each year.

In general, natural controls limit the animal population of the parks to reasonable figures. An exception, however, was recorded during the year in Banff Park, where it was found necessary to slaughter a number of elk in Bow River Valley. This action was taken only after a biological investigation, carried out during the critical months of winter.

Inspections were also carried out by biologists of the Department's staff in Cape Breton Highlands, Point Pelee, St. Lawrence Islands, Riding Mountain,

Nemiskam, and Jasper Parks. These investigations, supported by the scientific observations recorded, assist in the interpretation of detailed reports forwarded by the park wardens. In this manner, the value of the parks as natural sanctuaries may be gauged. Among other results of investigations carried out, detailed lists of birds are now available for ten national parks.

In May, 1941, a party of scientists from the Royal Ontario Museum, Toronto, visited Point Pelee Park. The party was engaged in the study of reverse migration of birds.

As opportunities arise, species which once occurred in parks but have been exterminated, are reintroduced. In accordance with this policy, a number of beaver were placed in Elk Island Park during the year. This area, situated in the Beaver Hills region of Alberta, at one time was a home for large numbers of this industrious little animal. Beaver placed in Cape Breton Highlands Park in 1938 have thriven, and the species is now well established in the Ingonish region.

WILD ANIMAL PARKS

An important feature of wild life conservation in Canada has been the establishment of special parks for the protection of certain animals that were in danger of extinction. Of these, Elk Island Park in Alberta contains a large herd of buffalo in addition to a number of moose, wapiti, and deer. In order to keep the herd within the grazing capacity of the park, it was found necessary this year to slaughter 500 buffalo under contract, which included the disposal of all products. The herd at present numbers 1,128 head.

Large numbers of buffalo are also successfully established in Wood Buffalo Park, an area of 17,300 square miles situated partly in Alberta and partly in the Northwest Territories. The most recent authoritative estimate places the number of buffalo in this park at 12,000.

Nemiskam National Park, situated in southern Alberta, contains a herd of prong-horned antelope. During the year, range and water conditions were satisfactory, and the antelope are reported to be in good health.

The remaining wild animal reserve, Buffalo National Park, has been turned over to the Department of National Defence for military purposes.

Following is a census of wild animals in fenced enclosures within national parks, as of March 31, 1942:—

Animals in Fenced Areas

Species	Banff Park Paddock	Elk Island Park	Nemiskam Park	Prince Albert Park Paddock	Riding Mountain Park Paddock	Total
Antelope.....			125			125
Buffalo.....	12	1,128		6	60	1,206
Elk.....	3	545			120	668
Moose.....		144			1	145
Male deer.....		24			1	25
White-tailed deer.....					8	8
Rocky Mountain sheep.....	6					6
Total.....	21	1,841	125	6	190	2,183

WILD LIFE PROTECTION

During the year, conservation activities necessary to prevent the depletion of Canada's wild life resources were carried on by the Bureau. The study of

fluctuations in the population of the snowshoe rabbit or varying hare in Canada was continued, and the data obtained from the return of questionnaires were forwarded to the Bureau of Animal Population, Oxford University, Oxford, England. A summary of the inquiry, compiled by Dennis and Helen Chitty of Oxford University, was published in *The Canadian Field-Naturalist*.

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

The Fifty-ninth Stated Meeting of the American Ornithologists' Union, Denver, Colorado, September 1-5.

Annual Convention of the Nova Scotia Fish and Game Protective Association, Halifax, February 19.

First Annual Meeting of the Canadian Conservation Association, London, Ontario, May 9-10.

Considerable effort was devoted to the preparation of agenda for the Dominion-Provincial Wild Life Conference, and to the arranging of details of the first Canadian meeting of the North American Wild Life Conference, both of which are to be held early in the fiscal year 1942-43.

The Advisory Board on Wild Life Protection held one meeting for consideration of eider-down collection in Baffin Island, and other wild-life problems of the Northwest Territories.

The following additions to the personnel of the board were made during the year:—

Inspector D. J. Martin, O.C. "G" Division, Royal Canadian Mounted Police, vice Assistant Commissioner Caulkin;

Dr. J. M. Swaine, Director of Science Service, Department of Agriculture, Ottawa, vice Dr. Arthur Gibson, Dominion Entomologist, now retired from the Service;

James Smart, Controller, National Parks Bureau, Department of Mines and Resources, Ottawa, vice the late F. H. H. Williamson;

D. Roy Cameron, Dominion Forester, Department of Mines and Resources, Ottawa;

Eric Druce, Bureau of Northwest Territories and Yukon Affairs, Department of Mines and Resources, Ottawa;

Dr. Austin L. Rand, Assistant Zoologist, National Museum of Canada, Department of Mines and Resources, Ottawa.

FISHING AND FISH CULTURE

Efforts to improve sport fishing in the national parks were continued, and cultural activities were carried on in Banff, Jasper, Waterton Lakes, Kootenay, Yoho, Mount Revelstoke, Prince Albert, Riding Mountain, and Cape Breton Highlands National Parks. In Jasper Park, the construction of a new fish hatchery was started. When completed, this hatchery will have a capacity of 750,000 fish eggs, and will assist in maintaining the fish population of the park at a high figure. Research work was carried out by the officer in charge of the hatchery in a number of lakes near the Town of Jasper. As a result, much information essential to the proper management of fisheries in the park was obtained.

The experiment of stocking Lake Wasquesiu in Prince Albert with small-mouthed black bass was continued, and a shipment of 300 adult fish from Ontario was received. Evidences of natural spawning of black bass were found in Hanging Heart Lakes and are attributed to adult fish introduced in 1936. As an experiment, rainbow trout fry were wintered in rearing ponds in

Riding Mountain Park in an endeavour to raise them from fry to fingerling stage before release in Clear Lake. In the latter stage the fish have a better chance of survival.

The park hatcheries in Banff and Waterton Lakes Parks again were utilized by the Province of Alberta in hatching trout eggs for restocking provincial waters, and more than 1,200,000 fry were distributed. In addition, numerous park waters were stocked with game fish. Included was Lake Louise in Banff Park, in which 400 rainbow and 200 speckled trout, all over legal size, were placed. During the year, a total of 1,470,327 fry, fingerlings, and adult fish were distributed in park waters as follows:

Park	Rainbow Trout	Cutthroat Trout	Speckled Trout	Salmon	Small-mouthed Black Bass	Total
Banff	504,900	124,000	99,300			728,200
Cape Breton Highlands				150,000		150,000
Jasper	265,995		10,680			276,675
Kootenay	20,000		10,000			30,000
Mount Revelstoke	6,000					6,000
Prince Albert					300 (adult) 100,000 (fry)	300
Waterton Lakes	109,062	20,090				129,152
Yoho	50,000					50,000
Total	955,957	144,090	119,980	150,000	100,300	1,470,327

Improved fishing was reported in Waterton Lakes Park, where the season's catch exceeded that of previous years. Many fine catches of great lake trout, great northern pike, and pickerel were reported at Prince Albert Park. Trout and salmon fishing were enjoyed by many anglers in Cape Breton Highlands Park, and numerous deep-sea species were caught in adjacent waters.

The creel census inaugurated in 1940 was continued, and returns showed a marked improvement over the previous year. More than 2,000 cards were received from anglers reporting their catches in Banff, Jasper, Waterton Lakes, Kootenay, Yoho, and Prince Albert Parks. This figure, however, represents only a small percentage of possible returns. The object of the census is to record the improvement or deterioration of fishing from year to year, and as its purpose becomes better known, it is hoped that fishermen will be more anxious to co-operate.

NATIONAL HISTORIC PARKS AND SITES

The functions of the National Parks Bureau include the restoration, preservation, marking, and administration of National Historic Parks and Sites, and the commemoration of the public services of outstanding personages connected with the civil and military history of the Dominion. In this phase of its work the Bureau is advised by the Historic Sites and Monuments Board of Canada, an honorary body composed of recognized historians representing the various parts of the Dominion.

Because of war conditions the annual meeting of the Board did not take place. Several tablets, however, were erected, bringing to 332 the number of sites which have been marked on the recommendation of the Board.

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

Fort Anne National Historic Park, Annapolis Royal, N.S.—During the year the sally-port or postern at Fort Anne National Historic Park was repaired and made waterproof. The entrance to No. 1 powder magazine was repointed and the stone stairs restored. Extensive repairs were made to No. 2 powder magazine, including the repointing of the interior and exterior walls. Additional articles of interest were obtained for the museum. Visitors to the park included many members of the active forces, as well as teachers and pupils from Canadian schools.

Port Royal National Historic Park, Lower Granville, N.S.—The newly constructed buildings forming the "Habitation" at Port Royal National Historic Park, Lower Granville, were officially opened on July 4, in the presence of a large gathering. A series of coloured drawings by Dr. C. W. Jefferys depicting life at the original "Habitation" was framed and hung in the Community Room. The furniture for this room was donated by The Order of 1606, Boston, Mass. Suitable pieces for some of the other rooms are being acquired. The number of visitors to the park showed an increase of nearly 50 per cent over the previous year.

Fortress of Louisbourg National Historic Park, Louisbourg, N.S.—The exterior woodwork of the museum was painted and the roads and paths within the park were improved. Additional book-cases were obtained to house the library of the late Senator McLennan, which has been donated to the museum. In addition to the 6,690 persons who signed the museum register, it is estimated that another 1,000 people visited the park.

Fort Beausejour National Historic Park, Aulac, N.B.—During the year, parcels of land in the vicinity of Fort Beausejour National Historic Park which contain the site of the old British blockhouse and the remains of Monckton's lines of entrenchments were donated to the Crown. Steps are being taken to have these areas included in the park. The exterior woodwork of the museum was painted, and the parking area was regravelled.

Fort Chambly National Historic Park, Chambly, P.Q.—Various sections of the stone walls of the fort were repointed and repairs were carried out on the northeast bastion and the retaining wall facing Richelieu River. The iron fence in front of the fort and picnic grounds was painted, and the surrounding grounds improved. A leaflet describing the exhibits in the museum was compiled and printed.

Fort Wellington National Historic Park, Prescott, Ont.—Improvements carried out at Fort Wellington National Historic Park included the reshingling of the building originally used as the officers' quarters. The palisades, flag pole, and fence surrounding the park were repaired, the cannon on the grounds were painted, and the parking area improved. Additional articles of interest were obtained for the museum.

Fort Malden National Historic Park, Amherstburg, Ont.—The exterior woodwork of the museum was painted, and the stonework around the basement windows and front entrance steps repointed. Two oak racks were built to display a collection of guns of historic interest. Among the numerous articles presented to the museum were a hand-pump fire engine formerly used at Fort Malden, and a hand-press on which the first issue of the "Amherstburg Echo" was printed. A full-time caretaker was appointed during the year.

During the nine-month period in which a record of attendance was kept, a total of 11,821 persons entered the museum, in addition to approximately 1,000 who visited the grounds.

Fort Prince of Wales National Historic Park, Churchill, Man.—General supervision was continued at Fort Prince of Wales National Historic Park during the year, and signs affixed to the walls were repaired.

NATIONAL HISTORIC SITES

During the year the following national historic sites were marked:

Birthplace of Sir Wilfrid Laurier, Saint Lin, P.Q.—At the ceremonies attending the dedication of the birthplace of Sir Wilfrid Laurier as a national historic site, a boulder and tablet on the grounds were unveiled by the Right Honourable W. L. Mackenzie King on November 20, 1941, the one-hundredth anniversary of Sir Wilfrid's birth.

Sir Samuel Leonard Tilley, Gagetown, N.B.—A bronze tablet was affixed to the Post Office Building in memory of Sir Samuel Leonard Tilley, K.C.M.G., a Father of Confederation, Premier and Lieutenant-Governor of New Brunswick, and Minister of Finance of Canada. He was born at Gagetown in 1818, and died in Saint John in 1896.

Treaty with the Indians, 1778, Saint John, N.B.—A bronze tablet was affixed to a monument on Fort Howe Hill, in honour of Abbe Joseph Mathurin Bourg and the Honourable Michael Francklin, Superintendent of Indian Affairs, for their services in keeping the Indians of Nova Scotia loyal to the Crown during the American Revolution by a Treaty of Peace made at Fort Howe on September 24, 1778.

Charles Fisher, Fredericton, N.B.—A bronze tablet was affixed to the Legislative Assembly Building in memory of Charles Fisher, a Father of Confederation; lawyer, statesman, and judge; Premier of New Brunswick, 1851-61. He was born in Fredericton on September 16, 1808, and died there on December 8, 1880.

William Henry Steeves, Saint John, N.B.—A bronze tablet was placed in the main hallway of the New Brunswick Museum in memory of William Henry Steeves, a Father of Confederation; industrialist and legislator; Senator, 1867-73. He was born at Hillsborough on May 20, 1814, and died in Saint John on December 9, 1873.

John Mercer Johnson, Chatham, N.B.—A bronze tablet was attached to the Post Office Building in memory of John Mercer Johnson, a Father of Confederation and Speaker of the New Brunswick Assembly. He was born in Liverpool, England, on October 10, 1818, and died at Chatham, New Brunswick, on November 8, 1868.

John Hamilton Gray, Saint John, N.B.—A bronze tablet was placed on one of the inner walls of the New Brunswick Museum in memory of John Hamilton Gray, a Father of Confederation; lawyer, legislator, and historian; Speaker of the New Brunswick Assembly, 1866-67, and Judge of the Supreme Court of British Columbia. He was born at St. George's, Bermuda, in 1814, and died in Victoria, B.C., on June 5, 1889.

Peter Mitchell, Newcastle, N.B.—A bronze tablet was affixed to the Post Office Building in memory of Peter Mitchell, a Father of Confederation; lawyer, legislator, and journalist; Premier of New Brunswick, 1865-67, and Senator, 1867-72. He was born at Newcastle on January 4, 1824, and died in Montreal on October 25, 1899.

Sir James McPherson Le Moine, Quebec, P.Q.—A bronze tablet was placed on an inner wall of Morrin College in memory of Sir James McPherson Le Moine, Kt., D.C.L., F.R.S.C., author, historian, and ornithologist. He was born in Quebec City on January 24, 1825, and died at Spencer Grange, Sillery, on February 5, 1912. The tablet was unveiled under the auspices of the Quebec Literary and Historical Society on January 14, 1942.

Joseph Bouchette, Quebec, P.Q.—A bronze tablet was affixed to the house at 44 St. Louis Street in memory of Joseph Bouchette, Surveyor-General of

Lower Canada and author of standard topographical works. Bouchette was born in Quebec City on March 14, 1774, and at one time resided in the house to which the tablet is affixed. He died in Montreal on April 9, 1841. The tablet was unveiled under the auspices of the Quebec Land Surveyors' Association on April 16, 1941.

Chemin Royal (King's Highway), Quebec, P.Q.—A bronze tablet was affixed to St. John's Gate, to commemorate the historic events connected with this highway. On August 5, 1734, Lanouillier de Boiscler, Chief Roadmaster of New France, started from Quebec by coach for Montreal, thus officially inaugurating the King's Highway in Canada.

MIGRATORY BIRDS CONVENTION ACT

The Migratory Birds Treaty 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), and 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 the Dominion and the Provinces, the Royal Canadian Mounted Police assisting with the enforcement.

The length of the waterfowl hunting season, bag limits, and other restrictions affecting the hunting of migratory birds in Canada continued without any major change as compared with the previous year. A closed season for Ross's goose, a species which has been greatly depleted in numbers, was established in Alberta and in the Northwest Territories, the only political divisions of Canada in which this species occurs. A similar closed season is provided throughout the range of the species in the United States. The closed season upon Atlantic brant was continued.

A change affecting sale of birds for food in less accessible areas in Canada was made.

In British Columbia the waterfowl situation was generally satisfactory in spite of local deterioration of nesting habitat. The mallard is widely distributed in this province, and is adaptable to a variety of conditions. This species continued to be abundant and the annual kill probably exceeded that of many other species.

In some respects a substantial improvement took place in the waterfowl situation in the Prairie Provinces, although many lakes and pot-holes in the south became dry or seriously subsided as the season progressed. The water-table continued to fall over substantial areas in the three provinces. In spite of these conditions waterfowl held their own in numbers and it may be possible that additional benefits will accrue to waterfowl owing to the war, since fewer hunters may be in the field and sporting ammunition is increasingly scarce. The water development work under the Prairie Farm Rehabilitation Act has been of distinct benefit in providing breeding habitat for waterfowl.

The duck population in Ontario and Quebec is very satisfactory for the most part. The birds that are principally hunted by sportsmen here are standing up to hunting pressure very well. The principal game duck is the black duck and they were present in satisfactory numbers.

In the Maritime Provinces the waterfowl situation might be described as highly satisfactory with the exception of brant, the continued scarcity of the latter being caused, no doubt, by the long-standing failure of the eel-grass crop.

Two new bird sanctuaries were established during the year. These are located at Port Joli in the Province of Nova Scotia, and at South River in the Province of Quebec. A total of 61 bird sanctuaries have now been reserved in Canada under the Migratory Birds Convention Act, giving a total area of 1,290 square miles.

There are 789 Honorary Game Officers appointed throughout the Dominion, of which 15 are Officers of the Forestry Service, 108 are Officers of the Department of Fisheries, and 107 are 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 operating under the Migratory Birds Convention Act as are also the members of the New Brunswick Provincial Police.

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 from the Department of the Interior to the Royal Canadian Mounted Police by Order in Council, P.C. 2283 of the 14th of October, 1932.

Field administration of the Act was continued under the supervision of four District Migratory Bird Officers. In addition to their regular work they carried out extensive waterfowl investigations, studies of food of waterfowl, snowy owl migration, the numerical status of woodcock, and the destruction of sea birds by oil, as well as faunal investigations as opportunity offered in certain national parks and other areas of special interest.

Special protective measures were continued for the few remaining trumpeter swans in British Columbia. They wintered very well and in one area were given the benefit of small supplies of grain for food.

Lectures were given on the value of native wild birds and their conservation, and successful co-operation was continued with the provincial governments, game conservation societies, and other organizations interested in bird conservation.

The eiderdown industry in Saguenay County, Quebec, on the north shore of the Gulf of St. Lawrence, continued to provide income for local residents through rational utilization of the down produced by a large nesting population of eider ducks. An experiment in the development of an eiderdown industry in southern Baffin Island was terminated after production of a quantity of down.

In order that proper steps may be taken towards the conservation of native wild birds as a valuable natural resource, it is necessary to have available for study certain precise data about them. The only practical and satisfactory way in which much of the important information required may be obtained is by means of scientific bird-banding.

Bird-banding in North America is being conducted in full co-operation between Canada's National Parks Bureau and the Fish and Wildlife Service of the United States Department of the Interior.

Practically all of the birds banded in Canada are marked by some 200 voluntary co-operators who serve without pay and furnish their own equipment and transportation. These conservation-minded citizens operate under Dominion permits, use only official bands which are furnished them free of charge, and provide the National Parks Bureau with full details of their banding activities. Permits to band birds are issued only to persons who possess definite ornithological ability.

Up to December 31, 1941, a total of 400,912 birds of many species have been banded in Canada and details as to band numbers, species, dates, etc. have been duly recorded. Of these, well over 20,000 individual birds have been recaptured and released, killed by hunters, or found dead. It is through study of such data that problems relating to wild life may be investigated. During

the calendar year 1941, a total of 22,299 new records of birds banded in Canada were added to the official records, while the recovery of 1,624 banded individuals was recorded.

Success of bird-banding research depends largely on the voluntary co-operation of the public in reporting details relating to any banded birds that are recovered, and the National Parks Bureau is deeply grateful to all those who have thus far helped in this way. Reports about banded birds may be mailed postage free in Canada if sent in envelopes marked "O.H.M.S." and addressed to the Controller, National Parks Bureau, Ottawa.

Permits and licences issued during the year under the provisions of the Migratory Birds Convention Act totalled 1,268. Printed material distributed comprised 5,446 copies of the Consolidation of the Migratory Birds Convention Act and Regulations; 19,456 copies of Abstracts of the Regulations; 37,881 posters, and 17,613 pamphlets; 1,981 motion picture films and slides were lent to voluntary co-operators, and 66 lectures were given by officers of the Bureau.

DOMINION FOREST SERVICE

During 1941 products of Canadian forests and forest industries continued to play an important part in the Allied war effort. Although full details are not available it seems probable that production of both the pulp and paper and the lumber industries exceeded all previous records. Exports of lumber to the United Kingdom were considerably smaller than those of the previous year, but those to the United States were greatly increased. Demand for Canadian newsprint was steady but the vastly expanded needs for other kinds of paper and for wood-pulps strained production facilities to the utmost.

War conditions have made it necessary to restrict silvicultural research on forest experiment stations. Provision of useful forestry work for internees at internment camps on three of the forest experiment stations continued. In addition, an alternative service workers' camp was established at the Kananaskis station. These men evinced an inclination to give of their best and the work output was very creditable.

Forest protection organizations throughout the country worked under handicaps during the summer season of 1941, due to losses of key men to the armed forces and restrictions in labour supply available. The fire hazard was extremely high in some parts of the country, particularly in the Provinces of Ontario and Quebec, and losses were heavy. Under war conditions dependence must rest on the exercise of an unusual degree of care by the general public if forest fire losses are to be kept within bounds. Wood is probably being put to a higher variety of uses in the war effort than any other single commodity, and it is the duty of every citizen to live up to his responsibilities in preventing forest fires.

The work of the Forest Products Laboratories during the year has to a large extent pertained to problems arising in the uses of wood for war industries and for special war equipment. The use of timber for aerodromes, military camps, aircraft, naval construction, munitions containers, and related uses, has demanded a great deal of attention and close liaison with the Timber Control and with various purchasing, inspection, and military services.

FOREST ECONOMICS

In external trade the "wood, wood products and paper" group of commodities were again responsible for a large favourable trade balance, principally with the United States. Thus wood and its derivatives made possible the purchase of large quantities of war supplies which had to be obtained outside Canada.

Domestic consumption of lumber for war purposes was about equal to that of 1940, namely, 400,000,000 board feet. Lumber was delivered at 150 different sites in Canada for use in the construction of more than 4,000 wooden buildings at naval, military, and air establishments and at munitions factories. About 25,000,000 board feet of Sitka spruce were produced for use in aircraft construction at home and abroad, while the output of birch veneer logs increased from 66,500 tons in 1940 to 90,000 tons in 1941. Increased quantities of lumber were used in boxes and crates. Many materials, and particularly metals, are in relatively short supply for civil purposes because of the demands of war industries, and wood has been found to be a satisfactory substitute in many instances.

Operations of the timber trade continued to be directed by the Timber Controller of the Department of Munitions and Supply. Because a system of price controls had gradually been developed from the commencement of timber control operations in 1940, the lumber industry was little disturbed by the institution of the general price control policy established by the Government in December, 1941.

It is estimated that the total area of Canada's forests, commercial and non-commercial, is 1,220,405 square miles. Of this area about 430,000 square miles are considered to be accessible and productive. About 35 per cent of the land area of Canada, and 58 per cent of the area of the nine provinces, is occupied by forests of one kind or another.

Forest Areas

Productive forests:	Square Miles
Merchantable	381,515
Young growth	389,050
Non-productive forests	449,840
Total forested land	1,220,405

The total volume of merchantable timber is estimated to be 313,140 million cubic feet, of which 211,656 million cubic feet are considered to be accessible to commercial operations.

The average annual depletion of merchantable timber during the ten-year period 1931-40 was estimated to be 3,642 million cubic feet. Nearly all of this depletion took place on the accessible and productive portion of the forest, and its replacement requires an average annual growth rate of 14 cubic feet per acre on that area.

Average Annual Depletion, 1931-40

	Millions of Cubic Feet
Volume used	2,548
Merchantable timber burned	394
Destroyed by insects, tree diseases, etc.	700
Total	3,642

Approximately 70 per cent of the total depletion was used and 30 per cent wasted.

In a group of important forest countries in northern Europe the annual increment actually secured averages 28 cubic feet per acre; but this is only achieved under conditions of forest management which are more intensive than those to be found in Canada to-day. It is believed that, under present conditions, any increase in the average rate of depletion may cause considerable reductions in our forest capital. In any case it has to be recognized

that our stocks of very large timber of great age are being rapidly used up and that the industries depending on logs from such trees will have to adapt themselves to the use of smaller material in the not distant future.

The relative importance of the principal branches of forest industry in 1940 is indicated in the following table:—

FOREST INDUSTRIES
Summary of Principal Statistics, 1940

—	Capital Invested	Employment	Salaries and Wages	Net Value of Products
	\$	Man-years ¹	\$	\$
Woods operations.....	209,000,000	100,000	100,000,000	150,000,000
Lumber industry.....	91,602,899	39,501	34,021,825	61,700,048
Pulp and paper industry...	642,979,942	34,719	56,073,812	158,230,575
Wood-using industries.....	106,761,146	35,547	34,570,093	54,892,521
Paper-using industries ²	58,350,125	13,235	15,904,147	33,637,248
Totals.....	1,108,694,112	223,002	240,569,877	458,460,387

¹ 300 man-days.

² Not including printing trades.

The net value of products of the forest industries in 1940 exceeded that of the previous year by 21.6 per cent

AERIAL FOREST SURVEYS

Measurements of timber quantities and other related data required for general use in aerial photographic estimating were obtained at the Petawawa Forest Experiment Station. The great value of aerial photographs for purposes of site classification was demonstrated on the same area.

At the request of the Indian Affairs Branch an estimate of spruce saw-timber on the Red Earth Indian Reserve in Saskatchewan was made. A stand table was compiled by measuring tree heights and crown widths in winter photographs taken ten years previously, and the volumetric estimates were adjusted to allow for growth during the past decade. The area was logged during the winter and the quantity cut was found to be very close to the amount estimated by study of the photographs. No ground work whatever was done in connection with this project. Maps and timber estimates were also prepared on two areas of Indian lands in Nova Scotia totalling 25 square miles.

Forest inventory maps were prepared covering 26 square miles in Saskatchewan and 2,605 square miles in Nova Scotia. In the latter province special uses for these maps have been found in connection with an economic survey which is being conducted by provincial authorities, and in coastal defence areas.

Estimates have been prepared from aerial photographs for test purposes covering two small areas, one located in the Baie Comeau region and the other on the upper basin of the Lièvre River, in the Province of Quebec. Cutting is proceeding in these areas and the returns will be available for comparison with the estimates when the work is completed.

Winter photographs of the Riding Mountain National Park in Manitoba were used for making estimates of the board foot volume contained in scattered large trees. Previous estimates had been expressed only in cords.

A number of Canadian foresters showed considerable interest in the aerial photographic work of the Dominion Forest Service, and a representative of the United States Forest Service made a special visit to Ottawa and entered into lengthy consultations on various aspects of the work.

A research note on the "Determination of Tree Heights from Shadows in Air Photographs" was published. This note is the first of a series which will deal in detail with the technique that is being developed. It is believed that these publications may be of value in connection with the use of aerial photographs for war purposes.

SILVICULTURAL RESEARCH

BOTANY AND ECOLOGY

For the fifth consecutive year phenological records—data on the time of leafing, flowering, fruiting, and growth of trees and shrubs—were taken at the several stations. The accumulated data will shortly be published.

The Sub-committee on Tree-Breeding of the Associate Committee on Forestry, National Research Council—made up of representatives of the Council, of the Entomological and Pathological Divisions of the Department of Agriculture, and of the Dominion Forest Service—has been actively pursuing its efforts to develop means of stimulating the production rate of desirable species, and to produce, by selection, cross-breeding, and hybridization, new types of commercially desirable trees; resistance to insect and fungus damage plays an important part in these investigations. Nurseries, arboretums, and testing gardens have been established at the Petawawa Forest Experiment Station, and at the National Research Council Laboratory. Promising results along the lines of vegetative propagation have been secured.

Other ecological studies conducted at the several research stations covered nursery studies, seed dissemination, seed-bed conditions, and crown development.

A check survey was made of the areas in the Lièvre basin which were surveyed in 1930. The growth rate of spruce and balsam fir was found to be 43.1 cubic feet per year for the period 1930-40. Results are given in Silvicultural Research Note No. 71.

Outlines for methods of studying conditions on cut-over lands were prepared and published.

SILVICULTURE

The war has tremendously stimulated the demand for wood and wood products of all descriptions, and, as a result, logging operations were in progress on several experiment stations. Advantage was taken of this situation to conduct studies of thinnings, improvement cuttings, and harvest cuttings.

Thinnings were carried out in fifteen-year-old plantations as part of a study to determine the minimum number of trees per acre required for maximum growth results. Pruning experiments to develop knot-free material were carried out. Inferior species such as poplar, balsam fir, and jack pine were removed from a number of mixedwood stands, to provide better growing conditions for such species as red pine, white pine, and spruce. An extensive operation to fill a war order for red pine poles released considerable young white and red pine.

An examination was carried out on cut-over white spruce lands in the Carrot River area, Saskatchewan, with a view to comparison with residual stands left after selective logging.

MENSURATION

Some preliminary yield tables for even-aged red pine stands at Petawawa have been developed. Tables showing yields of stands of various densities, for a ten-year period, are being prepared.

Advances in scaling methods have been made. A log scale on calipers showing values in International board foot units has been devised, to simplify timber cruising. Poles are now being scaled in cubic feet instead of in linear feet.

A volume table for spruce pit-props and a table showing shrinkage of cordwood when resawn were prepared.

ADMINISTRATION

Cover-type maps have been completed for the Petawawa Station, as part of the working plan survey.

Estimates of permissible annual cut of coniferous species for each working circle of the Riding Mountain National Park were prepared.

The amount of timber cut was kept within the working plan budget allowance at all stations.

FOREST PROTECTION

Taking Canada as a whole, the fire season of 1941 was the third worst on record since reliable statistics began in 1918. The total damage and cost was \$13,242,179 as against an average for the decade 1931-40 of \$4,498,463. In 1923 the total damage and cost was over forty-six million dollars and in 1919 it exceeded twenty-seven million dollars. The total area burned over in 1941 was 4,252,651 acres as against an annual average of 2,212,786 acres for the period 1931-40. The total number of fires reported was 5,951, while the 10-year average was 6,087. Of these fires, 23 per cent were attributed to lightning, an average of 16 per cent being attributed to this cause during the period 1931-40.

The season was not equally severe in all parts of Canada. The losses were below average for the previous decade in all provinces except Quebec, Ontario, and Alberta, where the areas burned over and the losses were much above normal. A statistical analysis will be found in Tables 1-4.

A short description of the fire season of 1941, by provinces, follows:

British Columbia.—An unusually high spring hazard developed following a winter of light snowfall and warm dry spring weather. However, from May onward the precipitation was much above the average and no prolonged dangerous periods occurred.

Alberta.—The spring fire season was abnormally long and severe following a winter of scanty snowfall. Bad conditions prevailed in the northern part of the province well on into the summer, and this resulted in one of the worst seasons on record.

Saskatchewan.—Serious hazard periods developed in the latter part of May and in midsummer but fortunately these were terminated by wet periods before extensive damage occurred.

Manitoba.—The fire hazard was generally below normal. Dry conditions prevailed in the northwestern part of the province and some bad fires occurred in the spring. Later in spite of rain these fires continued to spread in the ground and necessitated a great deal of trenching.

Ontario.—The season was marked by periods of extremely high hazard in certain sections. In one such period during May, three fires accounted for 60 per cent of the total area burned during the season and 70 per cent of the total damage. Two of these fires were of incendiary origin and accounted for half the total area burned over during the season.

Quebec.—Quebec experienced the worst fire season since 1923. The spring fire season was long and severe and extended well into the summer with little or no rain for long periods. Five people lost their lives as a result of forest fires.

New Brunswick.—The spring season was cool with frequent rains and well distributed rainfall throughout the rest of the season served to keep the hazard below normal, so that the year was one of the most favourable on record.

Nova Scotia.—The fire season began with dry windy weather in April. Later the weather became cold and damp, resulting in a favourable season with fewer fires than usual.

Dominion-Protected Lands.—These comprise National Parks, Indian Reserves, and Dominion Forest Experiment Stations. The fire season was generally favourable in national parks with the exception of Prince Albert Park where bad fires swept in from settled areas outside the park and accounted for 93 per cent of the total area burned in all the parks. Indian lands, as a whole, experienced a rather bad season, the area burned being about five times greater than normal and the cost plus damage about double the normal for the 10-year period 1931-40. Fire losses on Dominion Forest Experiment Stations were very small.

FOREST FIRE RESEARCH

For the benefit of the east slope national parks, research work in forest fire hazard was continued at the Kananaskis Forest Experiment Station in Alberta. The aim is to develop forest fire hazard tables for the east slope forest types, by means of which an accurate daily index of fire-hazard in each region may be computed from simple weather records. This system of fire-hazard measurement, developed some years ago at the Petawawa Forest Experiment Station and adapted for use in eastern regions by additional research in Quebec and New Brunswick, is now used throughout these two provinces in the daily administration of forest fire protection. Seventeen weather stations for the use of this system are now in operation in western national parks.

A study to determine the effect of altitude above sea-level upon the performance of portable gasoline forest fire pumping units was undertaken. The efficiency of these units was found to decrease rapidly with altitude. The study provided, for the first time, a knowledge of the performance to be expected from a unit at any given altitude, and made possible rating tests on a large number of units in the mountain parks to determine their existing state of efficiency. Where necessary, means for the improvement of such units were suggested.

Surveys were conducted in Rocky Mountains parks to determine the most economical and effective locations for lookout points for forest fire detection. Large numbers of mountain peaks were scaled and the area visible from each peak was mapped. A careful analysis of the data thus noted will make possible the selection of sites upon which lookouts may be constructed to provide the most economical and efficient coverage for fire detection in these mountain areas.

TABLE 1

*Forest Fire Losses in Canada, 1941, Compared with 10-Year Average 1931-40**

Item	Annual Averages 1931-40		Year 1941	
	No.	%	No.	%
Fires under 10 acres, number.....			3,833	
Fires 10 acres and over, number.....			2,118	
Total number of fires.....	6,087		5,951	
Area burned—				
Merchantable timber..... acres	476,782		1,498,128	
Young growth..... “	644,081		858,892	
Cut-over lands..... “	396,543		972,018	
Non-forested lands..... “	695,380		923,613	
Total area burned..... “	2,212,786		4,252,651	
Merchantable timber burned—				
Saw timber..... M. ft. b.m.	768,398		703,828	
Small material..... cords	1,929,394		7,620,649	
Estimated values destroyed—				
Merchantable timber..... \$	2,244,912		8,814,098	
Young growth..... “	886,690		1,549,200	
Cut-over lands..... “	246,603		961,606	
Other property burned..... “	302,028		610,216	
Total damage..... \$	3,680,233		11,935,120	
Actual cost of fire-fighting..... \$	818,230		1,307,059	
Total damage and costs..... \$	4,498,463		13,242,179	

* Minor differences in certain figures (as found in previous reports) are the result of more accurate revisions.

TABLE 2

Forest Fires in Canada by Causes, 1941, Compared with 10-Year Average 1931-40

Cause	Average 1931-40		Year 1941	
	No.	%	No.	%
Camp fires.....	1,198	20	797	13
Smokers.....	956	16	827	14
Settlers.....	1,018	17	1,068	18
Railways.....	272	4	265	4
Lightning.....	953	16	1,343	23
Industrial operations.....	138	2	140	2
Incendiary.....	500	8	176	3
Public works.....	63	1	45	1
Miscellaneous known.....	402	6	514	9
Unknown.....	586	10	776	13
Totals.....	6,086	100	5,951	100

TABLE 3
Statistics of Forest Fires by Regions, 1941
(Averages given are those for 10-year period 1931-40)

Item	British Columbia		Alberta		Saskatchewan		Manitoba		Ontario	
	Average	1941	Average	1941	Average	1941	Average	1941	Average	1941
Fires—										
Total number.....	1,676	1,561	358	445	248	274	404	259	1,563	1,265
Caused by lightning..... %	29	56	4	2	5	11	9	11	21	22
Areas burned—										
Merchantable timber..... acres	66,877	47,771	123,186	372,637	47,479	47,360	32,635	28,881	146,948	325,892
Young growth..... "	79,572	25,467	154,866	488,802	235,324	100,613	33,090	14,283	76,752	78,031
Cut-over lands..... "	213,538	34,659	17,496	34,510	15,250	11,304	4,506	1,285	21,471	150,422
Non-forested lands..... "	66,540	46,991	164,592	459,475	158,115	95,386	144,191	82,096	94,034	112,202
Total..... "	426,527	154,888	460,140	1,355,424	456,168	254,663	214,422	126,545	339,205	666,547
Damage..... \$	872,982	548,305	835,299	2,085,489	195,731	159,173	124,823	113,688	1,004,194	2,669,868
Cost of fire fighting..... \$	190,669	174,271	74,686	161,862	62,121	50,233	32,879	16,251	268,561	230,698
Total damage and costs..... \$	1,063,651	722,576	909,985	2,247,351	257,852	209,406	157,702	129,939	1,272,755	2,900,566

Item	Quebec		New Brunswick		Nova Scotia		Dominion Lands					
	Average	1941	Average	1941	Average	1941	National Parks		Indian Lands		For. Expt. Stations	
							Average	1941	Average	1941	Average	1941	Average	1941
Fires—												
Total number.....	1,087	1,710	260	147	356	153	79	64	51	68	7	5
Caused by lightning..... %	5	6	12	16	0	0	9	27	14	9	13	0
Areas burned—												
Merchantable timber..... acres	41,506	665,625	7,522	327	1,477	300	6,245	177	2,503	9,157	449	1
Young growth..... "	36,522	111,071	6,634	33	4,612	1,002	14,283	27,386	1,641	12,182	873	22
Cut-over lands..... "	110,564	718,014	10,241	324	1,269	1,232	1,504	19,555	673	633	36	80
Non-forested lands..... "	20,482	95,524	24,457	492	9,181	2,895	11,179	16,069	1,981	12,483	719	0
Total..... "	209,074	1,590,234	48,854	1,176	16,539	5,429	33,211	63,187	6,798	34,455	2,077	103
Damage..... \$	524,037	6,257,200	80,623	10,398	21,774	4,118	61,824	64,184	11,359	22,550	6,165	147
Cost of fire fighting..... \$	118,844	647,445	26,874	1,143	22,376	4,708	16,461	12,130	4,296	8,284	594	34
Total damage and costs... \$	642,881	6,904,645	107,497	11,541	44,150	8,826	78,285	76,314	15,655	30,834	6,759	181

TABLE 4

Fire Season, 1941—Comparative Statement by Provinces

Province	Increase or Decrease in Relation to Average for Period 1931-40			Proceedings Under Provincial Fire Laws	
	Number of Fires	Area Burned, Acres	Cost Plus Damage	Prosecutions	Convictions
	%	%	%		
British Columbia.....	- 7	- 64	- 32	25	24
Alberta.....	+ 24	+193	+147		
Saskatchewan.....	+ 10	- 44	- 19	20	19
Manitoba.....	- 36	- 41	- 18	1	1
Ontario.....	- 19	+ 97	+128	22	19
Quebec.....	+ 57	+660	+974	95	74
New Brunswick.....	- 44	- 98	- 89	23	20
Nova Scotia.....	- 57	- 67	- 80	6	6

FOREST PRODUCTS LABORATORIES

During the past year the work of the Forest Products Laboratories in Ottawa and Vancouver has been directed chiefly towards problems connected with the prosecution of war. Similarly, the Pulp and Paper Research Institute of Canada at Montreal has been giving valuable advice and assistance in connection with the war effort. Long-term investigations undertaken in days of peace have necessarily been curtailed so that the staffs could devote their attention to questions of immediate urgency. From the brief review of some of the year's activities which follows it may be noted that some projects were undertaken in direct co-operation with the fighting services while others were concerned chiefly with increasing the efficiency of war industries.

The following is a brief reference to some of the more important activities which have received attention.

MAIN LABORATORIES—OTTAWA

DIVISION OF TIMBER MECHANICS

Developments in the application of plywood to building construction and to the manufacture of aircraft have been reflected in the great increase in demand for basic strength data of plywood made from species such as yellow birch and Douglas fir. In addition, there has been a demand for data on the suitability of other species for the manufacture of plywood. This has been particularly true of some of the hardwood species which might provide suitable substitutes for birch in the manufacture of aircraft veneer. The possibilities of certain softwoods have also received attention. The investigation of these plywoods has been carried out in co-operation with other Government services and the data obtained have been made available to the services concerned.

Restrictions in the availability of certain glues for aircraft construction, and the necessity of speeding up production of glued assemblies, have caused heavy demands on the Laboratories. Tests to determine the suitability of numerous types of urea and phenol formaldehyde synthetic resins in the manufacture of special equipment have been called for by the Royal Canadian Air Force and other services of the Department of National Defence.

Supplies of Sitka spruce for aircraft are in great demand at the present time, and an extensive series of tests was carried out on white and red spruce to find out to what extent they could be used instead of Sitka spruce.

Among the many aircraft components for which high-grade, Sitka spruce has been used are laminated wing spars. Experiments were continued to determine whether sufficiently strong components could be built using lower grade material in the less highly stressed parts of these spars, without any sacrifice in the strength or quality of the completed component.

The packaging of munitions, both for transportation overseas and within Canada, consumes large quantities of lumber. The design of such packages upon scientific lines has been instrumental in making considerable economies in lumber consumption, in better protection of the contents, and in reduction in package volume, thereby conserving shipping space. The design of such containers has been carried out for the Departments of National Defence, Munitions and Supply, and for munitions manufacturers. The containers designed and tested were built from wood, fibreboard, corrugated board, plywood and other materials.

A life-float designed and built from Canadian materials at the Laboratories was submitted to tests by the naval authorities and showed considerable promise. Some changes in the design have been made to improve the construction and the new design is undergoing further development.

An investigation to determine the effect upon strength of worm holes in fire-killed timber was commenced at the request of one of the provinces in which considerable damage had occurred to a large stand of jack pine from borer attack subsequent to a fire which killed, but did not destroy, large quantities of timber.

On request an investigation was carried out to determine the effect of weathering upon the strength of cross-arms with a view to determining whether their maximum working life is being utilized to the best possible advantage. Some of these cross-arms had been in service for twenty-five years.

The amount of check testing being carried out for the Department of National Defence and the Inspection Board of the United Kingdom and Canada has continued to increase. A considerable part of the time of the staff of the division is now taken up in testing materials submitted by these departments and the Department of Munitions and Supply. Testing of a similar nature has also been carried out for aircraft manufacturers upon metals, adhesives, and aircraft parts.

DIVISION OF WOOD PRESERVATION

Work was continued on the treatment with fire-retardants of timber and plywood for naval and military purposes and on the testing of fire-retardant paints for wooden buildings.

Records of tests to determine the service life of treated and untreated timbers, some of which have been under observation over a period of years, were kept up to date but the work was not extended during the year.

There are in use in Canada some 10,000,000 untreated line poles, representing an investment of \$150,000,000. Prolongation of the service life of these poles would mean an immense saving of labour, material, and money.

In co-operation with various interested concerns, which contributed the necessary material and labour, stub cedar poles, subjected to six various types of ground-line treatment had been installed in a test plot at the Central Experimental Farm. These were analysed and examined, and a report was issued.

Some work was done on treatments to protect window sash from decay and to prolong the life of manila rope.

Processes to render wood plastic by impregnation with tanning agents and phenol-formaldehyde resins were investigated. The claims made for tanning agents were not substantiated but it was found that western white pine and western red cedar veneers could be compressed to a specific gravity of between 1 and 1.1, the veneer then being approximately one-half its former thickness.

The Department of Public Works was interested in the creosote treatment of white pine piling, and two charges were treated by the boiling-under-vacuum process.

A review was made of the literature regarding moisture-retardant coatings and a report issued.

Accelerated tests on wood preservatives by exposing small pieces of treated and untreated wood to the attack of fungi in glass jars filled with garden loam, at moisture contents of 20 to 30 per cent, were conducted in an attempt to find a better method of quickly evaluating wood preservatives.

DIVISION OF LUMBER SEASONING

Following a study carried out in the Laboratories, sugar maple was accepted as a substitute for black walnut in rifle furniture manufacture. The kiln-drying of maple rifle-furniture blanks was supervised by the Laboratories and additional manufacturing sources and suitable kiln-drying facilities were arranged for the firm manufacturing these rifles.

The study of kiln-drying eastern spruce with the least possible effect on the strength of the wood for aircraft construction was continued.

Urea-treated white pine deal, piled for several months since treatment, was inspected at time of shipment, but results indicated that a more intense treatment was necessary to obtain results sufficient to compensate for the extra cost. Gunstock blanks after short dips in saturated solutions of urea, and kiln-drying to 10 per cent moisture content, failed, without end-coating, to stand up to the standard drying schedule common to untreated blanks.

The year was featured by the numerous installations of modern dry-kilns made necessary by war requirements. The Laboratories were called on for advice with respect to a number of these installations.

DIVISION OF WOOD CHEMISTRY

Work was continued on the study of the yield and quality of pine tar obtained by the destructive distillation of various Canadian softwoods, encouraging yields being obtained from selected resinous sawmill waste of Douglas fir and white pine. Refining of the crude distillate was carried out with a view to determining the suitability of certain fractions for use in the rubber industry, for ore flotation, and for other industrial uses.

Increased consumption of gasoline for war purposes has directed attention to other substitute fuels, including producer-gas from wood or charcoal. A study was made of developments in other countries and some experimental work carried out on a truck fitted with a gas-producer. Assistance was rendered to committees of industry and of government interested in this specific subject, as well as in the general one of substitute fuels for internal combustion engines.

Difficulty has recently been encountered in obtaining genuine beechwood creosote, ordinarily imported from Europe for pharmaceutical purposes. Experiments were carried out with a view to determining the practicability of using Canadian beech in the preparation of this material.

A special beech charcoal was prepared at temperatures higher than those normally used in hardwood distillation. This charcoal was for use in experiments in the case-hardening of steel.

DIVISION OF WOOD UTILIZATION

The major work of the year was the formulation of tentative standard grading rules for Eastern Canadian spruce lumber. This work has been done in co-operation with the Trade Promotion Committee of the Canadian Lumbermen's Association with the support of the governments of the Provinces of Quebec, New Brunswick, and Nova Scotia. Data on the quality of spruce, obtained in the field last year, were tabulated and analysed, and the first draft of the grading rules based on these data was presented to the Committee in October, 1941. Later, an amended draft was submitted and approved, and by the end of the year the grading rules were in the hands of the printer.

Considerable time was devoted to work directly connected with the war effort. This work was concerned with such matters as the use of Eastern Canadian spruce for the construction of aircraft; various questions relating to construction lumber and other forest products for military establishments; and matters concerning the selection of suitable woods for specific war supplies.

Assistance was given to the Coal Administrator in connection with the use of wood and wood products for domestic heating and in compiling information useful to the consumer of wood fuel. Several problems which involved the selection of suitable Canadian woods to replace foreign woods previously imported were dealt with.

DIVISION OF TIMBER PATHOLOGY

Considerable losses in handling birch logs used for high-grade veneer were found to be largely due to faulty storage. It was found that storage under water gave one hundred per cent control, and this practice is increasing. Fungus infection of aeroplane wood caused numerous inquiries, and information was provided which would enable inspectors to evaluate the various stains and discolorations encountered.

Twenty creosoted jack pine ties, originally affected by red stain, which had been in service in a main-line track for twelve years, were examined. They were found in good condition, and there was no evidence of the spread or development of *Trametes pini*, although this organism was found yet alive in three of the ties. Some secondary wood-rotting fungi were found in five ties.

Some 7,000 red pine poles valued at approximately \$20,000 were inspected for the presence of decay. A report on the inspection provided a basis for classification of the poles and their economical utilization. Further assistance was given to two pulp and paper companies in the adjustment of treatment for slime control in their mills.

Inspection was made of wood in a warehouse in which vigorous fungal attack was in progress, and recommendations were made for arresting the decay threatening the wood installed in the building.

TIMBER PHYSICS DIVISION

An investigation of possibilities for increasing the use of sawdust and planer-shavings for insulation was commenced, and a preliminary report was prepared for the lumber organization which had requested the work. Investigation of the use of sawdust and shavings is being continued with special reference to building code regulations with respect to insulation.

Various inquiries were dealt with regarding the selection of wood and specifications for wooden articles used by the Department of Defence and other departments directly concerned with war work.

Attention was given to the use of Canadian woods to replace foreign woods in ship construction; to the examination of material which had failed in aircraft, to determine the reason for such failures; and to the effectiveness of various proprietary moisture-resistant coatings for war materials.

VANCOUVER LABORATORY

The work of this Laboratory has shown increasing concentration on the use of timber for war requirements. On this account research work on several projects had to be suspended while others had to be modified to meet immediate requirements.

Some of the more important problems dealt with are noted hereunder:

DIVISION OF TIMBER MECHANICS

Standard tests were carried out on yellow cedar to determine its basic properties for many specialized uses, particularly boat construction. Tests were also carried out on Douglas fir of the Mountain type.

A special study was conducted on the effect of kiln-drying at various temperatures on the strength of Sitka spruce, in order to facilitate the drying of this material for aeroplane construction.

A series of tests was started on Douglas fir and western hemlock timbers, in three merchantable grades, as defined in the Export No. 1 Grading Rules of the British Columbia Lumber and Shingle Manufacturers' Association.

Recommendations, following special tests, have led to the acceptance on a rate of growth and specific-gravity basis of Sitka spruce for slicing, prior to the manufacture of laminated leading edges for aircraft.

Tensile and panel tests were made on three-ply Sitka spruce and on mahogany-faced three-ply with a Sitka spruce core, in connection with the substitution of spruce for mahogany in aircraft construction.

The use of Engelmann and white spruce from the interior of British Columbia to augment supplies of Sitka spruce of aeroplane quality was investigated, with the co-operation of interested parties.

DIVISION OF TIMBER PRODUCTS

The use of shed dryers for accelerating the air-drying of lumber received attention. Marked acceleration of the drying rate was shown by tests at one mill where large fans are used to circulate air through the stock in unheated sheds.

A study was carried out at a mill where exhaust steam was passed through pipes under piles of 1-inch lumber. The results indicate a much faster rate and a moisture content considerably below what is possible during months on the coast under ordinary air-drying conditions.

Investigations were made of the reaction during kiln-drying of certain imported hardwoods, in order to determine their suitability as substitutes for woods which are unprocurable owing to war conditions.

Attention was given to the use of western white birch and broad-leaved maple for flooring, as a means of relieving demands for oak. Tests were carried out to determine the effect of kiln-drying to a low moisture content upon the hardness of these species and the efficacy of a special synthetic resin treatment in retarding the pick-up of moisture in manufactured strips.

A study of western hemlock timbers treated with urea and bulk-piled for various periods prior to kiln-drying showed much less degrade in the treated than in the untreated pieces.

A shipment of urea-treated Douglas fir and western hemlock fitches was made to South Africa to determine what effect this treatment might have upon timbers bulk-piled for considerable periods in a ship's hold. The results indicate that checking is eliminated but considerable staining occurs.

Attention was given to the possible use of arbutus to replace briar for smoking pipes, and also to extensive termite damage in foundation timbers of a large factory.

The cause of decay in western birch logs, after a comparatively short period of storage, was investigated and improved storage methods were devised to greatly reduce or prevent loss from this cause.

Problems having to do with the cause and prevention of decay of wood in service included: rot in laminated floors of a large department store; decay in foundation and basement timbers resulting from faulty construction; and decay in red alder furniture stock during air-seasoning.

Examinations were made of a green stain found in considerable volumes of Douglas fir from certain areas; a brown stain in the ends of certain western birch logs, which caused wrinkling of veneers cut from them; red stain in western red cedar shingles; and a bark-like tannin inclusion in western hemlock classed as "black check" in the United States.

PULP AND PAPER RESEARCH INSTITUTE OF CANADA

MONTREAL

Since August 1, 1940, the Montreal Laboratory of the Forest Products Laboratories has formed part of the Pulp and Paper Research Institute of Canada. On that date, the Dominion Government, the Canadian Pulp and Paper Association, and McGill University, entered into a new agreement

whereby all their pulp and paper research was placed under a General Director responsible to a Joint Administrative Committee consisting of representatives of the three corporate bodies.

Both fundamental and applied research is carried on at the Institute.

FUNDAMENTAL RESEARCH STUDIES

In the manufacture of sulphate pulp, the lignin, which constitutes from twenty to thirty per cent of the content of softwoods, is a total loss. Studies of lignin structure indicate the possibility of utilizing this substance for increasing the production of valuable aldehydes and in the field of plastics.

A more efficient method of bleaching kraft pulp and a method of manufacturing vanillin from sulphite waste liquor, both developed at the Institute, are now in active commercial operation. Work on the hydrogenation of wood indicates the possibility of using lower pressures and cheaper catalysts.

APPLIED RESEARCH STUDIES

In studies of the groundwood method of producing wood-pulp, the need arose for an instrument capable of testing the character of the pulp, as to strength and stretch, when in the form of a wet sheet. Such an instrument was successfully devised, and a duplicate was, with the co-operation of the Institute, constructed by a commercial mill. In the hope that some relation between the strength of the sheet at the wet end of a paper machine and the behaviour of the sheet in the machine might be found, a third instrument was installed in another mill. As no definite relation was found, this showed that other factors were of greater influence.

Work was continued on the development of an electrical conductivity method for measuring the consistency of a dilute pulp suspension. A device giving satisfactory results under laboratory conditions was built, and was subsequently simplified with a view to making it commercially practicable. While certain modifications yet remain to be worked out, its ultimate industrial adoption seems likely.

An objective method of measuring the printing qualities of paper has been under study for some time past. The principal lines of approach have been the measuring of the fidelity of reproduction of a standard half-tone, and the Carlsson trial printing method, which consists of pressing the paper against a definite weight of ink spread on a glass plate. The study is complicated by the fact that quality is itself largely subjective, but much suggestive and valuable material has nevertheless resulted.

Readings obtained with the Mullen tester, an instrument widely used in the paper industry for measuring the bursting strength of paper, are unfortunately subject to two major errors, inherent in its design. Methods for considerably reducing these errors under commercial conditions were devised, thus much increasing the value of the instrument.

An instrument for measuring the foldability of boxboard—one of its most important qualities—was designed and constructed. Certain modifications suggested by its experimental application were made, and a standard method of testing is now being worked out.

Other miscellaneous investigations covered building papers, to provide data for setting up specifications; an extensive series of tests of pulp sheets, before and after certain treatments; and tests of newsprint, necessitated by new U.S. tariff regulations.

As a result of the necessity for conserving chlorine, a maximum brightness in terms of the G.E. reflection meter was set for pulp. This instrument is not generally available in Canada, but, through co-operation with the Institute of Paper Chemistry, Appleton, Wis., it was possible to assist Canadian mills in meeting the new requirements.

Co-operation with industry was maintained by handling nearly 400 technical problems.

WAR WORK

Because of available equipment or special qualifications of personnel placed at the disposal of the Government, the Institute was able to render valuable assistance on problems connected with the war effort. In addition, much testing was done on pulp and paper products for munitions.