CANADA

REPORT *of the*

Department of

RESOURCES AND DEVELOPMENT

For the fiscal year ended

MARCH 31, 1953

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RESOURCES AND DEVELOPMENT

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1953

Price, 50 cents.

To His Excellency the Right Honourable Vincent Massey, C.H., Governor General and Commander-in-Chief of Canada.

MAY IT PLEASE YOUR EXCELLENCY:

The undersigned has the honour to lay before Your Excellency the Annual Report of the Department of Resources and Development for the fiscal year ended March 31, 1953.

Respectfully submitted,

ROBERT H. WINTERS,
Minister of Resources and Development.

The Honourable Robert H. Winters,
Minister of Resources and Development,
Ottawa.

Sir:

I have the honour to submit the Fourth Annual Report of the Department of Resources and Development which covers the fiscal year ended on the 31st of March, 1953.

Your obedient servant,

H. A. YOUNG,
Deputy Minister.

Department of Resources and Development

Minister	Hon. Robert H. WINTERS
Deputy Minister	Maj.-Gen. H. A. YOUNG
Assistant Deputy Minister	C. W. JACKSON

National Parks Branch

Director	J. A. HUTCHISON
National Parks and Historic Sites Division	*Chief*—J. R. B. COLEMAN
Canadian Wildlife Service	*Chief*—W. W. MAIR
National Museum of Canada	*Chief Curator*—F. J. ALCOCK

Engineering and Water Resources Branch

Director	Norman MARR
Water Resources Division	*Chief*—I. R. STROME
Engineering and Architectural Division	*Chief*—C. V. F. WEIR
Projects Division	*A/Chief*—G. H. FOURES
Trans-Canada Highway Division	*Chief*—R. A. CAMPBELL

Northern Administration and Lands Branch

Director	F. J. G. CUNNINGHAM
Northern Administration Division	*Chief*—F. FRASER
Lands Division	*Chief*—C. K. LECAPELAIN

Forestry Branch

Director	D. A. MACDONALD
Assistant Director	G. TUNSTELL
Forest Research Division	*Chief*—J. D. B. HARRISON
Forestry Operations Division	*Chief*—H. W. BEALL
Forest Products Laboratories Division	*Chief*—J. H. JENKINS

Canadian Government Travel Bureau

Director	D. Leo DOLAN
Assistant Director	G. H. ELLIS
Tourist Information Division	R. D. PALMER
Publicity Division	L. B. CONNERY
Technical Planning Division	H. A. UNDERWOOD

Administration Branch

Chief Administrative Officer	R. K. ODELL
Editorial and Information Division	*Chief*—A. J. BAXTER
Purchasing Division	*Chief*—H. C. WARNER
Legal Division	*Chief*—W. NASON
Personnel Division	*Chief*—A. C. WIMBERLEY
Economic Division	*Chief*—C. H. HERBERT

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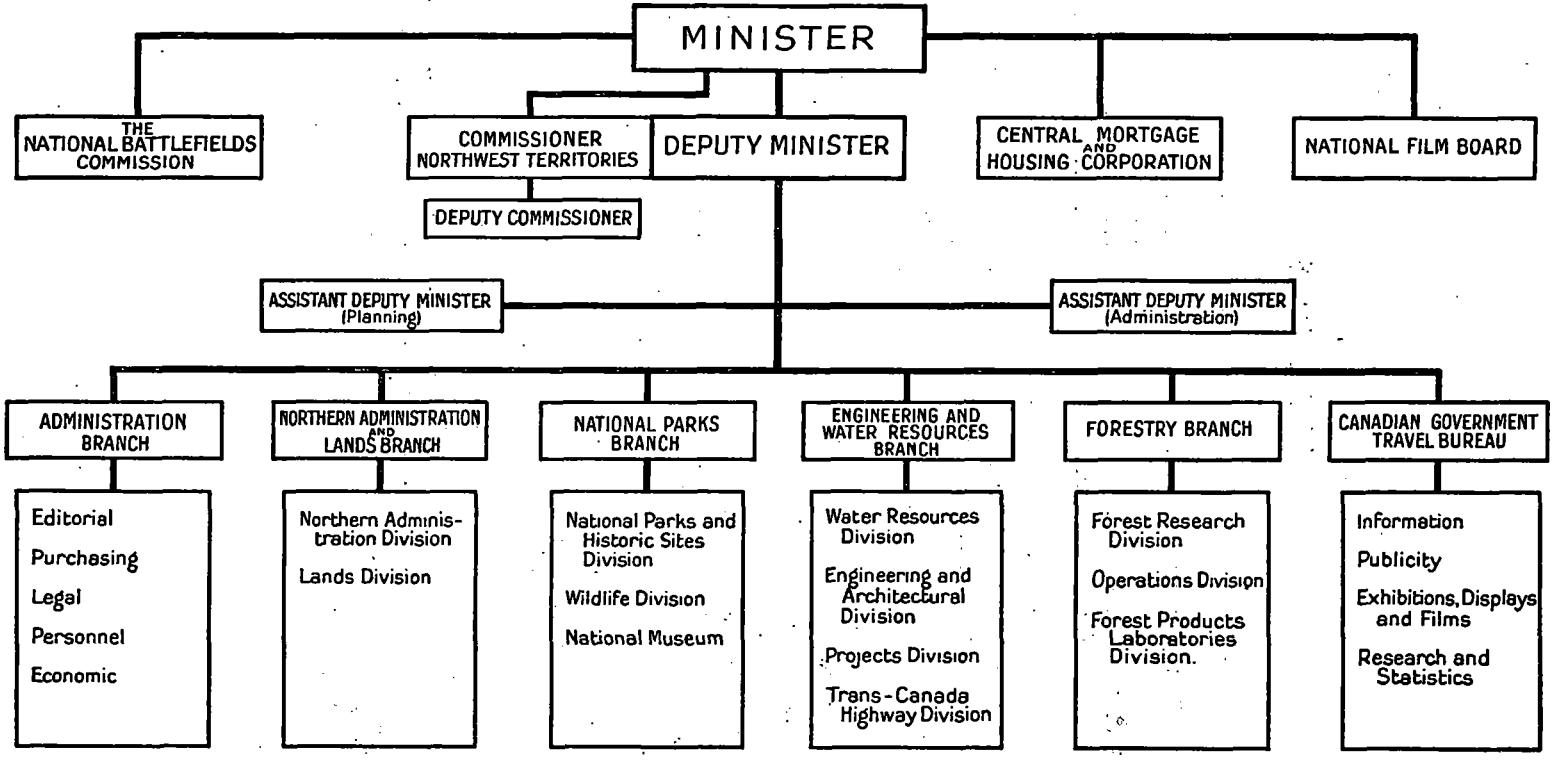
Inserted at the back of this Report is a map showing the location of national parks; game reserves; highway projects; forestry, water resources, wildlife, engineering and Northern Administration offices and posts, and other centres of departmental activity.

DEPARTMENT OF RESOURCES AND DEVELOPMENT



Organization Chart, 1952-53

DEPARTMENT OF RESOURCES AND DEVELOPMENT

Introduction

During the fiscal year, progress in those fields of resources and national development, which are the administrative responsibility of the Department, was marked by expanded mining and related activity and sustained growth in the value of mineral production in the Northwest and Yukon Territories; a substantial increase in the number of visitors to the National Parks; gratifying progress in the construction of the Trans-Canada Highway; the convening of the Sixth British Commonwealth Forestry Conference in Ottawa; and a new record attained in the number of tourist entries to Canada.

Mining activity in the Canadian North saw production values raised by about $2,000,000 in 1952-53 and development spread from the Mackenzie District eastward to Keewatin District.

There was a 21 per cent increase in the number of visitors to the National Parks from last year's record figure, with consequent growing pressure on parks roads and other facilities.

Nova Scotia's signature to the Trans-Canada Highway Agreement and maintenance of progress in paving and grading were viewed with marked satisfaction.

In the field of forestry, the holding of the Sixth British Commonwealth Forestry Conference and a better than average forest fire year throughout Canada were highlights. In the autumn of 1952, the Federal Government decided to participate financially in the spruce budworm spraying in northern New Brunswick, and Nova Scotia joined the ranks of those provinces which have entered into an agreement under the Canada Forestry Act to conduct forest inventories.

Wildlife management studies were continued in many parts of Canada, with emphasis on northern regions and the western prairies, and field investigations were also undertaken in anthropology and natural history.

There was a slightly more than 8 per cent rise in water-power development in Canada last year with an increase in interest in the possibilities of certain far northern areas.

Tourists were again attracted to Canada in record numbers, the majority of them from the United States. An increase of five per cent over last year brought the total to 26,300,000 individual entries, including commuters and other repeat visitors.

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The following table gives a summary of revenues and expenditures for the fiscal year:

	Revenues	**Expenditures*
Administrative Offices	$ 10.07	$ 384,930.00
National Parks Branch		
Branch Administration		22,428.75
National Parks and Historic Sites	984,530.26	6,537,829.37
Wildlife Division	4,134.85	308,961.59
National Museum	1,980.72	245,109.74
National Battlefields Commission	29.00	100,000.00
Grant to Jack Miner Migratory Bird Foundation		5,000.00
	990,674.83	7,219,329.45
Engineering and Water Resources Branch		
Branch Administration	9,178.50	60,665.66
Water Resources Division	145,457.72	1,218,836.91
Engineering and Architectural Division	37.58	370,838.14
Projects Division		1,335,746.30
Trans-Canada Highway Division		14,720,099.13
	154,673.80	17,706,186.14
Northern Administration and Lands Branch		
Branch Administration		28,134.81
Northern Administration Division	129,940.74	2,837,307.36
Lands Division	801,635.24	822,109.06
	931,575.98	3,687,551.23
Forestry Branch		
Branch Administration		124,962.75
Forest Research Division	21,135.38	882,378.11
Forestry Operations Division	18,971.35	1,101,676.35
Forest Products Laboratories	2,489.07	519,028.94
Grant to Canadian Forestry Association		6,000.00
Grant to Pulp and Paper Research Institute		100,000.00
Eastern Rockies Forest Conservation Board		1,045,297.17
	42,595.80	3,779,343.32
Canadian Government Travel Bureau		1,336,649.68
Totals for Department	$ 2,119,530.48	$34,113,989.82

* Expenditures include Exchequer Court Awards, $1,309.53, and Gratuities to Families of Deceased Employees, $6,528.24.

National Parks Branch

In reviewing the year's activities in the administrative sphere of the National Parks Branch, special attention is directed to the continued remarkable growth in the number of visitors to National Parks and National Historic Parks in all parts of Canada. For the sixth consecutive year a new record has been established for the number of visitors, 2,655,181 being recorded, an increase of 462,768 or approximately 21 per cent as compared to 1951-52.

Continued growth of visitor interest in the parks means, of course, increased use and pressure on roads and driveways, camping and picnic facilities, bathing establishments, playgrounds, golf courses, bowling greens, and other similar developments, with increased costs for maintenance and improvement.

In the larger national parks, private enterprise is concerned chiefly with catering to such visitor requirements as transportation, accommodation, and meals. In the more recently established national parks in the Maritimes, there has not been as ready an appreciation by private enterprise of the opportunities that exist for investment in the various developments needed to serve visitors.

In the western national parks the increase in visitor attendance has been, in two or three instances, so remarkable that at peak periods overnight accommodation for visitors has been overtaxed. This condition may be expected to continue as long as visitor pressure mounts and construction and maintenance costs remain high.

Major construction projects included the hard-surfacing and improvement of highways, roads, and townsite streets; the replacement of highway bridges; the renovation and repair of buildings and other structures; and beach protection work. Progress was made in the provision of additional accommodation for visitors, new camp-grounds were established and a number of existing camp-grounds were extended and provided with additional amenities. Recreational facilities were improved and maintained.

Restoration and improvement work was carried out at the Quebec Fortification Walls, Quebec; the Citadel, Halifax, and at a number of national historic parks. On the recommendation of the Historic Sites and Monuments Board of Canada, a number of memorials commemorating historic events and the services of distinguished Canadians were erected.

The Wildlife Division carried out, for management purposes, special scientific investigations of migratory birds, big game and fur-bearing animals, and game fish. It participated in Canadian and international wildlife conferences and co-operated actively with other scientific services and with conservation organizations and agencies in this and other countries. Progress in the work of banding wild birds for scientific purposes was reported and two new migratory bird sanctuaries were established. Several wildlife management bulletins were prepared and issued and numerous wildlife publications were distributed. Dr. Harrison F. Lewis, former Chief of the Canadian Wildlife Service, resigned from his position on March 31, 1952, and W. Winston Mair was appointed to the vacant position on August 1, 1952.

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The National Museum reports a busy year of field investigations in anthropology and natural history covering many parts of Canada. Officials of the Museum were able to add to the Museum collections in the course of these field investigations and other additions were made through donations and purchases. It is worthy of note that field investigations carried out during the summer months extended from Newfoundland to British Columbia and from southern Ontario into the Arctic and that they covered a wide variety of subjects. The annual series of National Museum lectures arranged in separate series, for adults and for children, continued to be well attended. The Museum continued to be of assistance to educational authorities throughout Canada.

National Parks and Historic Sites Division

Canada's system of national parks comprises 17 national parks and 11 national historic parks which range in size from a few acres to hundreds of square miles. The locations of these units are indicated on the map accompanying this report. The parks are administered under the authority of the National Parks Act and Regulations made thereunder.

Appropriations voted by Parliament permitted continuation of the extensive highway improvement project inaugurated a few years ago. Some progress was made in the provision of additional accommodation for visitors. New camp-grounds were established and a number of existing camp-grounds were improved or extended and provided with additional amenities. Recreational features which have been developed for visitors received increased patronage and numerous conventions were held at park centres. During the year, title to an area of approximately 175 acres was conveyed by the Corporation of the City of Revelstoke to the Department as an addition to Mount Revelstoke Park. The acquisition of lands donated will permit the construction of a new approach to the Mount Revelstoke Park Highway. Title to a small parcel in the townsite of Field was acquired for street improvement purposes and negotiations were completed covering the purchase of several acres of land in the vicinity of Mallorytown Landing as an extension to St. Lawrence Islands Park.

Travel to the Parks

The number of visitors to the national parks established an all-time attendance record. The largest increases in attendance were recorded at Banff, Kootenay, Riding Mountain, Waterton Lakes, and Point Pelee Parks. The number of visitors to each park, and comparative figures for the previous year, will be found in the following table, which does not include inter-park travel in the three-park unit composed of Banff, Kootenay, and Yoho Parks.

Comparative Statement of Visitors to the National Parks for Period April 1 to March 31

National Parks	*1952-53*	*1951-52*	*Increase or Decrease*
Banff	594,281	482,948	+ 111,333
Cape Breton Highlands ..	35,372	31,903	+ 3,469
Elk Island.....	136,720	139,040	— 2,320
Fundy	101,139	81,064	+ 20,075
Georgian Bay Islands	9,417	9,080	+ 337
Glacier	1,021	447	+ 574
Jasper	104,103	98,875	+ 5,228
Kootenay	173,158	122,834	+ 50,324
Mount Revelstoke ..	14,661	8,620	+ 6,041
Point Pelee	323,526	262,101	+ 61,425
Prince Albert ...	105,034	85,200	+ 19,834
Prince Edward Island	122,290	107,981	+ 14,309
Riding Mountain	409,518	334,089	+ 75,429
St. Lawrence Islands	42,856	44,002	— 1,146
Waterton Lakes .	195,562	164,908	+ 30,654
Yoho	41,003	43,705	— 2,702
Sub-total ...	2,409,661	2,016,797	+ 392,864
National Historic Parks and Sites			
Fort Anne	20,558	18,730	+ 1,828
Fort Battleford ..	11,259	6,788	+ 4,471
Fort Beauséjour..	23,249	20,029	+ 3,220
Fort Chambly ..	78,312	69,863	+ 8,449
Fort Lennox	9,668	7,837	+ 1,831
Fortress of Louisbourg .	19,050	17,751	+ 1,299
Fort Malden	15,564	15,649	— 85
Fort Wellington	8,562	6,910	+ 1,652
Port Royal Habitation ..	15,168	13,059	+ 2,109
Halifax Citadel (Site)	45,130		+ 45,130
Sub-total ...	246,520	176,616	+ 69,904
Grand total..	2,656,181	2,193,413	+ 462,768

Special Events

His Excellency, the Governor General, made short visits to Prince Edward Island and Jasper Parks. Delegates to the British Commonwealth Forestry Conference visited Jasper, Banff, and Kootenay Parks. The Trail Riders of the Canadian Rockies and the Sky-Line Trail Hikers held annual camps in the vicinity of Simpson Pass in Banff Park. The Alpine Club of Canada held its annual camp in the Mount Assiniboine area using Bryant Creek Trail for access. A half-way camp was established at Bryant Creek Meadows. The Indian Days celebration and the Winter Carnival at Banff were well attended. The Alberta Provincial Lawn Tennis Championships were held on the tennis courts in the recreational area in Jasper townsite.

Maintenance and Improvements

Roads and Bridges

Appropriations voted by Parliament permitted continuation of the highway improvement and the asphalt hard-surfacing program. In Kootenay Park, the second stage of the asphalt hard-surfacing of the Banff-Windermere Highway was completed, 28 miles being hard-surfaced and a seal-coating applied over the entire length of the highway between Mount Eisenhower Junction in Banff Park and the west boundary of Kootenay Park. A new 30-foot-span steel and concrete bridge was completed over Wardle Creek. In Yoho Park, relocation surveys were completed on the Yoho Valley and Loop Roads.

In Banff Park, in addition to the seven miles of the Banff-Windermere Highway which were seal-coated with asphalt, major repairs and widening of the Mount Norquay Road was undertaken. A gravel road was completed from the Banff-Jasper Highway to Peyto Lookout. On the Trans-Canada Highway, 2·6 miles of fine grade and 1·4 miles of rough grade were completed west of the east gate. The facilities for controlling and licensing traffic at the east gate were greatly improved with the provision of new lane-ways. New bridges were completed over the Bow River, east of Lake Louise Station, and over the Spray River near the Banff Springs Hotel. Extensive re-gravelling was carried out at the southern end of the Banff-Jasper Highway. Many bridges along this highway were re-decked and improved.

In Jasper Park, an asphalt bound gravel base was completed on the Banff-Jasper Highway from Mile 20 to Mile 48·7 and seal-coat was applied from Mile 0 to Mile 20. Good progress was made on the reconstruction of the Jasper-Yellowhead Road. A new bridge was constructed at Mile 15 on the Mount Edith Cavell Road.

In Waterton Lakes Park, 11 miles of road and townsite streets were seal-coated with asphalt. A preparatory base was laid on the Akamina Highway to Cameron Lake, together with five miles of asphalt-bound hard-surfacing and 10 miles of priming and seal-coating. All highways in Elk Island Park were re-surfaced with road oil.

In Prince Albert Park, 30 miles of Waskesiu Highway were seal-coated. A 12-foot span, multiplate arch culvert was constructed over Mud

Creek on the Narrows Road, replacing the former bridge. In Riding Mountain Park, plant mix hard-surfacing was completed on 34·5 miles of the No. 10 Highway and townsite streets. The first stages of hard-surfacing the by-pass east of the south gate was completed. A road three-quarters of a mile in length from Mile 12 on the No. 10 Highway to the Forest Experimental Station was completed.

In Cape Breton Highlands Park, replacement of the Mackenzie River Bridge was completed. In Prince Edward Island Park, an asphalt-bound, stone chip surface was laid on the section of the coastline road between Rustico and New London Bay.

Trails

In Kootenay Park, approximately 15½ miles of fire road was cleared and graded east of the Kootenay River, from Mile 27 on the Banff-Windermere Highway south to Pitt Creek. A new bridge was constructed over the Vermilion River. In Mount Revelstoke Park, the Silver Creek Trail was extended 1¼ miles. In Glacier Park, construction of the Mountain Creek trail from Bostock Summit to the main branch of Mountain Creek continued, with 1½ miles of new trail being completed. A timber bridge was constructed over the Illecillewaet River in the vicinity of the Glacier Railway Station. Several culverts were renewed, bridges repaired, ditches cleared and gravel spread as required on the Roger's Pass and Glacier Flat Creek fire roads.

In Banff, three miles of trail was built from the Spray reservoir to Fortune Flats, to replace the trail destroyed by the 1951 floods. Trail improvements and revisions were carried out in the Egypt Lake area. In Jasper Park, a new fire trail five miles in length was built from Sunwapta Falls south toward Fortress Lake. A new trail was constructed from Red Rock Canyon to the British Columbia boundary in Waterton Lakes Park.

The reconstruction of the Moose trail in Prince Albert Park progressed favourably as 17 miles of trail was graded and cleared. In Fundy Park, a walking trail was cut out from the Bayview subdivision to Herring Cove, a distance of two miles. Ten miles of fire trail from Broad Cove to Lake of Islands in Cape Breton Highlands Park was widened. The Gerome Brook trail was cleared for 2½ miles and is now passable for light trucks.

Communications

In Yoho Park, telephone line poles were renewed between the Leanchoil District Station and the west gate. The forest telephone line in Banff Park, from Massive to Redearth cabin was rebuilt. In Jasper Park, 10 miles of new telephone line was constructed between Geikie and Yellowhead, and 16 miles of new telephone line was completed between Amethyst Lake and the tearoom at the foot of Angel Glacier on Mount Edith Cavell. Two miles of forest line was re-constructed in Elk Island Park. In Prince Albert Park, one mile of telephone line between Waskesiu and Kapasiwin bungalows was re-located and nine miles of the warden line between Meridian cabin and Silver Grove cabin was re-located. A new 100-watt transmitter was acquired for use in the park. In Riding Mountain Park, five miles of line along the Norgate Road was re-poled.

Following is a statement of mileage of roads, trails, and telephone lines in the national parks, as of March 31, 1953.

Roads, Trails, and Telephone Lines

National Park	Motor	Secondary	Fire	Trails	Telephone Line
	Miles	Miles	Miles	Miles	Miles
Banff	181·15	.....	107·75	727·75	278·75
Cape Breton Highlands	50·80	5·00	25·23	21·75	3·34
Elk Island	18·00	.....	.....	20·00	17·00
Fundy	17·90	9·80	12·10	31·50	.....
Glacier	.....	.....	25·75	106·50	.....
Jasper	162·50	9·00	77·00	624·50	413·85
Kootenay	59·10	.....	26·00	158·50	60·00
Mount Revelstoke	18·50	.....	.....	56·75	11·00
Point Pelee	6·58	2·50	.....	.....	.....
Prince Albert	65·70	75·75	.....	268·75	129·00
Prince Edward Island	12·00	2·50	.....	3·50	.....
Riding Mountain	67·00	50·90	.....	119·00	227·50
Waterton Lakes	48·30	13·50	.....	151·90	75·00
Yoho	45·50	.....	26·50	209·00	72·50
Total	753·03	168·95	300·33	2,499·40	1,287·94

Buildings

During the period under review, 113 building permits were issued, authorizing new buildings, additions, and alterations in Banff Park. Major construction carried out included an administration building for the Banff School of Fine Arts, a service station, and 19 residences. Departmental construction included a new staff quarters at Upper Hot Springs, a youth hostel at Hilda Creek, and the renovation of buildings at the eastern gateway, including the construction of a new scale house with connecting archway.

In Jasper Park, 86 building permits were issued. On July 15, 1952, the central building of the Jasper Park Lodge development was destroyed by fire, but the adjacent buildings and tourist cabins were saved. The Canadian National Railways commenced the construction of a new main lodge which was expected to be ready for occupancy in June, 1953. Departmental activities included a dining room, kitchen, and "H" shaped bunkhouse placed in operation at the new town camp and the erection of a youth hostel in the vicinity of Beauty Creek.

In Glacier Park, construction of the log cabin at Sifton Pass was completed. The old bath-house at Radium Hot Springs in Kootenay Park was renovated for use as park administrative offices. In Elk Island Park, a warden's cabin was constructed near the east gate. The Sunset tourist cabin development at Sandy Beach was improved by installation of plumbing and heating units. In Waterton Lakes Park, a new restaurant was erected by private enterprise. A modern bunkhouse, which will accommodate 40 persons, was completed for departmental purposes.

A garage and service station was completed in Waskesiu townsite, Prince Albert Park. The Chief Warden's cabin and garage were moved to a new location near the south gate. An addition to the permanent camp cookhouse provided space for two walk-in refrigerators and sleeping quarters for the cook. A new warden cabin was erected at Waskesiu.

In Riding Mountain Park, a new milk bar was completed.

The tourist cabin development undertaken by the Department in the parks in the Maritime Provinces was extended by the erection of five modern cabins in Prince Edward Island Park and the provision of walk-in refrigeration units in Cape Breton Highlands and Fundy Parks. Residences for the use of park personnel were completed in Fundy and Cape Breton Highlands Parks. A new roof was laid on Dalvay House in Prince Edward Island Park.

Townsites

In the townsite of Banff, new streets in the Squirrel Street Division and Kootenay Avenue were graded and surfaced. Caribou Street, between Beaver and Muskrat Streets, was paved. Sidewalks were extended in the new subdivision by 1,100 feet, and walks laid in 1951 were finished to standard, including 8,500 feet of sidewalk on the east side of Banff Avenue. The approach roads to the Administration Building were revised and lighting improved. Street lighting was extended to Blocks 53 and 56 on Wolverine Street.

In Jasper townsite, Colin Crescent, between Elm and Miette Avenues, was widened and graded. The extension of Connaught Drive beyond Pine Avenue was continued. Geikie Street was widened and improved. New concrete curbing was installed on the north side of Fir Drive from Patricia Street to lane and on the west side of Patricia Street from Fir Street to Miette Street. A new hydrant was installed at the intersection of Geikie and Hazel Streets.

In Kootenay Park, a 3-inch pipe was laid, extending the present water supply from Radium Hot Springs townsite to a point adjacent to the park boundary where a 50,000-gallon storage reservoir was constructed. The streets in Field townsite, Yoho Park, were hard-surfaced. A new sidewalk was completed on Blocks 8 and 9 of Mount Stephen Avenue.

In Waterton Park townsite, concrete walks were constructed throughout the whole business section. The new year-round water system was completed and the new sewage system practically completed. In Prince Albert Park, extension of the electric distribution system to Block 3 of Waskesiu camp-ground was completed and service connections were made to the cabins. Work continued on the reconstruction of power lines from the power plant to Waskesiu Bungalows and the Prospect Point subdivision. A concrete gutter and sidewalk was built along Waskesiu Drive. New light standards were erected along Waskesiu Drive, and the cables were laid underground. This permitted removal of both the old light poles and overhead wires. Montreal Drive was widened from Waskesiu Drive to the outer side of the livery lots. The road beds widened in 1951 on Waskesiu and Montreal Drives were consolidated and gravelled.

In Riding Mountain Park, Ta-Wa-Pit Drive, the North Cross Drive, Balsam Road, Mooswa Drive, Spruce Crescent, and the roads leading to and from the camp-grounds and parking lot were hard-surfaced.

Accommodation for Park Visitors

The facilities provided in the public camp-grounds were well patronized, and the development of new camp-grounds and improvement of existing camp-grounds was carried on. At Tunnel Mountain in Banff Park, three new picnic shelters were erected, 25 stoves were installed, and

a permanent motion picture screen was constructed. The caretaker's quarters and office were completed at Two Jack Lake camp-ground. Benches and service buildings were replaced at Moraine Lake and Waterfowl Lake camp-grounds. In Jasper Park, an electric lighting system was placed in operation at Miette Hot Springs camp-ground. The Red Rock camp-ground in Kootenay Park was extended and new shelters were provided at Dolly Varden and at McLeod Meadow camp-ground. In Waterton Lakes Park, a new trailer camp was completed.

A new camp-ground area was developed at Waskesiu in Prince Albert Park. This camp-ground provides additional space for 60 portable cabins. The camp-ground development at the Narrows, Waskesiu Lake, was completed. In Point Pelee Park consolidation of existing camp-grounds progressed favourably, with the construction of a checking station and the under-brushing of a selected area. Forty new campsite tables were installed on the various islands in St. Lawrence Islands Park.

In Fundy Park, a large community kitchen was constructed at the camp-ground near park headquarters. Development of picnic grounds at Bennett Lake, at Lakeview, and at Hueston Place was commenced. In Cape Breton Highlands, improvements were effected at the main camp-ground at Ingonish Beach. At Corney Brook, a start was made on a new camp-ground, and a kitchen shelter, fireplace, and toilet were constructed. In Prince Edward Island, new kitchen shelters were built at Covehead and Stanhope.

Additional accommodation for the use of visitors was made available by private enterprise, including the following: Banff Park, one 4-room cabin, one four-in-one motel unit, and one duplex unit; Jasper Park, four bungalow cabins; Prince Albert Park, 14 cabins; Riding Mountain Park, six cabins and one motel containing 17 suites; Kootenay Park, three cabins.

General

In addition to the new construction outlined in the foregoing paragraphs, general maintenance of existing services was continued in all parks. This work included operation and maintenance of forest communication systems; sanitary services, including garbage collection; repairs and maintenance of roads and trails as well as streets and sidewalks in park townsites; maintenance of camp-grounds, picnic areas, and recreation facilities. Park buildings, including those at headquarters and those in the field, were maintained, and vehicles and other equipment were overhauled and repaired.

Recreation

Extensive improvements were made on the conversion of the existing 9-hole golf course to an 18-hole golf course at Waterton Lakes Park. In Jasper Park, the Miette Hot Springs bath-house was completely renovated and a steam heating and water pressure system installed. At Mount Norquay in Banff Park, and on the upper slopes of the Whistlers Mountain in Jasper Park, the clearing and improvement of ski slopes was continued. The ski hill at Mount Norquay is now considered one of the finest in Canada. The ski hill at Mount Revelstoke Park also was improved. In Elk Island Park, a new bowling green and tennis courts were provided. The outdoor amphitheatre at Fundy Park was completed and a motion picture projector and magnavox equipment were installed.

Conservation Services

Forest Protection

A total of 34 fires occurred in the national parks during the fire season of 1952. The total area burned over was 19,874½ acres, 98 per cent of which was the result of early spring fires in Riding Mountain and Prince Albert Parks. Damage to timber, young growth, and other property amounted to $4,759.40 which is comparatively light when compared to the large area burned over. It is interesting to note that 52·9 per cent of all fires reported were class "A" or under one-quarter acre in size.

An analysis of the causes shows that campers, settlers, railways, and miscellaneous known were responsible for 47·2 per cent, or 11·8 per cent each; smokers for 14·8 per cent; lightning, industrial operations, and unknown for 26·4 per cent or 8·8 per cent each; and incendiary and public works for 11·6 per cent or 5·8 per cent each.

Fire Losses in the National Parks, 1951 and 1952

	Number of Fires		Area Burned (Acres)		Cost of Suppression	
	1951	1952	1951	1952	1951	1952
					$ cts.	$ cts.
Banff	15	8	38¼	13½	493 69	1,773 12
Jasper	4	6	1	3¾	112 08	115 78
Glacier	2	2	304½	Spot	2,068 12	131 20
Kootenay	1	0	Spot	0	6 00	0 00
Yoho	0	1	0	Spot	0 00	32 01
Mount Revelstoke	2	0	6	0	1,066 69	0 00
Waterton Lakes	0	0	0	0	0 00	0 00
Elk Island	0	1	0	150	0 00	78 80
Prince Albert	1	1	8½	18,995	62 65	7,156 00
Riding Mountain	5	6	25½	577½	103 05	312 31
Georgian Bay	0	0	0	0	0 00	0 00
St. Lawrence Islands	0	3	0	¼	0 00	14 80
Point Pelee	0	0	0	0	0 00	0 00
Fundy	0	1	0	45	0 00	2,239 00
Prince Edward Island	0	0	0	0	0 00	0 00
Cape Breton	0	5	0	Spot	0 00	14 50
Totals	30	34	383½	19,784½	3,912 28	11,867 52

Improvements in Fire-fighting Equipment

Fire-fighting equipment purchased during the year consisted principally of replacements for articles no longer serviceable. Included were 17 portable gasoline pumps; 15,000 feet of 1½-inch, unlined linen hose; 5,000 feet of 1½-inch, rubber-lined hose; one fog nozzle and 30 regular 1½-inch nozzles; three portable canvas water tanks; 36 fire-fighting shovels; 24 "Rich" fire-fighting tools; 24 "Pulaski" tools; 23 dozen axes; 12 five-gallon water bags with hand spray pumps; eight relay tanks; and one "Firedog" trailer equipped with a 200-gallon water tank.

Construction of fire lookouts was limited to a 40-foot wooden tower on Wardle Mountain, in Kootenay Park, and a 30-foot tower at Mile 11 on the Banff-Windermere Highway. All lookouts were in operation throughout the fire season.

Fire Weather Conditions

With the exception of short periods of extreme fire danger in April and May, weather conditions were generally favourable throughout the national parks. In the mountain parks in British Columbia and Alberta, short periods of extreme danger occurred from April to September, but fortunately these were of short duration. In the prairie parks, the usual periods of high and extreme danger were present in the spring and autumn. In the Ontario parks, conditions were quite favourable, with sufficient rain to keep any danger well under control. In the parks in the Maritime Provinces, short periods of high and extreme danger occurred from late June to August, necessitating the closing of wooded areas to travel on several occasions.

Fire danger stations located in Banff, Jasper, Yoho, Waterton Lakes, Prince Albert, Riding Mountain, and Cape Breton Parks were in operation throughout the fire season.

Insect Control

Entomologists from the Forest Biology Division, Department of Agriculture, continued their investigations in the mountain parks from their field headquarters at Mount Eisenhower. A preliminary experiment was made in the use of a virus in the control of the lodgepole pine needle miner. The scope of the experiment, which was carried out in Yoho Park, was limited owing to the small amount of virus available, but the results were reported to be encouraging. According to recent reports, the needle miner population, although still present in the endemic stage, is not likely to cause any further heavy mortality at present.

In all parks close co-operation was maintained with the Division of Forest Biology in collecting specimens for the forest insect survey.

Disposal of Timber

In Riding Mountain Park, cutting of saw-timber, fuelwood, and some other products was continued under the control of a forest working plan for the benefit of local settlers. Under this plan 1,758 permits were issued for 3,776,370 feet board measure of saw-timber, 7,334 cords of fuelwood, 48,388 posts, 129,268 linear feet of poles, and 30,019 trees.

Logging operations of a limited character were also carried on in Jasper, Banff, and Prince Albert Parks to provide lumber for park use. The quantity of lumber resulting from these operations totalled 501,036 board feet, taken as follows: Banff Park, 230,000 feet; Jasper Park, 121,036 feet; and Prince Albert Park, 150,000 feet. In addition, a sale of fire-killed timber in Prince Albert Park produced 625,783 feet board measure and 41 cords of fuelwood. On Licence Timber Berth No. 406 in Yoho Park, 4,017,970 feet board measure of lumber was manufactured.

Mammals in National Parks

Following an outbreak of foot and mouth disease in the Province of Saskatchewan, preventive measures were put into force from April to July. All automobiles entering national parks in Western Canada were required to be driven through a disinfectant bath as a preventive against the communication of this disease to the animals within the parks.

Owing to a rabies epidemic in the Province of Alberta, it was found necessary to inoculate all dogs in the national parks in Alberta, British Columbia, and Saskatchewan. Measures also were taken to reduce the number of predators as a preventive against the spread of this disease to animals within parks in Alberta, Saskatchewan, and Manitoba.

The exhibition buffalo herd at Banff Park was reduced by seven. The meat was set aside for use of the Indians at the next Indian Days Celebration at Banff, and the hides were sold.

To avoid overgrazing of the range, 238 buffalo at Elk Island Park were slaughtered and the meat sold by tender. The following disposition of the hides was made: 85 sold by tender; 75 donated to the Royal Canadian Mounted Police; and 78 retained by the Department. It was also considered advisable to slaughter 111 elk. The Indian Affairs Branch, Department of Citizenship and Immigration, was given 28,970 pounds of elk meat for needy Indians, and the Indian Days Celebration Committee at Banff received 3,820 pounds.

The elk herd in Jasper Park was reduced by the slaughter of 75 head. The meat and hides were given to the Department of Citizenship and Immigration.

Eight buffalo were slaughtered at Prince Albert Park, in order to relieve the pressure on the grazing range. The meat was used in the work camps of the park. The hides were retained for departmental use. Ninety beaver, which were causing trouble along the highway, were trapped and pelted.

To prevent overgrazing of the range in Riding Mountain Park animal paddock, 24 buffalo were slaughtered. The meat was sold by tender and the hides were set aside for departmental use.

Six buffalo were shipped from Elk Island Park to Waterton Lakes Park to form the nucleus of an exhibition herd. The public has taken a keen interest in the establishment of this herd.

Gifts of Live Animals

Donations of live animals were as follows: from Elk Island Park—20 buffalo were transferred to the Experimental Station, Department of Agriculture, Alberta, and two female buffalo were shipped to the zoo at Granby, Quebec; from Jasper Park—one male, one female, and a kid goat were shipped to the Quebec Zoological Garden, Charlesbourg, Quebec.

Statement of Large Mammals in Fenced Enclosures in National Parks, March 31, 1953

Species	Banff Park Paddock	Elk Island Park	Prince Albert Park Paddock	Riding Mountain Park Paddock	Waterton Lakes Park Paddock	Total
Buffalo	12	832	12	50	8	914
Elk	.....	671	.....	172	.....	843
Moose	.....	386	.....	3	.....	389
Mule Deer	.....	131	.....	.....	.....	131
White-tailed Deer	.....	.....	.....	30	.....	30
Total	12	2,020	12	255	8	2,307

Fish Cultural Activities

Through the co-operation of the Game and Fisheries Branch of the Manitoba Department of Mines and Natural Resources and the Fisheries Branch of the Saskatchewan Department of Natural Resources, 1,250,000 common whitefish eggs were planted in Lake Minnewanka, Banff Park, in an attempt to improve conditions for survival and growth of lake trout.

As in previous years, the Department of Fisheries supplied eastern brook trout for stocking park waters located in the Maritime Provinces. During 1952, 1,640 fingerlings and 17,000 yearlings of eastern brook trout, all fin-clipped, were released in Cape Breton Highlands and Prince Edward Island Parks.

Details of plantings of trout in the Prairie and Mountain Parks from the three park hatcheries at Banff, Jasper, and Waterton Park are given in the following table. A program of stocking marked fish was continued. More than 68,000 yearlings and older fish and some fingerlings were marked by the removal of one or two fins before planting. Information obtained from the marking program has been useful in evaluating growth and survival of planted fish and in preparing stocking schedules for park waters.

Trout Plantings from National Parks Hatcheries during 1952

Species	Banff	Jasper	Waterton Lakes	Yoho	Kootenay	Riding Mountain	Prince Albert	Total
Rainbow Trout								
Fingerlings	500	86,250	2,000	2,000	.....	.....	.....	90,750
Yearlings	3,800	27,650	.....	4,000	.....	.....	.....	35,450
2-year olds	.....	658	.....	.....	.....	.....	.....	658
Adults	.....	168	160	.....	.....	.....	.....	328
Cutthroat Trout								
Fingerlings	70,035	.....	6,000	.....	.....	.....	.....	76,035
Eastern Brook Trout								
Fingerlings	9,500	2,000	2,000	.....	3,000	.....	.....	16,500
Yearlings	4,068	12,000	.....	.....	1,000	.....	2,000	19,068
2-year-olds	.....	350	650	.....	.....	.....	.....	1,000
Lake Trout								
Yearlings	.....	.....	.....	.....	.....	5,400	.....	5,400
Total	87,903	129,076	10,810	6,000	4,000	5,400	2,000	245,189

National Historic Parks and Sites

The National Parks and Historic Sites Division is entrusted with the restoration, preservation, and administration of the National Historic Parks and Sites, and the commemoration of the public services of outstanding personages in Canadian History. In this phase of its work, the Division is advised by the Historic Sites and Monuments Board of Canada, an honorary body of recognized historians, representing the various provinces of Canada.

The personnel of the Board is as follows: Chairman, Professor Fred Landon, London, Ont.; Professor D. C. Harvey, Halifax, N. S.; the Honourable E. Fabre-Surveyer, Montreal, Que.; the Reverend Antoine d'Eschambault, Genthon, Man.; Professor M. H. Long, Edmonton, Alta.; Dr. Walter N. Sage, Vancouver, B.C.; the Honourable Thane A. Campbell, Charlottetown, P.E.I.; Dr. Wm. Kaye Lamb, Dominion Archivist, Ottawa, Ont.; C. E. A. Jeffery, St. John's, Nfld.; Dr. Alfred G. Bailey, Fredericton, N.B.; Campbell Innes, Battleford, Sask.; W. D. Cromarty, Ottawa, Ont., and C. G. Childe, National Parks and Historic Sites Services, Ottawa, Ont.

The annual meeting of the Board was held in Ottawa May 27 to 30, 1952, when a wide variety of matters relating to the background of Canada were reviewed. Of the many sites that have been considered by the Board to date, 459 have been marked or acquired and 183 others recommended for addition at a later date.

National Historic Parks

At Fort Louisbourg National Historic Park, N.S., restoration work was carried out on the remains of the hospital and citadel. A section of the breastwork near the main entrance was repaired and the main entrance road levelled and gravelled.

At Lower Fort Garry National Historic Park, Man., repointing and restoration of the walls of the fort was undertaken. A mastic cap was placed on the top of the walls. The buildings and ground have been leased to the Motor Country Club until December 31, 1955.

At Fort Battleford National Historic Park, Sask., a section of the stockade was torn down and rebuilt. Two bastions were reconstructed and a fence was erected to enclose the park property. Additional show cases were acquired for the museum. The entrance road from the main highway was gravelled.

General maintenance included repainting and repointing of walls and fortifications where necessary; the improvement of roads and walks; the repairing and replacing of roofs, drains, bridges, ramparts, and gravestones; and the cleaning of tablets, cannons, and other appurtenances. The care of lawns, shrubs, and picnic grounds was carried out in the following national historic parks; Fort Anne, N.S.; Fort Beausejour, N.B.; Fort Chambly, P.Q.; Fort Lennox, P.Q.; Fort Wellington, Ont.; and Fort Malden, Ont.

National Historic Sites

The Citadel, Halifax, N.S. The custody of certain lands and structures comprising the Citadel was taken over by the Department in 1951 with a view to their development and preservation. During the year under review, sections of the ramparts were restored; 12 casemates in the Redan housing the guard room, office, Maritime Museum, and Military Museum were restored. The Cavalier Block was re-roofed and the Time Ball Tower was repaired and painted.

Quebec Fortification Walls, Quebec, P.Q. A considerable portion of these historic walls, exclusive of the Citadel and that part of the walls controlled by the City of Quebec, was taken over by the Department in 1950 in order that they may be maintained and preserved as a national

historic site. Extensive repairs have been made to the fortifications including the St. John's Gate, the Kent Gate, the Ramparts, and the Outer Citadel Wall.

Maurice Galbraith Cullen, R.C.A., St. John's, Nfld. A tablet was erected in the Hall of Memorial University to the memory of Maurice Galbraith Cullen, distinguished painter of the Canadian winter scene. The tablet was unveiled by Sir Leonard Outerbridge, Lieutenant-Governor of Newfoundland, on January 16, 1952.

Alcock-Brown Transatlantic Flight, St. John's, Nfld. A cut-stone monument with table was erected in a small park at the intersection of Le Marchant Road and Patrick Street to the memory of Captain Sir John Alcock and Lieutenant Sir Arthur Whitten Brown of the R.A.F., who, at 12.58 p.m. Newfoundland time, on June 14, 1919, took off nearby in a Vickers Vimy aeroplane on the first non-stop Transatlantic flight. Sixteen hours and twelve minutes later they landed at Clifden, Ireland, a distance of 1,800 miles. The monument was unveiled in the presence of a distinguished gathering, including Sir Leonard Outerbridge, Lieutenant-Governor of Newfoundland, on November 26, 1952.

Scots Fort, Port Royal National Historic Park, Lower Granville, N.S. A cut-stone monument with tablet was erected to mark the site of Scots Fort, built in the form of a pentagon, mounting "4 demcolverin and 4 miniones", and occupied by the colonists of Sir William Alexander, 1629-32. On the restoration of Port Royal to France in 1632, forty-two survivors of the Scottish colony were sent to England by Commander de Razilly, in the *Saint Jean,* one of the three ships in which he brought the new French colony to Acadia.

Gilbert Stuart Newton, R.A., Halifax, N.S. A tablet was affixed to the Nova Scotia College of Art building to the memory of Gilbert Stuart Newton, first native-born artist to be elected to the Royal Academy. The tablet was unveiled on October 24, 1952, by Reverend James W. Falconer, Professor Emeritus of Pine Hill Divinity Hall and President of the Board of Directors of the Nova Scotia College of Art.

George Munro Grant, Stellarton, N.S. A tablet was affixed to the Town Hall to the memory of George Munro Grant, educationist and author of *Ocean to Ocean.* He was minister of St. Matthew's Church, Halifax, 1863-77; Principal of Queen's University, 1877-1902; and President of the Royal Society of Canada, 1901.

The Pony Express, Victoria Beach, N.S. A tablet was affixed to a large boulder on the north side of the main road to commemorate the events connected with the Pony Express. From February until November, 1849, when the telegraph office in Halifax was opened, news from Great Britain brought to the United States by the Cunard steamers was delivered for the Associated Press and a rival organization, from Halifax to Digby Gut, by riders. The news was carried by steamer to Saint John and from there dispatched to its destination by telegraph.

John Clarence Webster, C.M.G., Saint John, N.B. A tablet was erected in the main hall of the New Brunswick Museum to the memory of John Clarence Webster, eminent surgeon, historian, author, and professor. He was a leader in the movement for the preservation of the relics of Canada's historic past. The tablet was unveiled by Mrs. Webster on September 25, 1952.

William Davidson, Newcastle, N.B. A tablet was affixed to the Court House building to the memory of William Davidson, the first English-speaking settler in Miramichi. He was a pioneer in the fishing, masting, lumbering, and ship-building industries, and in foreign trade.

Archbishop Tache, Riviere-du-Loup, P.Q. A tablet affixed to an iron standard was erected on De Gaspe Avenue to the memory of Alexandre Antonin Tache, Archbishop of Saint Boniface. He was a well known missionary, writer, founder, and statesman.

First Butter Factory in Canada, Athelstan, P.Q. A tablet affixed to an iron standard was erected on the grounds of the Champlain Milk Products Company, Limited, to mark the spot where, in 1873, the first butter factory in Canada was established. The tablet was unveiled on October 28, 1952, by members of the local dairy industry.

Battle of Montmorency, Courville, P.Q. A cut-stone monument was erected on the east side of Courville Hill to commemorate the Battle of Montmorency which took place there on July 31, 1759, when the French troops, under Montcalm and Levis, repulsed General Wolfe's army.

Sir John Alexander Macdonald, Kingston, Ont. A tablet was affixed to the existing monument in City Park to the memory of Sir John Alexander Macdonald, 1815-1891. First elected from Kingston to the Legislative Assembly of the Province of Canada in 1844, he was, for 47 years, a leading figure in the public life of his country. One of the Fathers of Confederation, he became the first Prime Minister of Canada and held the office 1867-73; 1878-91. Under his leadership the new Dominion was extended from sea to sea by incorporation of the territories of the Hudson's Bay Company, British Columbia, and Prince Edward Island, and linked together by construction of the Intercolonial and Canadian Pacific Railways.

First Military Test Flight, Petawawa, Ont. A tablet was affixed to a cairn on the camp-grounds to commemorate the first military demonstration of aircraft flight in Canada which was given there in August, 1909, by J. A. D. McCurdy and F. W. Baldwin, with the assistance of the Royal Canadian Engineers. On the morning of August 2, they made four successful flights in the *Silver Dart*. This aircraft was destroyed in landing after the fifth flight. Further flights were made in the *Baddeck No. 1* on August 12 and 13. The tests were terminated on the 13th, when this aircraft was damaged. A second tablet depicting the *Silver Dart* in flight was also affixed to the cairn. The monument was unveiled by the Honourable Brooke Claxton, Minister of National Defence, on August 12, 1952.

Archibald McKellar MacMechan, Kitchener, Ont. A tablet was erected in the Kitchener and Waterloo Collegiate and Vocational School to the memory of Archibald McKellar MacMechan, scholar, teacher, and author. He was Professor of English in Dalhousie University, 1889-1933. The tablet was unveiled on October 17, 1952.

Grant Allen, Kingston, Ontario. A tablet was affixed to one of the stone pillars at the entrance to Alwington House to the memory of Grant Allen, popular writer on science and a successful novelist.

Jean (McKishnie) Blewett, Chatham, Ont. A tablet was erected in the Public Library building to the memory of Jean (McKishnie) Blewett, poet, journalist, and novelist. The tablet was unveiled under the auspices of the Kent County Historical Society, on April 23, 1952.

Battlefield of the Beechwoods or Beaver Dams, Thorold, Ont. A special tablet was affixed to the existing cairn, in commemoration of the United States soldiers who were killed in the engagement which took place there on June 24, 1813 and are buried near the canal, about half a mile west of the cairn. Their place of burial is marked by a monument erected privately in 1874.

William Saunders, London, Ont. A tablet was affixed to a boulder erected by the local Public Utilities Commission in Campbell Memorial Park to the memory of William Saunders, scientific agriculturist and director of the Federal Experimental Farms Branch, 1886-1911. He was President of the Royal Society of Canada, 1906. The tablet was unveiled under the auspices of the London and Middlesex Historical Society on October 1, 1952.

William Canniff, Cannifton, Ont. A tablet was erected in the Public School to the memory of William Canniff, physician, author, and historian of early Upper Canada. The tablet was unveiled under the auspices of the Public School officials on November 13, 1952.

Fort Dauphin, Winnipegosis, Man. A cairn with tablet was erected in the village park to commemorate the historic events connected with Fort Dauphin which was built in that vicinity in 1741 by Pierre de La Verendrye at the request of the Crees and Assiniboines. The cairn was unveiled in the presence of a distinguished gathering, including the Honourable Douglas Campbell, Premier of Manitoba, on August 17, 1952.

Province of Manitoba, Winnipeg, Man. A tablet was erected at the front entrance to the Legislative Building, to commemorate Manitoba becoming a Province of Canada. This important event took place on July 15, 1870, following two centuries of government under the Charter of 1670 to the Hudson's Bay Company, the administrations of the Selkirk Colony, the Council of Assiniboia, and the Provisional Government of 1869. The tablet was unveiled by His Excellency the Governor-General on October 28, 1952.

The Reverend George Bryce, Winnipeg, Man. A tablet was affixed to the outer wall of the new Library and Theological building of the United College to the memory of the Reverend George Bryce, historian and teacher. He was the author of *The Remarkable History of the Hudson's Bay Company* and founder of Manitoba College.

Cut Knife Battlefield, Poundmaker Indian Reserve No. 114, Sask. A cut-stone monument with tablet was erected on the site of the engagement which took place on May 2, 1885, when Lt. Col. W. D. Otter led 325 troops composed of North West Mounted Police, "B" Battery, "C" Company, Foot Guards, Queen's Own and Battleford Rifles, against the Cree and Assiniboine under Poundmaker and Fine Day. After an engagement of six hours, the troops retreated to Battleford. The monument was unveiled by His Excellency the Rt. Hon. Vincent Massey, Governor-General on November 2, 1952.

Province of Saskatchewan, Regina, Sask. A tablet was affixed to a cut-stone monument in Victoria Park to commemorate Saskatchewan becoming a Province of Canada. Across this expanse of prairie, and northland of lake, stream and forest, drained by the Saskatchewan and Churchill Rivers, the Plains Indians roamed for centuries and later were

induced to trap and trade by fur companies. Settlers were attracted into this area known as Rupert's Land and the North West Territories. The latter, after 1870, were ruled by a Provisional Council, succeeded in 1875 by the North West Council. By 1888 a Legislative Assembly was evolved. On September 4, 1905, the eastern portion of these territories was inaugurated here by Earl Grey and Sir Wilfrid Laurier, as the Province of Saskatchewan.

Paul Kane, Fort Battleford National Historic Park, Battleford, Sask. A tablet was erected in the museum building to the memory of Paul Kane whose paintings preserve for posterity the life of the Indians of the Northwest. The tablet was unveiled by His Excellency the Governor-General on November 3, 1952.

Fort Benton-Fort Macleod Trail, Coutts, Alta. A cut-stone monument with bronze tablet was erected near the new Customs and Immigration building to commemorate the Fort Benton-Fort Macleod Trail. Until the building of the Canadian Pacific Railway across the prairies in 1882 and 1883 the most practicable route to southern Alberta was by the Missouri River to Fort Benton and thence northward along the Fort Benton Trail by mule and bull team, cart and covered wagon, to Fort Macleod. The Trail crossed the international border about seven miles west of Coutts, and over it came most of the travellers, mail, and supplies for the region. The monument was unveiled by His Honour John J. Bowlen, Lieutenant Governor of Alberta, on September 14, 1952.

Charles Alexander Magrath, Lethbridge, Alta. A tablet was erected in the City Hall to the memory of Charles Alexander Magrath, who, from 1878 to 1906, helped to make foundation surveys of the North West Territories and to develop the pioneer coal mining, railway, and irrigation enterprises of Sir A. T. Galt and associates. He was the first Mayor of Lethbridge, a member of the Territorial Legislature and of the Federal Parliament, Chairman of the Ontario Hydro-Electric Power Commission, of the Canadian Section of the International Joint Waterways Commission, and member of the Newfoundland Royal Commission (1935). The tablet was unveiled under the auspices of the Mayor and Council of the City of Lethbridge, on September 16, 1952.

Fort St. James, Stuart Lake, B.C. A cairn with tablet was erected on property belonging to the Hudson's Bay Company to commemorate the historic events connected with Fort St. James. Founded in 1806 by Simon Fraser of the North West Company this fort has been the chief fur trading post in north-central British Columbia, formerly known as New Caledonia. Since 1821 it has been in continuous operation by the Hudson's Bay Company. Fort St. James has been a most important link in the water, land and air communication with northern British Columbia.

Fort Victoria, Victoria, B.C. A tablet was affixed to the Government Street face of the Pemberton-Holmes building to mark the site of Fort Victoria. Founded by the Hudson's Bay Company in 1843, this fort became, after 1846, the headquarters of the Company's trade in British territory west of the Rocky Mountains. The last of the original buildings was demolished in 1862. The tablet was unveiled under the auspices of the Victoria Section of the British Columbia Historical Society, on August 28, 1952.

Richard Blanshard, Victoria, B.C. A tablet was affixed to the Post Office Section of the new Public Building on Government Street to the memory of Richard Blanshard, first Governor of Vancouver Island, 1849-1851, whose house stood on that site. The tablet was unveiled by the Rt. Hon. Louis S. St. Laurent, Prime Minister of Canada, on September 5, 1952.

Dr. John Stanley Plaskett, C.B.E. Victoria, B.C. A tablet was affixed to the telescope at the Dominion Astrophysical Observatory to the memory of Dr. John Stanley Plaskett, internationally renowned for his work in astronomy. He was Director of this Observatory, 1918-1935. The tablet was unveiled at a Joint Meeting of the American Astronomical Society and the Astronomical Society of the Pacific on June 26, 1952.

Wildlife Division

This Division deals with most wildlife matters coming within the jurisdiction of the Federal Government. Its functions include administration of the Migratory Birds Convention Act (in conjunction with the Royal Canadian Mounted Police and in co-operation with provincial game authorities); carrying on scientific research into wildlife problems in the Northwest Territories, Yukon Territory, and the National Parks of Canada; advising Northern Administration and Lands Branch and the National Parks and Historic Sites Division on wildlife management and co-operating in the application of such advice; and co-ordination and advice in connection with the administration of the Game Export Act by the provinces. It also deals with national and international problems relating to Canada's wildlife resources and co-operates with other agencies having similar interests and problems in Canada and elsewhere.

The Division staff included, during 1952-53, seven Dominion Wildlife Officers with districts as follows: Newfoundland, the Maritime Provinces, Quebec, Ontario, Manitoba and Saskatchewan, Alberta and the Territories, and British Columbia. Its organization provided for the employment of scientific research workers in the field as follows: a biologist with headquarters at Banff, Alberta, responsible for supervision of mammal investigations; a biologist in charge of caribou investigations with headquarters at Yellowknife, Northwest Territories; mammalogists with headquarters at Fort Smith, Aklavik, Fort Simpson, and Coral Harbour, Southampton Island, all in the Northwest Territories, and at Ottawa, for mammal investigations in the Northwest Territories; four Wildlife Management Officers with headquarters at Vancouver, Saskatoon, Ottawa, and Sackville, for research into problems affecting migratory birds and other wildlife; and three limnologists, with headquarters at Ottawa, engaged in limnological research in the national parks and elsewhere. Headquarters of Wildlife Division officers in the field are shown on the map accompanying this report. Five college and university students were employed as field assistants during the summer of 1952.

Migratory Birds Convention Act

This Act, as passed in 1917 and later amended, made effective the Migratory Birds Treaty signed in Washington, D.C., in 1916. It provides a measure of protection for numerous species of birds that migrate between Canada and the United States. The Federal and Provincial Governments

co-operate in the administration of the Act, and Regulations in accordance with it are adopted annually by Federal Order in Council after agreement by those governments. Since 1932, the Royal Canadian Mounted Police have been responsible for enforcing the Migratory Birds Convention Act.

Migratory Bird Regulations adopted under the Act in 1952 were generally similar to those of 1951. Open seasons provided for waterfowl in Western Canada were extended as follows: Manitoba (part of province), six days; Saskatchewan, ten days; Alberta, seven days; and British Columbia (part of province), one to ten days. The season for geese (other than brant) in Prince Edward Island was extended eight days to bring it into conformity with the duck season in that province. An additional 30-day open season for sea ducks on part of the north shore of the Gulf of St. Lawrence, in coastal waters only, was permitted on an experimental basis.

Field Investigations

Mammal Studies

Wildlife investigations were carried out in Prince Albert, Elk Island, Jasper, Waterton Lakes, Yoho, Kootenay, and Riding Mountain Parks. Range conditions and the grazing of horses in Jasper Park were studied and winter game ranges in that park and Banff Park were surveyed from the air. The condition of the elk range in Riding Mountain Park was examined on the ground. Animal-borne diseases called for special attention, and advice was given in regard to measures to prevent the possible spread of rabies and foot-and-mouth disease to animals in western national parks. In January, a census of muskrats in Point Pelee Park was carried out.

In Wood Buffalo Park, post-mortem examinations of bison killed in the annual slaughter were made. Studies of calf production and survival, and of the relationship between wolves and bison were continued.

Investigation of big game animals in the Far North was chiefly concerned with caribou and musk-oxen. Numerous areas were visited and much information collected. Winter ranges of the caribou were studied on the islands of Great Slave Lake and in the forest surrounding Keller Lake. The influence of forest fires on the ranges was assessed. Areas on the edge of the barrens in the Snare River watershed were examined, and sex, age, and calf counts were made in migrating herds. Aerial surveys of musk-oxen were carried out in the summer and winter ranges of the Thelon Game Sanctuary.

Studies of fur-bearing animals important in the fur trade were continued in Mackenzie District. Marten populations and habitat conditions were surveyed in the Anderson River and Mackenzie Mountains districts. Extensive aerial surveys of beaver were made in several regions from Arctic Red River and Fort McPherson in the north to the Saskatchewan boundary in the south. During the summer of 1952, there was carried out the first attempt in the Northwest Territories to capture beaver in areas of abundance and transfer them to areas of scarcity; beaver captured along the Kakisa River were transferred to two lakes north of that river. A survey of the area south of the Peace River in Wood Buffalo Park in Alberta gave indications of increased populations in lakes and streams where beaver were planted in previous years. An aerial census

of moose in the Fort Simpson district provided data on the abundance of these animals, which are important as a source of food for local trappers and their families.

An investigation of marine and fur-bearing mammals affecting the economy of the human population in the Eastern Arctic region was initiated.

Migratory Birds Studies

The annual survey of waterfowl populations and breeding conditions was carried out during the spring and summer of 1952 in co-operation with the United States Fish and Wildlife Service, provincial game branches, and private agencies. Officers of the Wildlife Division participated as members of teams operating in most of the provinces and in the Northwest Territories. The information obtained from the survey is of practical use in framing regulations for the autumn and winter hunting seasons.

Weather and water conditions were favourable in British Columbia and, although a slight decrease in the spring breeding population was indicated, mid-summer counts on sample areas showed a small increase over 1951. In Alberta, the season was exceptionally successful and a waterfowl production increase of 85 per cent for the whole province was estimated. Abundant surface water in Saskatchewan resulted in apparent tripling of the number of broods and an excellent waterfowl production. Early spring and late summer drought in Manitoba led to an estimated 20 per cent decline in the summering population of that province. In Ontario and Quebec, the season was normal and little change in the status of waterfowl was indicated. A decrease in the number of broods counted in the Maritime Provinces appeared to be partially offset by greater brood success. Sample water areas totalling 39 square miles on the Island of Newfoundland were surveyed, providing valuable information on waterfowl populations and data useful for comparative purposes in future years.

The annual winter inventory of waterfowl, carried out in all provinces except Manitoba and Saskatchewan, showed that favourable weather conditions had caused a decided increase over 1951 in the number of birds wintering in Canada. Greatest increases were in Ontario and Alberta (100 per cent and 70 per cent, respectively).

The annual survey of woodcock and Wilson's snipe in Eastern Canada was carried out in co-operation with the Wildlife Management Institute, the Royal Canadian Mounted Police, provincial game branches, and private citizens. As in previous years these surveys consisted of breeding-ground counts by reliable observers of singing male birds in selected areas. The number of singing male woodcock counted decreased from 1951 in Ontario, Quebec, and Prince Edward Island and increased in New Brunswick and Nova Scotia; it was believed that there had been no significant change in total numbers. The total number of Wilson's snipe counted in those five provinces was greater than in 1951 and also greater than the several-year average. Representative areas on the Island of Newfoundland were sampled for Wilson's snipe for the first time in 1952.

The following special investigations of migratory bird problems were made during the year.

Studies of the extent and type of damage caused by waterfowl and other migratory birds and of means of reducing such damage. Greatest attention was given to the problem of damage by ducks to cereal crops in the Prairie Provinces, and various frightening devices were tested in the field.

Investigation of hunting pressure on waterfowl in several provinces. Hunter bag checks were made at some points and band-recovery records of ducks were collected and analysed. The use of plastic neck bands for marking ducks was studied.

Investigation of waterfowl conditions, including hunting conditions, in the James Bay area, Ontario.

Investigation of the pollution of waters frequented by migratory birds.

Inspection of bird sanctuaries and investigation of areas proposed for sanctuaries.

Research in connection with the effect of aerial sprays used for control of forest insects at Upsalquitch, New Brunswick.

Investigation of the possible effect of proposed industrial projects upon the wildlife of the areas involved.

Investigation of the status of Ross's goose in Alberta and the Northwest Territories.

Banding and aerial counts of mergansers on the Miramichi River system, New Brunswick, in connection with a joint investigation, with the Department of Fisheries, of merganser-salmon relations.

An investigation of migratory bird conditions in the southern part of Labrador in the Province of Newfoundland, with emphasis on the location of murre colonies and the banding of murres.

An aerial census of flocks of snow geese at Cap Tourmente, Quebec.

Fisheries Studies

During 1952-53, the limnologists and one seasonal assistant conducted investigations in Banff, Waterton Lakes, Jasper, Cape Breton Highlands, Fundy, and Prince Edward Island National Parks. Anglers' activities were closely checked, and fish caught were examined at several lakes. Surveys were conducted in many of the waters of Banff Park, including Glacier Lake, where lake trout were reported for the first time. National parks in Eastern Canada were visited in order to discuss local fisheries problems, promote the creel census program, and collect further information on white perch.

With the co-operation of the Radio and Electrical Engineering Division, National Research Council, an underwater television unit recently devised and constructed by that Division was tested at Lake Minnewanka, Banff Park, in studies of spawning grounds and the deposition of lake trout eggs. This was the first application of television to fresh-water fisheries investigations.

Information and assistance were provided in the operation of the fish hatcheries in Banff, Jasper and Waterton Lakes Parks. A special study of the life history of Dolly Varden trout was conducted for the purpose of collecting eggs for planting in silty lakes in the mountain parks. An experiment in the use of antibiotics in feeding hatchery-raised fish was carried out at Banff and Jasper. The limnologists participated in preparing amendments to the national parks fishing regulations and advised park authorities regarding fish culture operations, including stocking schedules, and regarding commercial netting operations for whitefish in Waskesiu Lake in Prince Albert Park.

During the 1952 angling season, nearly 10,800 completed creel census cards from eleven national parks were collected and analysed. These cards covered nearly 22,000 angling efforts reporting a total catch of more than 47,000 game fish. Results of the creel census operations were summarized in booklets distributed to persons who filled in creel census cards during the 1952 angling season.

Migratory Bird Sanctuaries

The Wildlife Division is responsible for the establishment and administration of migratory bird sanctuaries under the provisions of the Migratory Birds Convention Act. On March 31, 1953, there were 90 such sanctuaries, with a total area in excess of 1,800 square miles. The following bird sanctuaries were established during the year under review; Richardson Lake Bird Sanctuary in the Province of Alberta, and Fielding and Guelph Bird Sanctuaries in the Province of Ontario. Manito Lake Bird Sanctuary in the Province of Saskatchewan was cancelled.

Thirty migratory bird wardens and sanctuary caretakers supervised important sanctuaries and breeding grounds in remote areas where special protection is required, such as the north shore of the Gulf of St. Lawrence and the breeding and wintering grounds of the rare trumpeter swan in Alberta and British Columbia.

Bird Banding

Scientific banding of wild birds in North America is conducted co-operatively by the Wildlife Division and the United States Fish and Wildlife Service. Other agencies, including the Wildlife Management Institute, Ducks Unlimited (Canada), some Provincial Game Departments, and certain universities, as well as private persons, assist in Canadian banding activities. Bird banding in Canada has been under Federal control since 1923, and all banding is done by qualified banders operating under authority of special permits.

As of December 31, 1952, the bird-banding records of the Wildlife Division contained approximately 740,900 entries relating to birds banded and some 66,100 records of recovered bands, including bands placed on birds in the United States and elsewhere and recovered in Canada. During the summer and autumn of 1952, more than 20,000 wild ducks were banded. Many Brunnich's and Atlantic murres were banded in the course of an investigation of these species; personnel of Royal Canadian Mounted Police detachments, Meteorological Stations of the Department of Transport, and the United States Air Force establishment on Padloping Island, have agreed to help in banding Brunnich's murres in their breeding grounds on the islands of the Eastern Arctic.

Miscellaneous

The Chief of the Wildlife Division addressed public gatherings as follows: meetings of the Gatineau (Quebec) Rotary Club in September; of the Ottawa Fish and Game Club in October; of the Renfrew (Ontario) Fish and Game Association in December; of the Quebec Society for the Protection of Birds, at Montreal, in January; and of the Toronto Field Naturalists Club, at Toronto, in February; and the 18th North American Wildlife Conference, at Washington, D.C., in March.

The Chief Biologist supervised the annual survey of woodcock and Wilson's snipe in the Ottawa area and co-ordinated data from all Eastern Canada on these birds. As representative of the Division he attended and addressed the following public gatherings: annual meetings of the Canadian Conservation Association, at Quebec, in June; the American Waterfowl Committee, at Washington, D.C., in August; the International Association of Game, Fish and Conservation Commissioners, and the American Fisheries Society, at Dallas, Texas, in September. He also attended the annual planning meeting for Canadian waterfowl breeding-ground studies and the 18th North American Wildlife Conference, at Washington, D.C., in March.

Under the provisions of the Migratory Bird Regulations, 2,930 permits and licences were issued by the Wildlife Division. These comprised 419 permits for collection of birds for scientific purposes; one permit for collecting eiderdown; 1,374 individual permits for disturbing or killing birds injuring agricultural or fishing interests; four permits for owners and occupants of land throughout specified areas to kill certain species of waterfowl found causing serious damage to crops; 20 permits for local control of the great black-backed gull by destruction of eggs and nests; 164 permits for local control of the herring gull by collection of its eggs; 16 permits for taking migratory birds for propagation; 699 permits for possession of migratory birds for propagation; 164 bird-banding permits; and 69 taxidermists' licences.

Printed material distributed included: Migratory Birds Convention Act and Regulations, 11,466; Abstracts of Migratory Birds Regulations, 58,040; posters, 32,748; and educational and instructive pamphlets, 29,946.

New publications issued in 1952-53 included: five new volumes in the series of Wildlife Management Bulletins; a pamphlet *Prevent Duck Damage* adapted from a United States Fish and Wildlife Service pamphlet; a folder, *Don't Shoot,* requesting co-operation of sportsmen in the protection of Ross's Geese and whooping cranes; and an educational pamphlet, *Hunters and Hunted,* revised from a Cornell Rural School Leaflet of the same name.

National Museum of Canada

General Activities

During the year, the National Museum carried out a wide program of field investigations in anthropology and natural history in many parts of Canada. Collections were added to as a result of these field activities and also through gifts and purchases; exhibits were enlarged and improved; several important bulletins were issued and others were prepared for publication; information was given out through printed matter, lectures, addresses, photographs, and correspondence; and material was loaned for a number of special exhibits both in Canada and abroad. Further repairs were carried out on the Museum building by the Department of Public Works.

Field work in archaeology was carried on in Quebec, Ontario, Saskatchewan, British Columbia, and the Northwest Territories. A special anthropological investigation involving a study of the blood grouping factors among the Indians of southern Alberta was initiated. Ethnological investigations, including folklore and folk song studies, were conducted

in Quebec, New Brunswick, Nova Scotia, and Newfoundland. Botanical studies were made in Nova Scotia and northern Ontario. The birds of Prince Edward Island and the mammals of Gaspé Peninsula, Anticosti Island, and the Magdalen Islands of the Province of Quebec were studied. Zoological investigations were carried out on Prince Patrick Island of the western Arctic. A party continued field studies in the Cypress Hills of Saskatchewan, searching for fossil mammals. Another party carried on palaeontological investigations in the Flathead valley of southeastern British Columbia. The study of the material collected and the preparation of reports concerning it occupied much of the time of the officers concerned during the remaining part of the year.

Wednesday evening lectures for adults and Saturday morning lectures for children were again an important phase of the Museum's activities. The afternoon film program during the months of July and August entitled *Canada in Colour* and the policy of having a special "Exhibit of the Month" were continued. The Macoun Field Club, the object of which is to interest boys and girls in natural history, had a successful year. Additional film strips were planned illustrating phases of the Museum's activities and interests. These are prepared and distributed by the National Film Board.

A separate Annual Report of the National Museum for the 1952-53 fiscal year is published, and this contains a more detailed account of museum activities.

Educational Services

One of the tasks of the National Museum is to disseminate information on the natural history of Canada and on the life and customs of the native races. As it is not possible for many Canadians to visit the National Museum, an endeavour is made to overcome the handicaps of distance by making available to other museums, naturalists, lecturers, teachers, writers and students natural history and anthropological specimens, films, filmstrips, publications and photographs, and by correspondence containing information on anthropological and natural history topics. In addition, there are special lectures and motion picture programs, exhibition hall tours and temporary exhibits.

National Museum Lectures

An important part of the Museum's adult education program was the annual series of Wednesday evening lectures arranged to meet a wide variety of interests. The Lecture Committee in charge of arrangements reports a most successful season.

Adult Lectures

Mount McKinley—1951, by Bradford Washburn, Boston, Mass.

Our Universe as We Know it Today, by C. S. Beals, Ph.D., F.R.S.C., Ottawa.

Around the Hawaiian Islands, by Yew Char, Honolulu, Hawaii.

Are You Going to Build? by Robert F. Legget, M. Eng. M.E.I.C., Ottawa.

Scenic Ontario, by J. M. Humphrey, Vancouver, B.C.

Nanook of the North, A Motion Picture, with introduction by Douglas Leechman, Ph.D., Ottawa.

Motion Picture Program—Commonwealth of Nations, with introduction by A. Gordon Huson, B.Sc., (Econ.) Ottawa.
Mountains and Deserts of Algeria, by J. M. Harrison, Ph.D., Ottawa.
Listening to Nature, by William W. H. Gunn, Ph.D., Toronto, Ont.
Historic Canada, by C. G. Childe, Ottawa.
The Romance of Glass, by James V. Mathews, Corning, N.Y.
Canoeing in the Western Arctic, by T. H. Manning, Ottawa.
The Atlantic Salmon, by Percy E. Nobbs, M.A., (Edin.) F.R.I.B.A., R.C.A., Montreal.
Holland Carries On, by Mari J. van Schreven, Ottawa.

The policy, initiated in 1912, of holding illustrated lectures for children on Saturday mornings was continued. These are so popular that the Museum auditorium is filled twice as a rule for each morning of the program.

Children's Lectures

Bush Christmas, Motion Picture Program.
A Live Program, directed by W. E. Steele, Kemptville, Ont.
Birds as a Hobby, by W. E. Godfrey, B.Sc., Ottawa.
The Royal Tour 1951, by Mrs. R. H. Winters, Ottawa.
The Enchanted Forest, Motion Picture Program.
Across the Sahara Desert, by J. M. Harrison, Ph.D., Ottawa.
Horses, Horses, Horses, by L. S. Russell, Ph.D., Ottawa.
Three Big Bruins, by R. D. Harris, B.A., Ottawa.
Nanook of the North, Motion Picture Program, with introduction by Douglas Leechman, Ph.D., Ottawa.
Airplanes and Helicopters in Canada's Northland, by C. S. Lord, Ph.D., Ottawa.
Realm of the Wild; Alive in the Deep, Motion Picture Program.
Adventures in the Arctic, by S. D. MacDonald, Ottawa.
Children of Other Lands—Holland. In co-operation with the Citizens Committee on Children and the staff of the Netherlands Embassy.

Group Visits

Increasing numbers of school groups visited the Museum with their teachers for guidance and instruction to supplement their school studies. Certain groups came for regular study and enjoyed the unusual experience of school work outside the class room. In addition to students from Ottawa and vicinity, classes came from Hamilton, Kitchener, Owen Sound and Meaford, North Bay, and Kingston, and Girl Guide groups from all parts of Canada. An advanced group of young men from the United Kingdom and an international group of New Canadians were given guided tours of the exhibition halls.

Lecture Hall

The use of the lecture hall was granted, as in former years, to scientific and related organizations, and the public was thus given the opportunity of hearing significant lectures on a variety of subjects. Among the organizations which used the hall were the Royal Astronomical Society, Ottawa Aeronautical Society, Scientific Film Society, National Gallery, United Nations Association, Ottawa Fish and Game Association, Logan Geological Club, and Canadian Geographical Society.

Photographs

Photographs on anthropological, biological, and palaeontological subjects from the Museum collections were supplied for illustrations in scientific text books, magazine and newspaper articles, and for use in the study of natural history subjects in schools. Requests were received from all parts of Canada, and from European countries, South America, the United Kingdom, and the United States.

Visual Aids

Visual aid material on anthropology, biology, palaeontology, and other phases of natural history was loaned to other museums, teachers, and other persons in all parts of Canada. This material is lent free of charge except for payment of transportation charges one way.

Archaeology

The study of the pictographs of southwestern Alberta which was begun last year was continued and several newly discovered examples were photographed and sketched. A totally new series in the Penticton district in southern British Columbia was also examined and recorded. New archaeological sites in the Okanagan Valley were investigated and at least two different cultures could be distinguished. Numerous specimens were obtained and the collections of amateurs were studied. A new field of investigation in the North Thompson Valley was opened and a number of promising sites found. It appears that the tendency was to have summer settlements on the banks of small lakes, away from the larger rivers, but the semi-subterranean winter houses were clustered along the shores of those streams in which the salmon run was heavy. Two sites near Clearwater, B.C., yielded large collections of specimens.

In the Northwest Territories, two sites on the shore of Great Bear Lake and three near Fort Liard were dug. Investigation of these areas in more detail has emphasized the importance of this part of Canada in reconstructing the history of human migrations.

Two sites in Manitoba were excavated and the material collected from them strengthens the hypothesis temporarily adopted to clarify the sequence of cultures in this general area. Some of the tribes that recently occupied the Canadian prairies once lived in this area.

A series of Indian burials at Point Pelee, Ontario, was examined and skeletal material collected. An ancient quarry site on Manitoulin Island was dug by a large crew; some thousands of specimens were collected. The archaeological survey of southwestern Ontario was continued and the work carried into the Ottawa Valley.

Further work was done at the site near Hawkesbury, Ontario, where evidence was discovered of a palisade which may have been the one defended by Dollard and his men in 1660.

Ethnology

As in previous years, parties were at work in the field during the summer months carrying out projects in cultural anthropology and in making collections and studies of folk-lore and folk-songs. Two field workers continued investigations in Gaspé Peninsula. The intensive

study of a typical Gaspé fishing community was initiated and data concerning its sociocultural life gathered. An effort was made to systematize the materials and the knowledge of the folk-lore of Gaspé; in order to present as complete a picture as possible of the oral literature of the peninsula, complementary surveys were made in areas which had hitherto been neglected. A monograph on the region is in preparation.

Parts of Newfoundland were visited with a view to collecting folk-lore and folk-songs; various sections of New Brunswick, Nova Scotia, and Beauce County in Quebec were also studied from this point of view. In all these places recordings were made on magnetic tapes. The materials are classified, catalogued, and studied at the Museum.

Zoology

A field investigation of the birds of Prince Edward Island was carried out; this resulted in the acquisition of many specimens and much information from an area concerning which detailed ornithological knowledge was scanty. Field work on the mammals of Anticosti Island, Magdalen Islands, and the Gaspé Peninsula was carried out as part of a general investigation of the Gulf of St. Lawrence region. The birds, mammals, and marine life of the Mould Bay area, Prince Patrick Island, N.W.T., were studied; specimens, photographs, and numerous observations were made. Palaeontological collecting was continued in the Oligocene deposits of the Cypress Hills of Saskatchewan. A second palaeontological expedition to the Flathead Valley of southeastern British Columbia resulted in the discovery of important Tertiary fossils. Specimens of living fauna were also obtained from this area.

A report on the birds of Manitoba was prepared for the Annual Report of the National Museum, and a paper on the birds of the Canadian Arctic was completed for the Northern Administration Division. A detailed report on the birds of Prince Edward Island is in preparation. The mammals of southeastern Quebec and the mammals of the Canadian Arctic tundra were the subjects of short reports. Two reports on the barnacles of the Atlantic Coast of Canada were completed. A study of the amphibians and reptiles of Eastern Canada is in progress. A detailed study of the fossils of the Cypress Hills Oligocene, Saskatchewan, and also of the Tertiary fossils of the Flathead area, British Columbia, were continued. Shorter papers on birds, amphibians, and fossils of Canada were completed for publication.

Specimens were examined or inquiries answered for members of the following institutions: Archaeology Section, National Museum; Canadian Wildlife Service; Northern Administration; Geological Survey, Department of Mines and Technical Surveys; Biological Control Laboratory, Department of Agriculture; Defence Research Board, Department of National Defence; Quebec Department of Fish and Game; Newfoundland Department of Natural Resources; Canadian Museums Association; Arctic Institute of North America; Department of Geology, Laval University; College de Ste Anne de la Pocatière, Kamouraska, Que.; Carleton College, Ottawa; Royal Ontario Museum of Zoology and Palaeontology; Provincial Museum of Natural History, Regina; Department of Zoology, University of Alberta; Department of Zoology, New York University; Department of Zoology, Brandeis University; Department of Entomology, University of Minnesota; Department of Zoology, University of California in Los

Angeles. Similar services were rendered to numerous private individuals. Assistance was given to the museum of Eastend, Saskatchewan, which had been seriously damaged by flood.

A revision of the systematic bird exhibit was completed, as well as a rearrangement and relabelling of the exhibit of Canadian amphibians and reptiles. Similar revisions of the exhibit of Canadian crustaceans and of a portion of the dinosaur exhibit are in progress. The study collection of birds was completely rearranged, and progress was made on a rearrangement of the collection of fossil vertebrates. Preparation of the fossil vertebrates obtained from the Oligocene of Saskatchewan and from the Cretaceous of Alberta and Saskatchewan continued. Several specimens will soon be available for new exhibits.

During the fiscal year the following specimens were added to the zoological collections: approximately 8,800 specimens or lots of specimens of invertebrate animals; approximately 500 specimens of fishes and 800 specimens of amphibians and reptiles; 531 specimens of birds and two lots of birds' eggs; 151 specimens of mammals; approximately 50 determinable specimens of fossil vertebrates.

National Herbarium

During the past year botanical investigations were conducted in Cape Breton, N.S., and in the Clay Belt region of Ontario and Quebec. Valuable botanical information, including large collections of plant specimens for the national collections as well as for exchanges with other botanical institutions, resulted from these surveys besides numerous photographs and other records.

In the herbarium the plant specimens and other botanical information resulting from field work were studied and classified together with plant material which, during the year, was submitted for study and report by various Government Departments, by other herbaria, by the botanical departments of Canadian or foreign universities, or by individuals. Two botanical papers and several reviews were prepared for publication by members of the herbarium staff, and much progress was made with the preparation of four book-length reports dealing with the flora of different parts of Canada. Various exhibits were prepared for local and outside educational institutions. Five thousand four hundred and eleven plant specimens were loaned to and 933 borrowed from other botanical institutions for study; several thousand plant specimens received for identification were dealt with by the herbarium staff and numerous memoranda were written; 3,635 herbarium specimens were received by exchange, 1,514 by donation and approximately 11,833 resulted from field work or were obtained in exchange for determination by the herbarium staff. Five thousand five hundred and eighty-three plants were mounted and inserted in the herbarium, bringing the total number of mounted specimens of flowering plants and ferns in the National Collection to 220,965. When the reorganization of the collections of mosses, lichens, and algae has been completed this total will be materially increased.

One hundred and seventeen numbers were added to the file of botanical type specimens which now number 1,469.

During the year, some 172 Canadian or foreign botanists visited the herbarium.

Branch Publications

Wildlife Division

Wildlife Management Bulletins

Series 1, Number 5: *The Mammals of Prince Albert National Park, Saskatchewan.* J. Dewey Soper.

Series 1, Number 6: *Surveys of Elk and other Wildlife in Riding Mountain National Park, Manitoba, 1950, 1951 and 1952.* D. G. Colls.

Series 2, Number 3: *The Birds of Elk Island National Park, Alberta, Canada.* J. Dewey Soper.

Series 2, Number 4: *The Birds of Prince Albert National Park, Saskatchewan.* J. Dewey Soper.

Series 2, Number 5: *The Economic Status of the Herring Gulls of the Grand Manan Archipelago, New Brunswick, 1949.* D. H. Pimlott.

Magazine Articles

Mallophaga Collected from Birds in Ontario. G. M. Stirrett. *Canadian Entomologist,* July 1952.

Lawrence's Warbler in Canada. G. M. Stirrett. *Canadian Field-Naturalist,* July-August, 1952.

Rough-legged Hawk Migration in James Bay Area. G. M. Stirrett. *Canadian Field-Naturalist,* May-June, 1952.

Early Records of the Red and the Gray Fox in Ontario. E. H. McEwen (Collaboration). *Journal of Mammalogy,* February, 1953.

Second Report on the Barren-ground Caribou Investigation. A. W. F. Banfield. Arctic Circular, October, 1952.

Dickcissel in Newfoundland. L. M. Tuck. *Canadian Field-Naturalist,* March-April, 1952.

Yellow-breasted chat in Newfoundland. L. M. Tuck. *Canadian Field-Naturalist,* July-August, 1952.

Television Goes Underwater. Victor E. F. Solman. *Forest and Outdoors,* March, 1953.

Arkansas Kingbird in Westmorland County, New Brunswick. G. F. Boyer. *Canadian Field-Naturalist,* March-April, 1952.

Transfer of Anaesthetized Adult Lake Trout by means of Aircraft. J. P. Cuerrier. *Canadian Fish Culturist,* December, 1952.

Caribou Calving Studies, 1951, and *Biological Investigation of the Thelon Game Sanctuary, 1951.* J. P. Kelsall. *Arctic Circular,* January, 1953.

Technical Papers

In *Investigations of Woodcock, Snipe, and Rails in 1952 (Special Scientific Report—Wildlife No. 18),* issued jointly by the Wildlife Division and the United States Fish and Wildlife Service:

Woodcock Singing Counts—Eastern Canada, and Wilson's Snipe Singing Counts in Eastern Canada. Victor E. F. Solman.

In *Transactions of the Seventeenth North American Wildlife Conference:*

Management of Ducks and Geese in Canada. Harrison F. Lewis.

Why Have Fish Hatcheries in Canada's National Parks? Victor E. F. Solman, J. P. Cuerrier, and W. C. Cable.

In *Transactions of the Fifth British Columbia Natural Resources Conference*:

Intergovernmental Aspects of Recreation and Wildlife. D. A. Munro.

Miscellaneous

Hunters and Hunted (pamphlet).

Prevent Duck Damage (pamphlet).

Don't Shoot (folder).

Analysis of Creel Census Cards Received from National Parks during the 1951 Angling Season.

(Three pamphlets dealing separately with mountain, prairie, and eastern parks.)

National Museum

Bulletin No. 124, *Iroquois Pottery Types,* a technique for the study of Iroquois prehistory, 166 pages, by Richard S. McNeish.

Bulletin No. 125, *Birds of the West James Bay and Southern Hudson Bay Coasts,* 114 pages, by T. H. Manning.

Bulletin No. 126, *Annual Report of the National Museum of Canada for the Fiscal Year 1950-51,* 227 pages.

Hints on the Control of Small Mammal Pests in Eastern Canada, 11 pages, by Austin W. Cameron.

Publications of the National Museum, 1913-1951, 127 pages. This index lists the publications in numerical order, and by author, subject and region.

Engineering and Water Resources Branch

The Engineering and Water Resources Branch deals with projects related to the development of natural resources and the provision of improved road transportation facilities. This responsibility includes joint Federal-Provincial projects and certain projects with international aspects.

The Branch surveys water resources throughout Canada and administers the construction of roads and highways where there is a Federal interest. Engineering advice and service is provided to the various branches of this Department and to other Federal Government Agencies.

In order to perform these duties this Branch is divided into four divisions, as follows: Water Resources Division; Trans-Canada Highway Division; Engineering and Architectural Division; and Projects Division. The functions and activities of the various divisions are described in detail under the sections of this report assigned to each. Field officers are maintained in the ten provinces and in the Yukon and Northwest Territories.

The Branch also renders engineering advice and supplies technical and administrative assistance to the Northwest Territories Power Commission. The Director of the Branch is a member of this Commission. The Director also served on the Continuing Committee on the St. Lawrence Seaway and Power Project and on a Board of Engineers appointed to co-ordinate the preparation of an application to the International Joint Commission for an Order of Approval of certain works to develop the power resources of the International Rapids Section of the St. Lawrence River.

Water Resources Division

The primary function of the Division is the acquisition, analysis, and publication of stream-flow and run-off data covering the whole of Canada. These basic data are used in connection with power development, storage, irrigation, drainage, flood warnings, flood control, fisheries research, navigation, domestic water supply, and various international waterway problems. The Division acts as the central repository for hydrometric and water-power information acquired from all available sources. In the provinces, gauging stations are maintained and hydrometric investigations are carried out in accordance with co-operative agreements under which provincial authorities contribute funds towards the cost of operation. In the Yukon and Northwest Territories and on Federal lands, hydrometric operations and the administration of the Dominion Water Power Regulations are direct responsibilities of the Division. International waterway problems are of active concern and engineers of the Division serve on numerous boards and committees, act as technical advisers to the Department of External Affairs and to the International Joint Commission, and carry out special investigations and studies as required. Engineering assistance and advice are supplied to Federal Government agencies, particularly on hydraulic problems.

The Division's activities are largely co-ordinated with those of public and private organizations which are interested in the use of water resources. Close co-operation is maintained with federal, provincial, and municipal authorities with respect to water-power and water-supply problems. Stream-flow data are furnished to many private companies, a large number of which reciprocate by supplying the Division with gauge records and with assistance in securing data of mutual interest. Cordial relations are maintained with the Water Resources Division of the United States Geological Survey in the operation of international gauging stations and in the exchange of run-off data.

In addition to its routine hydrometric operations, which were expanded during the year, the staff of the Division was called upon to carry out a large amount of special investigatory work, particularly in connection with the Columbia River, the Red River and other prairie rivers, the Niagara River, and the Saint John River.

Hydrometric Service

For the purpose of facilitating hydrometric field operations, district offices are maintained in Vancouver, Calgary, Winnipeg, Ottawa, Montreal, and Halifax, with sub-offices at Kamloops, Nelson, Cranbrook, Whitehorse, Keewatin, Fort Frances, North Bay, Niagara Falls, and St. John's. The location of each of these offices is shown on the map inserted inside the back cover of this report.

Stream Gauging

During the year, hydrometric field operations were maintained at a high level owing to the continuing demand for run-off data, particularly on international rivers, and 1,122 gauging stations were operated, many of them continuously by the use of recording gauges. During the open-water season a maximum of 481 part-time observers were employed by the Division as gauge readers, and 315 of these served throughout the year; about an equal number of gauge readers, who also report to the Division, were paid by various co-operating agencies. A total of 4,296 stream-discharge measurements and 2,226 inspections of gauging stations were made by the technical field staff.

Field operations in British Columbia and the Yukon are directed from the district office in Vancouver, and sub-offices for hydrometric work are maintained at Kamloops, Nelson, Cranbrook, and Whitehorse. A total of 395 gauging stations were in operation, of which 211 were all-year stations; 19 of these stations are located in Yukon Territory and one in the Northwest Territories. Improvements to gauging stations, which were maintained under the regular hydrometric program, included the building of a gauge well and shelter on Kusawa Lake, near Whitehorse. Close liaison was maintained with the British Columbia Water Rights Branch and the British Columbia Power Commission, and effective co-operation was given to the British Columbia Electric Company Limited, the Aluminum Company of Canada, and the Bonneville Power Administration. Special hydrometric programs were carried out in connection with Columbia River investigations, Fraser River studies, and fisheries research. Totals of 1,306 discharge measurements and of 585 visits of inspection were made during the year.

The Calgary district office maintained 226 gauging stations, of which 52 were in continuous operation and the remainder during the open-water season only. Operations in the two provinces concerned are carried out under agreements with the Alberta Water Resources and Irrigation Branch and with the Saskatchewan Water Rights Branch. Eight stream-gauging stations in connection with power development and six water-level gauges for navigation purposes are located in the Northwest Territories. A considerable part of field operations is concerned with international prairie rivers on which 51 co-operative international and 22 semi-international gauging stations were maintained. In co-operation with the Eastern Rockies Forest Conservation Board, 17 stations were maintained, involving the construction of a number of new gauge wells and shelters. On behalf of the Prairie Provinces Water Board, 15 stations were operated. Close co-operation was given also to the Prairie Farm Rehabilitation Administration in securing hydrometric data for irrigation studies, to Calgary Power Limited on storage and power studies in the Bow River Basin, and to the Consolidated Mining and Smelting Company in water-power studies on the Taltson and Slave Rivers. Hydrometric operations involved 1,699 discharge measurements and 612 inspections of gauging stations.

The territory covered from the Winnipeg district office includes eastern Saskatchewan, Manitoba, and northwestern Ontario, throughout which 152 gauging stations are distributed; 96 of these are all-year stations. Operations in Manitoba are under agreement with the Manitoba Water Resources Branch. Regulation of lakes in the Winnipeg River basin was continued, sub-offices being maintained at Keewatin and Fort Frances. Supervision was exercised over the Ogoki and Long Lac diversions by the Ontario Hydro-Electric Power Commission. Special studies and hydrometric operations were carried out on international prairie rivers. New major gauge wells and shelters were constructed on the Red River at Emerson and on the Assiniboine River at Headingley. With the co-operation of the provincial governments and of interested mining and power companies, extensive hydrometric operations were continued in the drainage basins of the Churchill, Fond-du-Lac, Nelson, and Hayes Rivers. Water-level recorders were maintained on the Nelson and Churchill Rivers. Northern transportation was provided by the Air Services of the Governments of Manitoba and Saskatchewan for five trips, each of about ten days duration. Field operations included 765 discharge measurements and 528 inspections.

Field operations in that portion of Ontario east of Long Lake and the Kenogami River, and in the Ottawa River basin in Quebec, are directed from the district office at Ottawa, sub-offices being maintained at North Bay and Niagara Falls. Hydrometric work included the maintenance of 148 gauging stations, of which 69 were primarily in the interest of power development. One new permanent station on the Grand River, and three temporary stations on the Maitland River were established for flood control studies. During the year, 168 discharge measurements and 370 station inspections were made. In March, the metering of the St. Lawrence River at Galop Rapids was undertaken, range lines and gauges were established, and one measurement was obtained. On the Niagara River, studies were continued with respect to river slopes and discharge, co-operation was afforded in securing data for model studies in the design of remedial works, and assistance was given to the International Niagara Falls Engineering Board. Although operations in Ontario are principally under co-operative arrangements with the Ontario Hydro-Electric Power

Commission, the Ontario Department of Planning and Development, and the Grand River Conservation Commission, co-operation in matters of mutual interest is maintained with a number of private agencies.

The Quebec District Office at Montreal is closely associated with the Quebec Streams Commission and co-operates in its investigations. Co-operation is also maintained with the power-producing agencies of the Province including the Quebec Hydro-Electric Commission, the Shawinigan Water and Power Company, the Aluminum Company of Canada, and the Gatineau Power Company. A total of 171 gauging stations were in operation, of which 115 were all-year stations; the majority of stations are for power purposes. On rivers flowing into Hudson Bay, observations of water level at certain stations were continued in co-operation with the Shawinigan Water and Power Company, and one measurement was secured on the Waswanipi River. Four measurements were made on the Ashuanipi River in Labrador, and one on the Wacouana River, a tributary of the Moisie River, in co-operation with the Iron Ore Company. Three temporary gauges were maintained on the York River in connection with water-supply studies for the Gaspé Copper Mines Limited. Special work included the rating of the outflow of storage reservoirs and the checking of power-station ratings. In all, 266 stream measurements and 50 visits of inspection were made.

Hydrometric operations in the Atlantic provinces were directed from the district office at Halifax, a sub-office being maintained at St. John's, Newfoundland. In all, 30 gauging stations, in large part for power purposes, were maintained throughout the year; records on six other rivers were supplied by private agencies. Run-off data obtained were adequate to meet essential requirements. In Nova Scotia, the work of maintaining 13 stations was carried out under an agreement with the Nova Scotia Power Commission, co-operation also being received from several private power companies. In New Brunswick, under an agreement with the New Brunswick Electric Power Commission, 10 stations were maintained during the year. In Newfoundland, organization of a hydrometric program proceeded satisfactorily under an agreement with the Department of Natural Resources. There are now seven stations in operation. One new installation was made on Piper's Hole River and others are planned. The construction of a gauge well and shelter on the Hamilton River in Labrador was essentially completed under very difficult conditions during the summer and autumn of 1952, with installation of the recorder to be made in 1953. Field work included 92 stream gaugings and 81 inspections of stations.

Run-off Conditions in Canada

For Canada as a whole, while low water was experienced in certain areas, particularly in October and November, total run-off for the year was well above normal, the average for 22 typical rivers distributed across the country being 121 per cent of the median flow of these rivers. Severe floods occurred on a number of small rivers but none was of major proportions.

In British Columbia, although the mean run-off of five typical rivers was 111 per cent of median flow, there was considerable variation throughout the year. The flow of the Fraser River was consistently low from August forward, and its mean flow for December was record-low. The Columbia River was low from August to January inclusive, and a new low record for October daily flow was established. Run-off in the northern

part of the province was heavy during the greater part of the year, although it fell off in February and was deficient in March; in July new high records were established on the Skeena River for daily and monthly flow in this month. On Vancouver Island, the discharge of the Sproat River averaged 141 per cent of normal, although the river was very low in October.

Run-off from the mountainous areas of Alberta, as indicated by the key stations on the Bow and North Saskatchewan Rivers, averaged 120 per cent of normal. Aside from rather high water on the North Saskatchewan in April, there were no extreme variations in flow. However, on several of the smaller rivers in southern Alberta and Saskatchewan, the spring freshets were the highest on record. In early April, Medicine Hat was badly flooded by the waters of Ross and Sevenpersons Creeks. In mid-April, Swiftcurrent Creek rose to high levels, severely damaging the Duncairn Reservoir and flooding part of the City of Swift Current. A large part of the town of East End, Saskatchewan, was under water following April floods on the Frenchman River, which peaked at about four times its previously recorded maximum flow.

Prairie run-off in southern Saskatchewan and Manitoba, as indicated by the flows of the Assiniboine and Red Rivers, averaged close to normal, with only a moderate variation of stage. The Saskatchewan River at The Pas, Manitoba, was moderately high in April and May, but was about normal during the remainder of the year. In more northerly districts, the flow of the Churchill River was somewhat below normal, but those of the Nelson and Hayes Rivers were moderately above normal. The level of Lake Winnipeg was above normal throughout the year and was at elevation 712·40 feet on March 31, 1953, which is about 0·5 foot above the long-term mean. Lakes Winnipegosis and Manitoba did not vary greatly from normal.

In northwestern Ontario, the English River, with a yearly flow of 120 per cent of median, was moderately high in spring and summer months but was below normal during autumn and winter. The controlled flow of the Winnipeg River did not vary greatly from normal and total discharge was 95 per cent of the long-term mean.

With some variation from month to month and from district to district, run-off in north-central and southern Ontario averaged 124 per cent of normal. The discharge of the Moira River was very low in November, and that of the North Magnetawan was high in September and in March. The only new record established was for low daily June flow on the Missinaibi River.

General run-off in Quebec was well in excess of normal, averaging 126 per cent for the four typical rivers. The flows of the Harricanaw and St. Maurice Rivers were excessive for about half the year; a new high record for daily flow during February was established on the St. Maurice, and for mean monthly March flow on the Harricanaw. The discharge of the Outardes River did not vary greatly from normal throughout the year. Poorest conditions obtained on the St. Francois River which was low throughout the summer and autumn, being record-low in July and in September; however, high flows were recorded in the January-March period. Floods, largely owing to ice jams, occurred in March on several smaller rivers and heavy damage was experienced, particularly on the North River.

Run-off in New Brunswick and Nova Scotia was extremely variable during the year, although the mean flow of all typical rivers was above normal and the average was 119 per cent of median flow. The Saint

John River was above normal in the spring but was consistently low during the summer and autumn, the July flow being record-low. The Lepreau River varied from month to month, being particularly low in July and setting new high February records for average and daily flows. Similarly the St. Mary River in Nova Scotia was very low in September but established new high February records. The Lahave River was low in October and high in February, but no new records were set. In Newfoundland, long-term records are not yet available for comparison.

Flood Warning Service

As continuous records of river stage are obtained at strategic points on certain rivers which are subject to dangerous flooding, a flood warning service is provided where required. On the Columbia and Fraser Rivers, river-stage forecasting is of particular value during the annual snow-melting period and, commencing May 1 each year, daily observations, made at 18 key points, are relayed to the Vancouver office by telegraph. From these reports and from current meteorological data, a forecast of water levels for the following three days is released to the public and has proved of great value. This service was maintained in May and June 1952 but no serious flooding occurred. Co-operation was maintained with United States authorities in connection with their forecasts of stages on the lower Columbia River during this period.

A similar service is given by the Calgary office in forecasting stages on the North and South Saskatchewan Rivers. Co-operation is received from several agencies and predicted stages are supplied to Medicine Hat, Saskatoon, Prince Albert, and other downstream points. The necessary observations were made in June 1952 but were discontinued at an early date as high river stages did not occur.

The Winnipeg office also forecasts stages on the Winnipeg River. Water-level observations were made available to interested parties but flood stages were not experienced during the year.

Current-Meter Rating and Experimental Station

A specially constructed and fully equipped station for the calibration of current meters and for the carrying out of tests and experiments in connection with stream-gauging apparatus is maintained at Calgary. Meters are rated for many organizations, as well as for the district offices of the Division, and much experimental work is carried out. The station operated from April 23 to November 18, and rated 105 meters for the Division and 28 for other agencies. A fully equipped work-shop is maintained and 76 meters were overhauled and repaired. In addition, a number of water-stage recorders were completely stripped, repaired, tested, and put back into service.

Snow and Glacier Surveys

For the purpose of estimating the amount of spring run-off which will result from the accumulated snow in certain important drainage basins, annual snow surveys are made on selected typical courses in these areas to determine the amount of water content in the snow cover; the monthly date of each individual survey is the same in each year but it varies according to the district location. The Calgary office co-operates annually early in May with the United States Geological Survey on snow surveys in the St. Mary River basin. The 31st survey, which was made in

1952, showed a snow cover about 70 per cent of normal. An independent survey in the Bow River basin is made late in March, and the 17th survey, which was made in 1953, showed the water content of the snow to be 120 per cent of the long-term mean. Four new courses in the Cypress Hills were established in 1952 and the first survey, which was made in March 1953, showed a mean water content of 2·06 inches. Snow gauges were constructed for supplementary observations and were operated during the winter. In the Winnipeg River watershed, the Division carries out seven surveys which form part of a co-operative program with the United States Corps of Engineers and the Hydro-Electric Power Commission of Ontario. The 1953 results showed a water content about 71 per cent of normal. In the northern section of central Ontario, six snow surveys, which are part of a co-operative program with the Hydro-Electric Power Commission of Ontario, were carried out in February and March. In 1953, results showed a water content about 59 per cent of normal. The regular snow survey was made in northern New Brunswick in March, showing a water content of 4·6 inches. In Nova Scotia, there was no snow cover.

Glacier observations, which were initiated in 1945 in connection with studies of the water resources of the mountainous regions and which are now made at two-year intervals, were carried out in 1952. Six glaciers are under study in British Columbia and five in Alberta. The 1952 surveys showed that recession was continuing at an average annual rate of 50 feet in the Coast and Selkirk Ranges, as compared with 40 feet for the year 1950. In the Rocky Mountain Range, the observed annual recession was 69 feet, which is the same as in 1950.

The Water-Power Resources of Canada

From the stream-flow records acquired as a result of the Division's hydrometric investigations, and from all data accumulated from other sources, revisions are made from time to time in the estimates of the water-power resources of Canada. The current estimate shows resources of 50,705,000 h.p. at ordinary six-months flow, which will allow of an economic installation of about 66,000,000 h.p.; on the basis of ordinary minimum flow, the estimate is 29,207,000 h.p. During 1952 new hydraulic installations totalled 1,066,250 h.p., bringing the installed capacity of all water-power plants in Canada to 14,305,880 h.p.; central-electric stations comprise 90 per cent of this total. New plants and extensions which are under active construction for operation in 1953 are tentatively rated at about 900,000 h.p., and others with a total capacity of approximately 2,500,000 h.p. are under preliminary construction or are definitely planned. The current water-power situation in Canada was discussed in the Division's annual bulletin, *Water Power Resources of Canada,* issued under date of March 15, 1953.

Water Resources Monthly Review

Co-operation was continued with the United States Geological Survey in supplying data for the monthly summary of general stream-flow conditions in the United States and Canada, issued by the Survey. The flow records of 22 typical rivers, well distributed across Canada, are computed immediately at the month's end, each District Office providing data for the rivers in its territory; these data are transmitted by airmail to Washington where they are combined with those for the United States.

The information in bulletin form is made available promptly to the general public and in some instances is broadcast by radio; semi-annual and annual summaries also are issued. Supplementary to this bulletin, press releases covering conditions in Canada only were issued by the Division early in each month. The information is of great value in all matters concerned with current run-off.

International Waterway Problems

Both directly and through the International Joint Commission, the Governments of Canada and the United States have created numerous International Engineering Boards and Boards of Control, on which the Division is represented, for the purpose of studying and reporting on a wide range of problems arising from boundary waters. In this connection, the Division participated in the preparation of eleven annual Board of Control reports, nine semi-annual Engineering Board progress reports, one final Engineering Board report, and the text of one interim Engineering Board report, all for submission to the Commission. Certain of these Boards advised the Commission on specific problems as required. A summary of major activities of the Division pertaining to these Boards is given hereunder.

Columbia River Engineering Board

This Board, of which the Chief of the Division is Chairman for Canada, continued its studies of the water resources of the Columbia River Basin towards development of the most advantageous and comprehensive plan for their ultimate use. In Canada, much of the extensive field program required for this purpose has been directly supervised by the District Engineer at Vancouver, who is Chairman for Canada of the Engineering Committee assisting the Board.

To facilitate field operations of the Division, a sub-office was maintained at Revelstoke. Surveys were conducted in the reconnaissance of tributary streams; in damsite, river valley, and under-water topography; in reservoir delineation; and in backwater profiles and flowage appraisal. Subsurface investigation of possible damsite foundations was continued, with preliminary drilling and sampling operations completed at four locations and in progress at a fifth location. Seismic surveys were made as required at various locations. The continuing program of the collection and compilation of data relating to surface and ground waters and to special meteorological conditions was maintained. Additional hydrometric facilities were put into operation, including a cable-way spanning the Columbia River at 12-Mile Ferry, south of Revelstoke.

Field operations by other agencies, which were co-ordinated by the District Engineer at Vancouver, contributed substantially to the progress of this investigation. The Legal Surveys Division, Department of Mines and Technical Surveys, had three parties on river surveys and continued with the compilation and publication of the Columbia River series of maps. The Geological Survey of Canada continued its investigations at a number of damsites, and issued preliminary reports on those located on the main stem of the Columbia River from Boat Encampment to Revelstoke. The Geological Survey also assisted in ground-water studies and in the interpretation and analysis of samples from drilling operations.

The Public Works Department completed field work on under-water surveys and made progress on the charting of these surveys. The British Columbia Department of Agriculture continued its program of soil surveys, with particular attention to the Upper Columbia River Valley south of Golden.

During the past year, the Board has given particular attention to the following special problems: (a) The application of the United States Government to construct a dam on the Kootenay River at Libby, Montana; (b) The effects of the flood control project now under construction on the Canadian reach of the Okanagan River.

Osoyoos Lake Board of Control

This Board, of which the District Engineer at Vancouver is a member, continued its supervision of the water levels of Osoyoos Lake, which are partially controlled by operation of the Zosel Dam located below the lake outlet on the Okanagan River at Oroville, Washington. Engineers of the Vancouver Office made periodic inspections of Osoyoos Lake and of downstream river conditions. Some remedial work was done by the Corps of Engineers, United States Army, on the Tonasket Creek tributary.

Kootenay Lake Board of Control

This Board, which has as its Canadian membership the two senior engineers in the District Office at Vancouver, continued its supervision of the operations of Corra Linn Dam. The level of Kootenay Lake was held within the prescribed limits during the entire period. Problems arising from the control and regulation were given further study. Damage claims from the effects of high water, which were filed with the Board by the Kootenay Valley Reclamation Association, received careful attention.

Waterton-Belly Rivers Engineering Board

The Canadian membership of this Board consists of the Chief and the Assistant Chief of the Division, together with a senior Department of Agriculture engineer currently on loan to the Division. In accordance with the instructions issued by the International Joint Commission in 1950, unilateral studies of the problems of conservation and apportionment of the waters of these rivers were continued, substantial field and office assistance being received from the Calgary office.

St. Mary and Milk Rivers

The Chief of the Division is the accredited officer representing Canada in the continued supervision of the division and use made of the waters of these rivers. The Calgary District Office handled the extensive field and office work required in the maintenance and operation of 37 international and 19 non-international gauging stations which recorded the quantities of water stored, diverted, and used by each country.

Souris-Red Rivers Engineering Board

Membership for Canada on this Board is identical with that for the Waterton-Belly Rivers Engineering Board. A report outlining the water supply and water requirements of the Red River basin had been filed with the International Joint Commission and progress was made on the preparation of similar data covering the Souris River.

Lake of the Woods Control Board

This Board, of which the Chief of the Division is the member for Canada, was established in 1926 under the authority of the Lake of the Woods Convention of 1925. Between elevations 1,056 and 1,061, the range established by the International Joint Commission, regulation is under the jurisdiction of the Canadian Lake of the Woods Control Board, but when the lake level is above or below these prescribed limits, regulation is subject to the approval of the International Board.

Although the spring inflow in April and May 1952 was well below normal, lake regulation was at no time during the year under the jurisdiction of the International Board.

Rainy Lake Board of Control

This Board, of which the Chief of the Division is the member for Canada, was established by the International Joint Commission in 1941, under the authority of the Rainy Lake Convention of 1938. The Board is responsible for regulating the levels and outflow of Rainy and Namakan Lakes.

The operation of the control works for these lakes is carried out under the direction of the District Engineer at Winnipeg, a sub-office being maintained at Fort Frances.

Spring and summer inflow was above normal but lake levels were maintained below the upper limits provided by the Order of the International Joint Commission of June 8, 1949. While average inflow for the year was 98 per cent of the long-term mean, the monthly variation ran from 172 per cent in July to 62 per cent in December. The level of Namakan Lake fell from elevation 1,110·51 on April 1, 1952, to elevation 1,110·31 on April 10, and rose to elevation 1,119·31 on July 14. By August 1, the level was drawn down to elevation 1,118·76 but, because of the heavy inflow, it again rose to elevation 1,119·31 by August 20. During the remainder of the year, there was a gradual fall to elevation 1,108·87 on March 31, 1953.

The level of Rainy Lake fell from elevation 1,104·68 on April 1, 1952, to 1,104·48 on April 12, and then rose steadily to rule-curve elevation 1,108·12 on July 3, and to a maximum of 1,108·77 on July 14. The lake was drawn to elevation 1,108·06 on August 5, again rose to elevation 1,108·65 on September 4, was more or less ponded throughout October, November, and December, and then gradually fell to elevation 1,105·50 on March 31, 1953. Water was wasted at varying rates during the summer and early autumn.

Lake Superior Board of Control

This Board, of which the Assistant Chief of the Division is member for Canada, supervised regulation of lake levels within the range established by the International Joint Commission. Inflow to the lake was abnormally high for the third successive year but, owing to the excessively high level of Lake Huron and its backwater effect on the lower St. Mary River, outflow from Lake Superior had to be curtailed to meet the control requirements at Sault Ste. Marie, where high river levels were causing considerable damage. The Board gave this serious situation close attention and managed to maintain the lower river requirements, with only a minor rise above the Lake Superior limiting level.

Niagara Board of Control

This Board, of which the Assistant Chief of the Division is member for Canada, continued to record the quantity of water used for power production and to determine the quantities available under the terms of the Niagara Diversion Treaty of February 27, 1950. Division engineers at the Niagara Falls sub-office inspected operations and records for the Board.

Niagara Falls Engineering Board

This Board, of which the Assistant Chief of the Division is Chairman for Canada, gave continued attention to the studies required for design of remedial works to perpetuate the scenic beauty of Niagara Falls. As a result of these studies, and of tests made on the Islington and Vicksburg models of the Falls, the Board was able to complete its final report entitled *Preservation and Enhancement of Niagara Falls* for submission to the International Joint Commission. The Working Committee, on which the Division is represented by its senior engineer at Niagara Falls, rendered valuable assistance in this investigation.

Saint John River Engineering Board

This Board, of which the Assistant Chief of the Division is Chairman for Canada, continued its investigation of the Saint John River Basin to determine what further development of the water resources would be practical in the public interest. The original Reference, dated September 28, 1950, was amended on July 7, 1952 to include all of the basin above tidewater near Fredericton, N.B.

In Canada, field investigations were continued under the immediate supervision of the Work Group, whose Chairman is the District Engineer at Halifax. The extensive program of reconnaissance surveys, foundation investigations, geological studies, review of fisheries problems, and flowage appraisal surveys was carried through to substantial completion. Much assistance was afforded by other agencies, especially the Department of Public Works on drilling operations, the Topographical Survey Division of the Department of Mines and Technical Surveys on supply of contoured reservoir plans, and the New Brunswick Electric Power Commission on damsite surveys and flowage appraisal.

The splendid co-operation of all participants in this investigation enabled the Board to complete the text of its Interim Report on the water resources of the Saint John River Basin for submission to the International Joint Commission. Progress also was made on preparation of the appendices to this report.

Other Boards

Members of the Division staff also served on numerous other Boards, established to deal with international waterway problems, which operated in a routine manner during the year. These include the following Boards of Control: Columbia River (Grand Coulee Dam backwater), Souris River, Prairie Portage, Massena (diversion from St. Lawrence River), Lake Champlain, Lake Memphremagog, St. Croix River, and the Engineering Boards for Sage Creek and for Passamaquoddy (tidal power).

Federal-Provincial Boards and Special Investigations

Dominion-Provincial Board—Fraser River Basin

The District Engineer at Vancouver serves on this Board, which was set up in 1948 to study measures for the improvement and development of the Fraser River and its tributaries. Several meetings of the Board and of its committees during the year were attended by representatives of the Vancouver office.

In enlarging the co-operative hydrometric program, a new gauge well and shelter were constructed on West Road River near Cinema and a recorder placed in operation. The ferry cable on the Fraser River at Hansard was adapted for use in obtaining discharge measurements.

Bow River Control Board

Hearings by the Royal Commission on the Bow River floods, which were held in Calgary in April and May, were attended by representatives of the Calgary office. Evidence was given and a brief was presented. As a result of the hearings, the Bow River Control Board was set up in September, 1952. The District Engineer at Calgary was an ex-officio member and attended meetings in September and March. An inspection of the Bearspaw site, where preliminary construction is under way by Calgary Power Limited, was made in March.

Prairie Provinces Water Board

The Chief of the Division is one of the two federal representatives on this Board which was organized in 1948 to study the inter-provincial waterway problems of the three Prairie Provinces. A meeting of the Board, held at Regina on December 17, was attended by the District Engineers from Calgary and Winnipeg.

Gauging stations, established at the request of the Board on rivers crossing the Alberta-Saskatchewan and the Saskatchewan-Manitoba borders, were maintained throughout the year.

Red River Basin Investigation

The special investigations and studies concerned with the reduction of the flood hazard in the Greater Winnipeg area were continued during the year. A separate office was maintained in Winnipeg. Surveys and sub-surface explorations were carried out in connection with various alternative flood control schemes. Office studies included such factors as hydrological and meteorological conditions, flood magnitudes and frequencies, run-off characteristics, flood routing, backwater effect, preliminary designs, and cost estimates.

The field investigations, which covered both the Red and Assiniboine Rivers, were completed. The several appendices, which will form the basis for the final report, were essentially completed, and a beginning was made on the first draft of the final report.

Canadian Lake of the Woods Control Board

Within the prescribed limiting elevations of 1,056 and 1,061 feet, lake regulation is under the jurisdiction of the Canadian Board, but at other times is subject to the approval of the International Board. The

Chief of the Division is a member of both boards. Operation of the control works is carried out under the direction of the District Engineer at Winnipeg, a sub-office being maintained at Keewatin, Ontario.

The spring inflow was well below normal and lake level was regulated within the storage limits provided by the Lake of the Woods Convention. The average inflow for the year was 73 per cent of the long-term mean, with monthly variations running from 26 per cent in October to 165 per cent in July. Lake level on April 1, 1952, was at elevation 1,059·66, rose gradually to elevation 1,060·06 on May 3, and then more or less ponded during the months of May and June. Because of heavy precipitation in the latter part of June and throughout July, the level rose steadily to elevation 1,060·99 on August 2. By August 6, a falling stage had developed and the level continued to fall throughout the remainder of the year, reaching elevation 1,058·70 on March 31, 1953. Water was wasted at varying rates for short periods in April and July, but at other times the discharge was regulated to conserve storage in the reservoir.

The above Canadian Board also exercised supervision over the regulation of Lac Seul, which regulation was carried out by the Hydro-Electric Power Commission of Ontario. The spring inflow was below normal and lake levels at all times were maintained within prescribed limits. The average inflow for the year was 87 per cent of the long-term mean but the monthly variations ran from 47 per cent in October to 197 per cent in July. Lake level fell from elevation 1,168·58 on April 1, 1952, to elevation 1,168·33 on April 15, rose to elevation 1,171·46 on July 30, and was steadily drawn to elevation 1,165·28 on March 31, 1953. Because of heavy inflow, water was wasted from the middle of July to the middle of August.

The flow of the Winnipeg River was about normal and at all times was in excess of the equitable requirements of the interests operating hydro-electric power plants in Manitoba.

Three meetings of the Canadian Board were held during the year.

Technical Assistance to Federal Agencies

The western district offices of the Division carry out important administrative, engineering, and construction functions on behalf of other Federal Government agencies.

The Public Works Department received assistance in the major hydraulic problems involved in the development and maintenance of ship channels in the Fraser River and in other matters. The Division's Vancouver Office acted in British Columbia on behalf of the Dominion Lands Agent in the administration of Federal lands. Co-operative hydrometric programs with the Pacific Biological Station, Fisheries Research Board of Canada, and the International Pacific Salmon Fisheries Commission were continued throughout the year, including the building of a new gauge installation on Pitt River. Close co-operation in hydrometric matters was maintained with the Department of Agriculture in its irrigation work in Alberta and Saskatchewan by the Prairie Farm Rehabilitation Administration. On behalf of the National Parks Branch, supervision was exercised over the flow of the Spray River from the Spray Lakes Reservoir, and of the Ghost River diversion to Lake Minnewanka.

Water Power Administration

In connection with the administration of the Dominion Water Power Regulations, attention was given to the following developments.

Yukon Hydro Company Limited

Operating under final licence of March 18, 1952, the plant had a total output of 1,655,063 kw. hrs. during 1952 and rental received amounted to $284.61.

Correspondence was exchanged in regard to a proposed addition of 940 h.p. to the plant in 1953, and a plan covering the changes in the powerhouse was approved January 23.

Lake Minnewanka-Cascade Development

This plant operates under final licence of May 14, 1947, and, as the total net power output during 1952 was 64,094,400 kw. hrs., rental in the amount of $9,489.11 was received.

In connection with the regulation of Lake Minnewanka, daily water elevations were obtained; at the end of March, the lake elevation was 4,816·15 feet, storage being well above average for the time of year. Stream gauging stations were operated to measure the Ghost River diversion to Lake Minnewanka.

Ghost Development—Bow River

Under the terms of the final licence for this development, dated May 14, 1947, one-half the annual rental is paid to the Government of Canada, through the Division, for the benefit of the Indians of the Stony Band. For the calendar year 1952, the total rental was computed as $22,208.42. As an advance payment of $3,500 had been made, a final amount of $7,604.21 was received from Calgary Power Limited for transmittal to the Indian Affairs Branch.

Yellowknife River Plant

The plant of the Consolidated Mining and Smelting Company of Canada, Limited, on the Yellowknife River, Northwest Territories, operating under Final Licence dated December 24, 1942, had a power output of 26,060,800 kw. hrs. in the calendar year 1952, as compared with 24,277,900 kw. hrs. in 1951. The rental received for 1952 amounted to $3,215.23.

Survey Permit—Yukon Territory

Under date of December 29, 1952, a survey permit was issued to Quebec Metallurgical Industries Limited to facilitate their water-power investigations in Yukon Territory.

Publications

Hydrometric and run-off data, as accumulated and tabulated, are published in *Water Resources Papers,* which are issued at irregular intervals according to convenience of printing. Each of these reports, giving data for two climatic years, covers one of the four drainage divisions into which Canada is divided for this purpose. The immediate distribution requires about 400 copies of each report, a large proportion of which are issued free of charge, although there is a set price for each volume.

Revenue

During the year, the various provinces contributed $43,227.50 in support of co-operative water-resources studies; also $85,850 53 was received from the Province of Manitoba in connection with capital and operating costs of Lake of the Woods and Lac Seul reservoirs, as provided in the Natural Resources Transfer Agreement. Revenue secured from water power licences amounted to $13,677.52. Revenue from miscellaneous sources was $1,521.40. Total revenue was approximately $145,000.

Engineering and Architectural Division

The Engineering and Architectural Division functions as a general engineering and architectural unit servicing the various branches of the Department by furnishing technical advice, investigating and undertaking the design of construction projects, preparing plans and specifications, calling for tenders, awarding contracts, and supervising construction operations. Payment for work done is made from funds provided by the branch concerned. Engineers are allocated to other branches for the supervision of maintenance work and small construction projects being undertaken on a day labour basis. Some of the personnel so allocated serve in a dual capacity by acting as National Park Engineers and at the same time supervising work on the major construction projects under the supervision of this Division.

The preparation of plans and specifications often involves preliminary and final field surveys, ranging from site selection for buildings to layouts for water and sewer systems and road location surveys. The interested Division supplies the necessary funds for the more comprehensive surveys and the Engineering and Architectural Division's field personnel perform a wide variety of lesser surveys and investigations as a regular service to other Divisions of this and other departments.

National Parks Projects

National Historic Sites

Repairs to the walls of Quebec Citadel, begun during the summer of 1951, were continued. Work was concentrated on repairs to the St. John Gate area, including repointing and resetting of stonework and waterproofing and repairs to ceilings and archways. The Ramparts section stonework was repaired and repointed and similar work was undertaken in the Kent Gate Area and at the outer Citadel wall, Glacis-St. Denis Avenue.

The heating system of the Museum Building, Fort Beauséjour, N.B. was redesigned and repaired.

Repairs to the Halifax Citadel, begun in 1951, were continued and included the following work: restoration work on Casemates 7 to 13 and Cavalier Barracks; landscaping of parade grounds; remodelling of first floor of Old Town Clock building, and repair of clock mechanism; continuation of repairs to escarp and counterscarp walls. Restoration included plumbing, heating and electrical installations, and drainage.

Cape Breton Highlands National Park

A temporary steel truss, abutments, and approaches to the Mackenzie River Bridge on the Cabot Trail were constructed. An engineer's residence was built, for the most part with local labour.

Point Pelee National Park

White oak piles were driven to protect the east side beaches and tree line from erosion. This work was a continuation of similar protective measures undertaken in previous years.

Prince Edward Island National Park

An asphalt seal coat was placed on 6·5 miles of the Rustico-New London road. The roof of Dalvay House was repaired and shingled.

Fundy National Park

An engineer's residence was constructed by contract, and investigations for a proposed new water supply system were undertaken. A spillway dam was constructed at Bennett Lake adjacent to No. 14 Highway.

Banff National Park

Alterations to the sewage disposal system at Lake Louise were completed, including the installation of a chlorinator. A 90-foot steel truss span, abutments, and approaches to the Spray River Bridge at the golf course were completed. Improvements at the East Park Gate area were completed in conjunction with Trans-Canada Highway construction undertaken at the same time.

Elk Island National Park

Further improvements to the Sunset Cabins Development were made, including heating, plumbing, sewage, and water supply facilities.

Jasper National Park

Projects undertaken included the construction of a winter heating system for Jasper Townsite water supply, asphalt seal coating of the Banff-Jasper Highway, Mile 0 to Mile 20, and the construction of a consolidated base course from Mile 20 to Mile 50 of the same Highway. Extensive repairs were made to Miette Hot Springs bath-house, including waterproofing of concrete, repairing drains, setting ceramic tile, painting, and plastering. A 32-foot span bridge with 24-foot roadway was constructed on concrete abutments at Mile 15, Cavell Road. The superstructure of this bridge was of precast concrete, a type of construction which offers some improvements over more conventional methods. The improvement of 17·5 miles of the Jasper-Yellowhead road was nearly completed, including the replacement of seven small bridges.

Kootenay National Park

Work included the placing of an asphalt bound base course on 28 miles of the Banff-Windermere Highway and the seal coating of 66 miles. Seven miles of this Highway is located in Banff National Park and 59 miles in Kootenay National Park. The construction of the Wardle Creek Bridge, begun last year, was completed. The extension of the water supply system at Radium Hot Springs Townsite (including a reservoir) to serve residents at the West Park boundary and Radium, begun last year, was completed.

A good start was made on the installation of an improved ventilating system for the Radium Hot Springs Aquacourt.

Prince Albert National Park

Work undertaken included seal coating 30 miles of the Waskesiu Highway and the construction of extensions to the townsite water supply system. Work on a new pumphouse, chlorination system, and water intake were carried to approximately 90 per cent completion.

Riding Mountain National Park

Work completed consisted of placing a plant mix bituminous surface on Number 10 Highway and the Wasagaming Townsite streets, a total of 34·5 miles, plus the construction of a 2·2 mile by-pass around Wasagaming Townsite for through truck traffic.

Waterton Lakes National Park

Work completed included seal coating the consolidated base course constructed in 1951 on the Pincher and Cardston entrance roads and townsite streets; also the completion of a consolidated gravel base course on the Akamina Road. The construction of a water system and sewer system for the townsite was undertaken, including service connections.

Yoho National Park

The construction of 4,200 feet of the Yoho Valley Road was commenced. Early heavy snowfalls made it necessary to postpone further construction into the 1953-54 fiscal season.

Improvements to the Field streets and sidewalks were completed. Other work included the Loop Road location survey and the upper Canyon Road survey.

Trans-Canada Highway Projects

Trans-Canada Highway construction within Banff and Yoho National Parks was undertaken as follows:

(*a*) Construction of approximately four miles of the Trans-Canada Highway from the East Gate of Banff Park westerly, including three concrete box culverts and the construction of the Carrot River Bridge. The bridge and culverts were completed but approximately 16 per cent of the sub-grade work remains to be done.

(*b*) Construction of the Bow River Bridge (near the junction of the Pipestone and Bow Rivers) and connecting roads. The bridge is of reinforced concrete, double span rigid frame construction, 126 feet in length, roadway width from curb to curb 24 feet, with three-foot sidewalks and iron hand rails on each side.

(*c*) Road location surveys were continued in Banff and Yoho National Parks.

Northern Administration Projects

The following is a summary of work undertaken on behalf of the Northern Administration and Lands Branch.

All-year maintenance of the Mackenzie Highway from the Alberta-Northwest Territories boundary to Hay River Townsite, through the townsite and on to the West Channel, was carried out. This year's work

included the lowering of the fill over the West Channel and the raising of two fills over the overflow channels. Minor work included the painting of several buildings at Yellowknife; construction of a foundation for Abasand Building No. 47, Yellowknife; repairs to Area B buildings in Whitehorse; and investigations for a permanent water supply for Hay River Townsite.

Pre-fabricated residences were supplied and erected at Aklavik (teacher's living quarters), Hay River (warden's residence), and Fort Simpson (Chief Warden's residence).

Agreements were entered into with the Yukon Territorial Government for the following road work:

(*a*) All-year maintenance of the Mayo-Whitehorse road on the basis of payment to the Territorial Government of 50 per cent of the cost. Inspections were made and accounts paid accordingly.

(*b*) Construction of an all-weather road between Stewart River Crossing and Dawson, Yukon Territory, on the basis of the Federal Government contributing to the cost of construction to an amount not in excess of $300,000 over a three-year period. Considerable progress was made in spite of a late start.

Agreements were entered into with mining companies for the construction of the following roads:

(*a*) A resources road from a point on the Mackenzie Highway to Pine Point on the basis of the Federal Government contributing 50 per cent of the cost, or $25,000, whichever is the lesser, to the Consolidated Mining and Smelting Company. The road was completed, inspection was made, and payment completed.

(*b*) A resources road between Keno Village and the top of Keno Hill, on the basis of the Federal Government contributing 50 per cent of the cost or $100,000, whichever is the lesser to the United Keno Hill Mines Limited. The road was 65 per cent completed this year and payment made accordingly.

A walk-in freezer was built at Fort Smith for the Wood Buffalo meat packing section and another freezer was begun in Aklavik for the Reindeer section of the Wildlife Management program.

Extensive repairs were made to the Pan-American duplex houses at Whitehorse.

Projects for Other Departments

An observer's residence, with two-car garage, was constructed at Newbrook, Alberta, for the Dominion Observatory, Department of Mines and Technical Surveys.

Plans and specifications were completed in this Division for all the above projects, and the administration work included calling for tenders and awarding contracts, except for those projects undertaken by day labour.

Projects Division

The Projects Division functioned in investigating joint projects where Federal assistance was involved, reported on progress, and recommended payment. In addition, the Division gave engineering advice and prepared design drawings of bridges and buildings for other Departments and Federal Government Agencies.

Sharable Projects

Trans-Canada Highway Bridges

The Division reviewed the design of 42 bridges to be constructed on the Trans-Canada Highway, having an estimated value of $5,000,000. Design of all bridges on the Highway is the responsibility of the province concerned, but, in order to have uniformity, each province submits its design to the Division for review. By this means, standard practices are developed and followed by the participating provinces. In making the review the following three aspects are investigated: loading must conform to the classification H20–S16–44 of the A.A.S.H.O. Code; stress analysis and distribution of live and dead load moments; and size of members and the area of distribution of the steel reinforcement.

Fanshawe Dam, London, Ontario

The Federal Government agreed to pay an amount not to exceed $1,738,219.50 which is approximately 37½ per cent of the original estimated cost of the Fanshawe Dam near London, Ontario. This dam will be completed in 1953.

Black Bay-Ace Lake Mining Area Road, Saskatchewan

The Federal Government agreed to pay an amount not to exceed $66,666, approximately 33⅓ per cent of the estimated cost of this mine road. The road, which was completed in 1952, is approximately 15 miles long and the cost of construction was shared by the Province of Saskatchewan, by the mining company, and by the Federal Government.

Victoria-Patricia Bay Highway, Victoria, B.C.

The Federal Government has agreed to pay an amount not to exceed $442,000 or approximately 50 per cent of the original estimated cost of this 18-mile Highway. The Province of British Columbia assumes the remainder of the cost. The Division examined progress reports of construction and made recommendations with regard to payment based on construction completed. This road will be completed in 1953.

Preparation of Design Drawings

National Parks

The Division completed design drawings for the following park bridges: Carrot Creek, Banff National Park; Edith Cavell, Miette River, Sulphur River, and Villeneuve, all in Jasper National Park; and Mackenzie River, Cape Breton Highlands National Park. Total estimated cost is approximately $350,000.

Central Mortgage and Housing Corporation

Engineering assistance was given with regard to the structural design of several apartment house projects located throughout Canada.

Department of Transport Air Services

Design drawings were completed for the Department of Transport in connection with a subway near Ottawa to serve the approach to the terminal area of the Uplands (Ottawa) Airport. Estimated cost is $180,000.

Engineering Advice

National Defence (Army)

The Division reviewed plans and specifications for certain highway bridges on the Alaska Highway and made recommendations with regard to related loading and foundation problems.

As of March 31, 1953 the Projects Division was combined with the Engineering and Architectural Division reducing the number of Divisions in the Branch to three.

Trans-Canada Highway Division

The Trans-Canada Highway Act passed by Parliament became effective on December 10, 1949. Under this Act, the Minister is empowered to enter into an agreement with the provinces for the construction of a Trans-Canada Highway. The Act provides for the Federal Government to contribute up to 50 per cent of the cost of new construction and up to 50 per cent of the cost of a highway which was constructed prior to the passage of the Act and which can properly be incorporated in the Trans-Canada Highway. The total Federal contribution is limited to $150,000,000 and the Highway is to be completed by December 9, 1956.

On May 15, 1952, Nova Scotia became the ninth province to conclude an agreement with the Federal Government for the construction of the Trans-Canada Highway.

Schedule "A" of the Agreement with each province outlines the route chosen by the province. This route is shown on the map at the back of the report. General specifications for the construction of the Highway are contained in Schedule "B" of the Agreement.

Following passage of the Act, the Trans-Canada Highway Division was established to administer federal interests in the construction of the Highway. The responsibility for design of the Highway and its constructions rests initially with the provincial departments concerned. The duties of the engineers of the Trans-Canada Highway Division are to inspect, in co-operation with provincial engineers, all phases of construction and to ensure that the terms of the Federal-Provincial Agreement are carried out. The Division co-operates with provincial government authorities in determining final construction costs and the amount of the federal contribution.

The Head Office of the Division is located in Ottawa. The Division is represented in the provinces by supervising engineers, working in close liaison with provincial officials. Supervising Engineers' Offices are located in St. John's, Nfld.; Halifax, N.S.; Fredericton, N.B.; Toronto, Ont.; Winnipeg, Man.; Regina, Sask.; Edmonton, Alta.; and Victoria, B.C. Field

inspecting engineers, working under the direction of the supervising engineers, have offices strategically located along the route of the Highway and frequently inspect all work in progress. Close liaison is maintained between these engineers and provincial field engineers. Inspecting Engineers' Offices are also located in Charlottetown, P.E.I.; Ottawa, Ont.; Orillia, Ont.; Sudbury, Ont.; Port Arthur, Ont.; Swift Current, Sask.; Calgary, Alta.; and Kamloops, B.C. Supervising and inspecting engineers' offices are shown on the map at the end of this report.

Conferences of Federal-Provincial highway officials have been held in Ottawa annually since November, 1951. The second conference was held in Ottawa on September 15 to 17, 1952, and was attended by senior highway officials and engineers from each of the nine participating provinces, departmental officials, and the Federal supervising engineers.

Committees were appointed to study various phases of design, specifications, and construction practices. A special committee, composed of departmental officials and the senior representatives from each province, discussed ways and means of achieving greater uniformity in administrative practice. It was agreed that the next conference would be held during November, 1953.

Since inception, the Highway has created wide interest outside Canada. In 1952, more than 30 requests were received from leading international journals and magazines for information and photographs. Abroad, the various missions of the Department of External Affairs received others. In response to this demand, the National Film Board undertook to share with the Department costs of producing a colour motion picture film which would record construction work in progress and would also be useful in tourist promotion. During the year, camera crews were at work in British Columbia, Alberta, and Saskatchewan. Scheduled for release in 1954 is a feature length film entitled *Canada's New Main Street.*

Progress in building the Highway was, in general, fairly well maintained in 1952, in spite of the heavy demand on labour and materials by the National Defence program. Steel for bridge building was again in short supply and the construction of a number of major structures had to be deferred. The removal of controls on steel at the end of December will undoubtedly accelerate this phase of the work. During the fiscal year 1952-53, 267 miles of the Highway were graded and 208 miles were paved, as compared to 288 miles graded and 192 miles paved in the previous fiscal year. Since work was commenced on the Highway, a total of 64 bridges have been approved for construction and of these 47 have been completed. Total payments made to the provinces during the fiscal year 1952-53 amounted to $13,952,545.44 as compared to $12,791,641.30 for the previous year.

The sum of $500,000 voted by Parliament for work on the Trans-Canada Highway in the national parks was made available to the Engineering and Architectural Division to carry out surveys and to commence construction of the Highway within the parks. Details of work undertaken are shown in the report of the Engineering and Architectural Division.

Tables giving full details of mileage constructed commitments incurred, and payments made by the Federal Government to each of the provinces may be found in the Report of Proceedings Under the Trans-Canada Highway Act for the fiscal year ended March 31, 1953.

Publications

Water Resources Division

Surface Water Supply of Canada

Water Resources Papers

No. 103—St. Lawrence and Southern Hudson Bay Drainage, 1947-48 and 1948-49 (Bilingual).

No. 106—Pacific Drainage, 1946-47 and 1947-48.

Water-Power Bulletins

Hydro-Electric Progress in Canada.

Water-Power Resources of Canada.

(Mimeographed in English and French).

Northern Administration and Lands Branch

The Northern Administration and Lands Branch is responsible for the administration of natural resources vested in the Crown in the right of Canada in the Northwest Territories and the Yukon Territory, the management of certain land and mineral rights vested in the Crown in the right of Canada in the provinces, and the administration of Eskimo affairs.

The Branch administers the Northwest Territories under the Northwest Territories Act 1927, as amended. There being no Territorial Civil Service, all administrative functions of the Government of the Northwest Territories are performed by the Branch. The Commissioner's report on the administration of the Territories appears on Page 88.

The Branch is also responsible for the administration of the Yukon Territory under the Yukon Act 1927, as amended. The administrative functions of the Government of the Territory are performed by a Territorial Civil Service under the Commissioner of the Territory. The Commissioner's report on the administration of the Territory appears on Page 93.

The Branch maintains offices at Ottawa, Edmonton, Fort Smith, Yellowknife, Hay River, Aklavik, Whitehorse, Mayo, and Dawson.

Administration of the Northwest Territories

The Northwest Territories Act provides for the administration of the Northwest Territories by a Commissioner (who is Deputy Minister of Resources and Development) under instructions given from time to time by the Governor in Council or the Minister of Resources and Development, and a Council of 8 members which has legislative powers analogous to those of a Province. The membership of the Council consists of 5 senior Civil Servants appointed by the Governor in Council and 3 elected representatives from electoral districts in the District of Mackenzie. The last election was held in August 1951, and the next will be held in 1954. At the close of the fiscal year the Commissioner was Major General H. A. Young. The appointed members were Lieutenant Colonel F. J. G. Cunningham (Deputy Commissioner), Commander L. C. Audette, Air Commodore W. I. Clements, Commissioner L. H. Nicholson and Major D. M. MacKay. The elected members were James Brodie, Fort Smith (Mackenzie South), Frank Carmichael, Aklavik, (Mackenzie West), Mervin Hardie, Yellowknife, (Mackenzie North). The appointed officers of the Council are J. R. E. Bouchard, Secretary, and W. Nason, Legal Adviser. During the year the Council held two sessions, one at Ottawa from July 2 to 10, and one at Fort Smith from December 8 to 11.

The Public Services Section of the Northern Administration Division is responsible for the preparation of legislation to be submitted to the Northwest Territories Council for consideration; the preparation of regulations made under Ordinances; the administration of taxation and other

revenue legislation; the disposition of certain grants to the Territories under acts of the Government of Canada; the administration of Ordinances relating to law enforcement, public health, and the care of the aged and indigent; and the preparation of the agenda for meetings of the Council and correspondence dealing generally with legislation. The Section is also responsible for liaison between the Government of Yukon Territory and Federal Government departments.

Administration of Yukon Territory

The Yukon Act provides for the administration of Yukon Territory by a Commissioner (who is an officer of the Branch) under instructions given from time to time by the Governor in Council or the Minister of Resources and Development, and a Council which has legislative powers analogous to those of a Province. The Council consists of five members elected from electoral districts in the Territory. The last election was held in August 1952 and the next will be held in 1955. At the close of the fiscal year the Commissioner was W. G. Brown. The elected members and the district each represents were:

James Mellor, Dawson, (Dawson District); Alexander Berry, Mayo, (Mayo District); A. R. Hayes, Carmacks, (Carmacks District); J. L. Phelps, Whitehorse, (Whitehorse East); Frederick Locke, Whitehorse, (Whitehorse West).

The appointed officers are W. M. Cameron, Secretary, and F. G. Smith, Legal Adviser. During the year, the Council held two sessions at Dawson, one from April 23 to 30 and one from October 15 to 22.

As early as 1951 it became apparent that the concentration of population in Whitehorse emphasized the desirability of moving the seat of Government from Dawson to Whitehorse at the earliest possible date. Since accommodation was not available at that time, the actual move was postponed until completion of a building program. The move of the five federal employees, eight territorial employees, and their families was carried out in March, 1953. At the present time, the offices of the Government are located in the old Territorial School building, pending completion of a Federal building which is expected to be ready for occupancy by December, 1953.

Lands Division

The Lands Division is responsible for the administration of Crown-owned lands, minerals, and timber in the Northwest Territories and Yukon Territory and, under the Public Lands Grants Act, 1950, is responsible for the administration of public lands in the provinces under the control and management of the Minister of Resources and Development. The latter include former Ordnance and Admiralty lands, those lands reserved to Canada under the Transfer of Natural Resources Agreements, Federal lands for which entry was granted by the Federal Government but for which the applicant is not yet eligible for patent, and certain mineral rights reserved by Section 57 of the Soldier Settlement Act.

A Central Office of Record maintains maps, plans, and related information regarding Public Lands and former Ordnance Lands placed under the administration of the Department of Resources and Development, and provides a Central Registry of federally-owned or controlled lands, the information for which has been registered with this Department.

The Seed Grain Section is responsible for the records of all seed grain, fodder, and relief advances made by the Federal Government to settlers in the western provinces between the years 1876 and 1926 and prepares and submits recommendations in connection with adjustments or apportionment of these accounts. Where there has been a joint Federal-Provincial loan, action is taken in co-operation with the province concerned.

Records pertaining to former Dominion Lands are maintained by the Dominion Lands Section which provides an information service on all western lands for which Crown grants have been issued by the Federal Government since 1873.

Northwest Territories

Mining

During 1952, there was an increase in mining activities in the Mackenzie, Yellowknife, and Arctic and Hudson Bay Mining Districts, although prospecting decreased. On April 1, 1952, the office of the Mining Recorder for the Mackenzie Mining District was transferred from Fort Smith to Yellowknife. Twenty-three properties did mine development work, twelve of which performed some underground examination. Six of the latter were gold properties, three were uranium, two were lead-zinc, and one was tungsten. There were five producing mines, four of which were gold and one uranium. One gold producer ceased operations during 1952.

The value of mineral production totalled $8,817,981, being a slight increase from 1951. In the Yellowknife area, the three gold producing mines averaged 1,100 tons of ore treated per day, recovering a total of 207,907 ounces of gold and 53,667 ounces of silver. The number of men employed at the three mines averaged 835. In the Quyta-Giauque Lake area, the producing mine averaged 90 tons milled per day and recovered a total of 34,188 ounces of gold and 2,983 ounces of silver. An average of 90 men were employed.

At Pine Point, 41,822 feet of diamond drilling was performed at the lead-zinc property on the south shore of Great Slave Lake. A 70-mile, all-weather road from the Mackenzie Highway to the property was built during the summer, a townsite was laid out, and sewer and water systems were installed. A three-compartment shaft was collared to a depth of 41 feet and a headframe, mine dry, hoist room, and compressor house were constructed.

Mining at the uranium mine on Great Bear Lake was continued but construction of the crushing plant and mill, which were destroyed by fire in November, 1951, was not completed until May, 1952, immediately after which production was resumed. The production figures are not available. At a uranium property at Hottah Lake development work continued and production is expected to commence in 1953. At Stark Lake, 415 feet of drilling and 50 feet of raising was performed on a uranium prospect. In the Mackay-Courageous Lake area, underground development work was continued on a tungsten-gold operation and an airstrip was built adjacent to the property. On another gold property in the area, a three-compartment shaft was collared to a depth of 32 feet.

At O'Connor Lake, south of Great Slave Lake, a three-compartment shaft was sunk on a lead-zinc prospect to a depth of 178 feet, and 155 feet of cross-cutting and 202 feet of drifting was done on the 150-foot level. At Outpost Island in Great Slave Lake the tungsten-gold mine was dewatered and some development work performed on the fourth level.

In the Ferguson Lake area in the Keewatin District, 57,723 feet of diamond drilling was performed on the Ferguson Lake concession, together with a detailed program of geological investigation. Over one million dollars was spent in exploration activities on the concession during 1952.

At Rankin Inlet on Hudson Bay, further surface development work on the high-grade nickel deposit was performed and plans were being made for underground development during the 1953 season. Mineral claims were staked in the Ennadai and Tatinnai Lake areas on base metal showings.

Interest was shown in the known iron deposits in the Belcher Islands in Hudson Bay and staking was conducted in the area during March of 1953.

At the Mine Rescue Station at Yellowknife, classes were conducted in mine rescue training and first-aid work. Seventy men qualified for basic certificates of mine rescue training.

Routine inspections were carried out on the active underground operations and claim inspections were conducted when necessary.

Petroleum and Natural Gas

Applications were received for 182 exploratory petroleum and natural gas permits in the Northwest Territories, of which 28 were disallowed owing to prior staking. Permits granted from applications received during the fiscal year totalled 255, comprising approximately 15 million acres.

Four diamond drill test holes and twelve wells were drilled and abandoned as dry holes. Although some indication of oil was encountered in the test holes, no commercial quantity was revealed. The "Proven Field" at Norman Wells produced 259,418 barrels of oil as compared to 217,818 barrels the previous year.

Value of Mineral Production*

	1951	1952	Total Production to end of 1952
Gold	$7,819,975	$8,438,816	$51,233,202
Silver	60,728	48,925	1,106,528
Lead			490
Copper	536	1,427	26,065
Tungsten		6,786	44,460
Crude Petroleum	399,887	312,276	4,473,235
Natural Gas	7,621	9,751	55,308
	$8,288,747	$8,817,981	$56,939,288

* Exclusive of production of "radioactive" ores.

Revenue

A total of $272,070.17 was received from mining in the Northwest Territories. This revenue was made up as follows: coal leases, $49.50; coal permits, $10; coal royalty, $26.54; miners' licences, $22,745.51; petroleum and natural gas permits, $75,500; petroleum and natural gas bonus, $25,427; petroleum and natural gas leases, $1,839.23; petroleum and natural gas royalty, $12,930.06; petroleum and natural gas (Government's share of production), $91,766.01; petroleum and natural gas surface leases, $1,453.53; quartz mining fees, $20,586.95; quartz mining leases, $2,247.30; quartz mining royalty, $13,683.72; quartz mining surface leases, $708.46; sale of claim sheets, $262.99; sale of maps, $389.88; and gravel permits, $2,443.49.

Lands and Timber

Land Sales

There were 132 land sales completed in the Northwest Territories in the fiscal year 1952-53. These sales were in the following settlements: Fort Franklin, 1; Arctic Red River, 1; Hay River, 11; Aklavik, 8; and Yellowknife, 111.

In addition to these sales, 32 agreements of sale are in effect, 28 of which are for the benefit of veterans receiving assistance under the Veterans' Land Act.

Land Privileges

The 188 land privileges in force included: licence of occupation, 6; grazing lease, 4; permission to occupy, 48; agricultural lease, 9; fur farm lease, 7; surface lease, 81; waterfront lease, 31; docksite lease, 1; shipyard lease, 1.

Twenty-five of the surface leases were for the benefit of qualified veterans.

Timber and Hay Permits

A total of 143 timber permits were issued, of which 128 were general permits and 15 were commercial permits.

Timber cut	Lumber ft.b.m.	Round Timber lin. ft.	Fuelwood cords
Commercial permits:	5,514,828	308,471	
General permits:	306,500	23,294	4,628
Total cut:	5,821,328	331,765	4,628

Three hay permits were issued in the Northwest Territories to authorize the cutting of 35 tons.

Revenue

A total of $55,487.06 was received in revenue from the following sources: timber, $23,091.38; lands, $27,814.99; grazing and hay, $3.50; miscellaneous, $4,397.69; Land Titles Office, $179.50.

Yukon Territory

Mining

The Galena-Keno Hill area, Mayo Mining District, continued to be the principal sphere of mineral production. The total value of minerals produced amounted to $11,276,211 (preliminary figures) as compared

with $9,793,170 in 1951. The highest output was in silver and lead. Gold production slightly declined while zinc and cadmium increased considerably.

Whitehorse District

A great deal of interest in early exploration and development was focused on the Quill Creek copper-nickel showings discovered in the summer, while one company continued to increase zinc-lead ore reserves north of Fuller Lake on the Canol Road.

The coal mine at Tantalus Butte, near Carmacks, produced 7,800 tons of coal during the year, and plans were being made to increase coal reserves to enable a still greater production. There were 1,354 new quartz grants issued and 536 quartz renewals. Ninety-six mineral claims were surveyed during the year, through arrangements made with the Surveyor General, while one private Dominion Land Surveyor conducted mineral claim surveys.

Dawson District

Dredging was the principal medium utilized in placer operations and there was a slight decrease in gold production. The number of private operators using bulldozers and sluice boxes decreased, which, in turn, had a diminishing effect on gold production. Placer mining grants issued numbered 25 and placer renewals totalled 966.

Mayo District

Development work was the keynote this year and production showed a slight increase. Construction of a new custom mill was commenced. A new hydro project on the Mayo River, located five miles north of Mayo Townsite, together with a transmission line, was completed and began delivering power to mining properties and private consumers in the Mayo area. The main producing mine employed 405 men as at December 31, 1952 and tonnage milled totalled 138,281 tons. There were 210 new quartz grants issued and 1,414 quartz renewals.

During the fiscal year, 10 quartz mining leases were renewed, 3 coal leases and 4 hydraulic leases were in good standing.

Value of Mineral Production

	1951	1952*	Total Production to end of 1952
Gold	$2,856,022	$2,702,841	$232,667,001
Silver	3,255,156	3,314,851	32,896,719
Lead	2,306,085	2,950,433	13,341,191
Copper	-	-	2,711,695
Coal	60,597	132,000	1,091,988
Tungsten	7,098	-	25,413
Cadmium	178,091	278,276	641,828
Antimony	-	-	173
Zinc	1,130,121	1,897,820	4,002,049
	$9,793,170	$11,276,221	$287,378,057

* Preliminary figures

Mining Inspection Service

Owing to increased mining activity and the expansion of underground development, a resident mining inspector was appointed for the Yukon Territory with an office at Whitehorse, Yukon Territory.

Revenue

A total of $206,451.59 was received from mining in the Yukon. This revenue was made up as follows: coal leases, $567.96; hydraulic leases, $2,390.00; quartz mining surface leases, $67.65; quartz mining fees, $47,896.47; quartz mining leases, $2,310.00; quartz mining royalty, $89,206.93; placer mining fees, $22,432.67; placer gold royalty, $37,226.46; sale of claim sheets, $24.30; survey fees, $4,300.00; and quarrying leases, $29.15.

Petroleum and Natural Gas

Eight applications for petroleum and natural gas permits were received and one was granted during the year. The other seven applications were being processed at the end of the fiscal year.

The right to explore for petroleum and natural gas in two areas containing 3,066,880 acres each, one of which areas is partly in the Northwest Territories, was granted as a result of a public competition.

Lands and Timber

Land Sales

There were 27 land sales completed in the Yukon Territory during the fiscal year 1952-53, including properties at Whitehorse, Dawson, and Watson Lake.

In addition to these sales, there were 92 agreements of sale in force, 87 of which were arranged for veterans receiving assistance under the Veterans' Land Act.

Land Privileges

There were 141 land privileges in force, including waterfront lease, 25; permission to occupy, 48; agricultural lease, 5; licence of occupation, 2; surface lease, 56; grazing lease, 5.

One of the surface leases was for the benefit of a qualified veteran.

Timber and Hay Permits

There were 290 general permits and 35 commercial permits issued during the year, authorizing the cutting of the following amounts of timber:

Timber Cut	Lumber (ft. b. m.)	Round Timber (lin. ft.)	Fuelwood (cords)
Commercial permits	4,997,918	1,991,607	573
General permits	-	35,469	12,562
Total	4,997,918	2,027,076	13,135

Nine hay permits were issued to authorize the cutting of 166 tons.

Revenue

Revenue received during the year from resources other than minerals totalled $47,657.73. It was derived from the following sources: timber, $33,750.13; lands, $11,942.47; grazing and hay, $26; Land Titles Office, $1,446.05; and miscellaneous, $493.08.

Public Lands in the Provinces

The public lands in the provinces administered by the Lands Division comprise the former Ordnance and Admiralty Lands, former Dominion lands and public lands, as defined by the Public Lands Grants Act, under the control and management of the Minister of Resources and Development, together with certain lands transferred to this Department for administration and disposal by other departments. Many of these areas are non-revenue producing and cannot be placed on a revenue producing basis until the interest of the Crown can be clearly defined. To clear the title necessitates searches dating back to the time that each parcel was acquired and determining the disposition since that date. In the case of long term leases reversionary interests have to be computed in accordance with accepted practices. Efforts to place all available lands on a revenue producing basis continue, and, where there is no further requirement for public purposes, sales have been negotiated. In this connection, 16 appraisals were made in order to determine the present value.

During the fiscal year, no additional lands were placed under this administration but two parcels were transferred to other Government departments to meet their requirements.

Twenty-seven sub-division lots and 13 parcels were disposed of by outright sale. Ten of these lots and six of the parcels were sold for nominal sums for public purposes. Patents were issued for 10 sub-division lots and four parcels of land. Under Agreements of Sale, 22 sub-division lots and eight parcels of land were disposed of. There are at present 185 active leases, licences of occupation, or permits covering 102 sub-division lots and 99 parcels of land.

The following is a summary of revenue received during the fiscal year: Sales and Agreements of Sale, $25,812.18; Rental, $8,974.11; Fees, $51.50; Grazing, hay and timber, $39.90; Total, $34,877.69.

Central Office of Records

During the fiscal year, 1,123 new abstracts of title were integrated into the central office of records of Federal lands. The Lands Division has now basic information on nearly 18,000 parcels of land held by the Federal Government throughout Canada.

Dominion Lands Records

By the Natural Resources Agreements of 1930 between the Federal Government and the Western Provinces, Canada was made the custodian of all former records pertaining to Crown lands, mines and minerals, and royalties derived therefrom within the respective provinces, subject to the original or complete copies being forwarded to the Province concerned upon request. These records, for which the Lands Division is responsible, were contained at that time in 2½ million files. These files dealt with the settlement and development of Western Canada which included colonization; administration of the land, forest, and mineral

resources; railroad subsidies; the various agreements regarding the surrender of Hudson Bay lands; individual grants to the Northwest half-breeds in accordance with various treaties; and veteran's grants in connection with the Red River Expedition, the Riel Uprising, and the South African and First World Wars.

During the period 1873 to 1930, 525,000 patents were issued by the Federal Government for lands in Western Canada. The Patent Registers have been invaluable in providing evidence concerning the actual rights that were conveyed by the Crown. The information on the files has made it possible to supply essential data concerning the age and nationality of persons now interested in obtaining Old Age Pensions or proof of citizenship. It may be noted that in the past fiscal year, over 2,000 written and 1,600 telephone inquiries regarding former Dominion Lands have been answered.

In accordance with procedure approved by the Public Records Committee and the Treasury Board, the examination and segregation of old Dominion Lands files continues and 210,000 files were dealt with during 1952-53.

At the request of Provincial Governments and private individuals, 462 certified copies of Letters Patent have been prepared providing a revenue of $765.

Seed Grain, Fodder and Relief Indebtedness

The indebtedness referred to in this report represents those accounts that are still outstanding for advances of seed grain, fodder for animals, and other relief made by the Federal Government to homesteaders and early settlers in Western Canada. The advances were made in almost every year from 1876 to 1926 and were secured by interest bearing liens registered against the debtor's land. From 1919-1922 the Provincial Governments of Saskatchewan and Alberta shared the advances of fodder and relief on a 50-50 basis.

In 1927, the Federal Parliament passed legislation which established Seed Grain Advisory Boards to investigate individual accounts, and, where circumstances warrant, to write-off all or part of the outstanding indebtedness. During the fiscal year 1952-53, the Boards made recommendations on 3,016 accounts and eight other accounts were paid in full. As a result of this, $1,696,633.33 of principal and interest was written off and $71,221.84 was received in payments. A total of 9,729 liens were discharged. This represents a very large increase over previous years, when 500 settled accounts was a good average year. The increase is due to an investigation that has just been completed into the nature and value of the security held. In many cases, there was found to be no security of value and the account was written off. As of March 31, 1953, there were 3,350 Federal accounts and approximately 4,000 Joint Federal-Provincial accounts still outstanding.

When the resources were transferred in 1930, the provinces agreed to protect the Federal advances by registering liens whenever a patent issued. During 1952-53, there were 33 certificates of indebtedness issued charging newly patented land with 130 liens. There were also about 400 inquiries from provincial government offices and debt adjustment and loan boards for statements of outstanding indebtedness.

The following summary shows the financial operation for the year ended March 31, 1953:—

Summary

	Principal	Interest	Total
Debits			
Amount outstanding March 31, 1952	$1,767,618.10	$3,206,007.15	$4,973,625.25
Accrued Interest April 1, 1952 to March 31, 1953		66,115.67	66,115.67
Total Debits	$1,767,618.10	$3,272,122.82	$5,039,740.92
Credits			
Net Revenue April 1, 1952 to March 31, 1953	$ 55,403.22	$ 15,818.62	$ 71,221.84
Amounts written off as loss by Orders in Council—April 1, 1952 to March 31, 1953	551,480.54	1,145,152.79	1,696,633.33
Total Credits	$ 606,883.76	$1,160,971.41	$1,767,855.17
Amount outstanding March 31, 1953	$1,160,734.34	$2,111,151.41	$3,271,885.75

Manitoba

	Principal	Interest	Total
Debits			
Amount outstanding March 31, 1952	$ 7,813.18	$ 14,921.66	$ 22,734.84
Accrued Interest April 1, 1952 to March 31, 1953		173.29	173.29
Total Debits	$ 7,813.18	$ 15,094.95	$ 22,908.13
Credits			
Net Revenue April 1, 1952 to March 31, 1953	$ 445.62	$ 371.90	$ 817.52
Amounts written off as loss by Orders in Council—April 1, 1952 to March 31, 1953	$ 4,779.66	$ 10,228.08	$ 15,007.74
Total Credits	$ 5,225.28	$ 10,599.98	$ 15,825.26
Amount outstanding March 31, 1953	$ 2,587.90	$ 4,494.97	$ 7,082.87

Saskatchewan

	Principal	Interest	Total
Debits			
Amount outstanding March 31, 1952	$1,259,522.72	$2,267,962.63	$3,527,485.35
Accrued interest April 1, 1952 to March 31, 1953		50,771.44	50,771.44
Total Debits	$1,259,522.72	$2,318,734.07	$3,578,256.79
Credits			
Net Revenue April 1, 1952 to March 31, 1953	$ 47,602.10	$ 12,821.07	$ 60,423.17
Amounts written off as loss by Orders in Council—April 1, 1952 to March 31, 1953	293,870.39	628,392.28	922,262.67
Total Credits	$ 341,472.49	$ 641,213.35	$ 982,685.84
Amount outstanding March 31, 1953	$ 918,050.23	$1,677,520.72	$2,595,570.95

Alberta

	Principal	Interest	Total
Debits			
Amount outstanding March 31, 1952	$ 500,282.20	$ 923,122.86	$1,423,405.06
Accrued interest April 1, 1952 to March 31, 1953		15,170.94	15,170.94
Total Debits	$ 500,282.20	$ 938,293.80	$1,438,576.00
Credits			
Net Revenue April 1, 1952 to March 31, 1953	$ 7,355.50	$ 2,625.65	$ 9,981.15
Amount written off as a loss by Orders in Council	252,830.49	506,532.43	759,362.92
Total Credits	$ 260,185.99	$ 509,158.08	$ 769,344.07
Amount outstanding March 31, 1953	$ 240,096.21	$ 429,135.72	$ 669,231.93

Mineral Rights in the Provinces

Two public competitions for the purchase of leases of the petroleum and natural gas rights underlying 72 parcels of land were held during the year. Leases were granted for the rights in 48 parcels. The mineral rights in 230 properties covering some 36,800 acres were released to the administration of this Department by the Department of Veterans Affairs.

Revenue

The revenue derived during the fiscal year was made up as follows: bonuses for the purchase of petroleum and natural gas leases, $130,663.13; rental, $20,982.37; lease fees, $140; assignment fees $21; extension fees, $14,460.23; and sales of mineral rights in Ontario, $391.

Hay and Grazing in Saskatchewan

Seven permits were issued on the animal quarantine reserves in southern Saskatchewan. The area covered by these permits comprised 8,960 acres. Stock returns submitted by the permittees indicated that 201 head of cattle and 74 horses were maintained on these lands. One permit to cut hay was issued.

Northern Administration Division

Development Services

The Development Services Section is responsible for the construction and maintenance of roads and departmental buildings; settlement improvements, including electrical services; transportation; sanitation, including water and sewer services; and general engineering programs in the Northwest Territories.

Buildings

The Department of Public Works completed two small residences for this Department at Fort Smith in order to provide more living accommodation for members of the staff. They also converted the attic of the Administration Building into additional office space. The grounds surrounding departmental residences at Fort Smith were landscaped and fences erected. Prefabricated, one-storey residences were erected for employees of the Department at Hay River, Fort Simpson, and Aklavik by contract under the supervision of the Engineering and Architectural Division of the Department. The site for the erection of the proposed eight classroom school and teachers' apartment building at Aklavik was selected and prepared for commencement of construction early in 1953. Additional temporary accommodation for pupils was provided in Aklavik and additions were made to several of the Department's buildings at Yellowknife, some of which were redecorated. A number of small cabins were erected in Wood Buffalo Park by resident wardens.

A large walk-in freezer for use in the buffalo meat marketing project was constructed at Fort Smith. Plans were made for others to be built in 1953.

The Central Mortgage and Housing Corporation, on behalf of the Department, completed the construction of four duplex houses and one single residence at Upper Whitehorse, Yukon. These are two-storey houses with basements and are connected to an extension of the Department of National Defence water and sewer mains. Funds were provided and arrangements made by this Department for the extension. Three duplex buildings acquired from the Department of National Defence at Lower Whitehorse were improved. Basements were placed under two of them.

In addition to the above construction work, improvements were made to a number of departmental buildings in the Northwest Territories and Yukon Territory, and maintenance work was carried out.

Municipal Facilities

The operation of the Yellowknife water and sewer systems was continued under the supervision of a departmental engineer until March 31, 1953 when the systems were transferred to the Local Administrative District for future operation. The operating costs have been materially reduced and the revenues increased to an extent that will permit a successful operation of the system by the Local Trustee Board. The system was greatly improved by the installation of a new alarm system, control panel, automatic pressure regulating valve, and other devices which permitted a reduction in the number of personnel required to operate the system. During the year, 43 additional services were connected making a total of 184 services for the system.

The all-year water supply system at Fort Smith operated successfully during the year. The Northwest Territories Government will assume responsibility for the operation of this system after March 31, 1953.

At Aklavik, the summer water supply and filtering system was operated during the summer months by a local committee of customers and the system was self-supporting.

Investigations were made by departmental engineers of the possibility of obtaining a satisfactory supply of water for domestic purposes from wells at Hay River Settlement but results from the exploratory wells did not indicate the availability of the required quantities of water for a settlement system. Investigations will be continued in 1953.

Roads

The Government of the Northwest Territories assumed responsibility for the construction and maintenance of local roads within settlements of other than Local Administrative Districts of the Mackenzie District. Roads within a Local Administrative District are the responsibility of the District with some degree of financial assistance from the Territorial Government for construction. The Department continued to be responsible for the construction and maintenance of trunk roads, and shared responsibility for the construction and operation of resources roads with the mining companies which benefited from such roads. The Mackenzie Highway from the Alberta-Northwest Territories border to Hay River Settlement was maintained by contract under the supervision of the Engineering and Water Resources Branch of the Department. The Consolidated Mining and Smelting Company of Canada Limited constructed a truck road from the Mackenzie Highway near Alexandra Falls easterly to its mining property near Pine Point. The Department contributed $25,000, an estimated 50 per cent of the cost of the road. A grant of $2,015 was made to the Local Administrative District of Yellowknife towards the construction of roads within the settlement. A similar grant of $16,246 was given to the Hay River Local Administrative District for new roads within its boundaries. The Department provided $7,000 for the upkeep of the trunk road from Negus Mine to Akaitcho Mine in the Yellowknife District and a similar amount for the upkeep of the road from Yellowknife to the airport. This included the maintenance of that part of each road lying within the surveyed part of Yellowknife Settlement. After March 31, the Local Trustee Board will be responsible for the upkeep of these sections of the two trunk roads. An experimental oiling of the surface of a portion of the airport road within the settlement produced satisfactory results.

The Department continued to maintain the trunk roads from Fort Simpson to the airport, a distance of 12 miles, and from Fort Providence to the airport, a distance of three miles. The road from the Alberta provincial boundary through Fort Smith to Bell Rock, a distance of nine miles, was also maintained by the Department. In Wood Buffalo Park, roads were maintained and a 40-mile dirt truck road from Pine Lake to Peace Point was completed.

In Yukon Territory, the 246-mile, all-weather Whitehorse-Mayo Highway and the 26-mile section of the Atlin Road lying within Yukon Territory were maintained by the Territorial Government with funds provided by the Department. Construction was commenced on the 110-mile, all-weather road from Dawson to its junction with the Whitehorse-Mayo Highway near Stewart River Crossing. This is a three-year project with an estimated total cost of $500,000 of which amount $300,000 will be provided by the Department. A new 10-mile resources road was commenced between Keno and the top of Keno Hill in accordance with terms of an agreement between Canada and the United Keno Hill Mines Limited. The latter will undertake the construction work. It is estimated that this road, which will be finished in 1953, will cost $200,000. The Department will contribute 50 per cent of this amount.

The maintenance of the Alaska Highway, of access roads to airports along the Northwest Staging Route, and of flight strips bordering the highway was under the jurisdiction of the Northwest Highway System (Canadian Army). This highway was open for traffic throughout the year. Maintenance work included relocation, grading, gravelling, bridge repair and replacement, and culvert and sign installation. Similar repair and maintenance work was carried out on the Haines Road, which was open for traffic during the summer months only.

Facilities for tourist accommodation and for the maintenance and repair of motor vehicles along the Alaska Highway continued to increase in number. The Department, with the help of the Northwest Highway System, maintained 10 public overnight camp-grounds and five lunch stops.

Regular bus services were operated on the highway between Dawson Creek, British Columbia, and Dry Creek, Yukon Territory, by the British Yukon Navigation Company, and from Dry Creek to Fairbanks and Anchorage, Alaska, by Alaska Coachways.

Conservation and Management Services

The Conservation and Management Services Section is responsible for conservation of the forest and timber resources of the Northwest Territories and Yukon Territory (with the exception of the sale of timber berths); the maintenance of an adequate fire protection and supervision service for the forests; the management of Wood Buffalo Park and the Buffalo Project; and the management of the Reindeer Project. On behalf of the Territorial Government, the Section maintains fire protection services in the settlements in the Northwest Territories and enforces and administers the Game Ordinance.

Warden Service in the Northwest Territories

The Warden Service is responsible for the detailed field administration of game and forest resources, including forest fire protection and all other conservation and management activities. While the Warden Service is maintained by the Federal Government, it administers wildlife resources for the Territorial Government.

These activities are carried out in the Mackenzie District by two Chief Wardens, located at Fort Smith and Fort Simpson, and eleven Wardens, located at Aklavik, Fort McPherson, Fort Good Hope, Fort Norman, Fort Simpson, Fort Liard, Hay River, Fort Resolution, Rae, Yellowknife, and Fort Smith. A patrolman is employed at each warden establishment to assist the warden. Coverage was improved during the year by the appointment of a Chief Warden at Fort Simpson, who supervises the Central Warden District, and the establishment of a station for a patrolman at Fort Providence.

The fire suppression and patrolling equipment at the warden stations, and the warden's residences were improved. New residences for wardens were erected at Aklavik, Fort Simpson, and Hay River.

Each warden station in the Mackenzie District and Wood Buffalo Park is supplied with fire-fighting equipment. The warden is in charge of forest fire suppression in his district and is responsible for recruiting fire-fighting crews and directing their activities. The Royal Canadian Mounted Police take this responsibility in centres where no warden is stationed.

Boats, aircraft, and motor vehicles are used to transport fire suppression crews, equipment, and provisions to and from fires. In view of the distances and difficulties involved, the fire suppression force has to be disposed to the best advantage, leaving some distant or isolated fires unfought. Availability of charter aircraft at Fort Smith and Yellowknife permits the protection of the area within a 125-mile radius of these points. Small standby suppression crews were stationed at Fort Smith and Yellowknife during the 1952 fire season. These crews form a well trained and experienced nucleus around which to build a large suppression force from casual labour when required. In addition to basic fire suppression techniques, training consists of learning to operate and maintain fire pumps and other equipment. When not engaged in fire suppression or the repair and maintenance of fire equipment, these men are available for other work as required.

A well-equipped repair depot for fire pumps, outboard motors, and other fire-fighting equipment is maintained at Fort Smith. All repairs on equipment used locally are made there, in addition to major repairs on all equipment used throughout the District.

Fire prevention publicity plays an important part in protection work each year. Warnings are printed in newspapers and broadcast by radio. Forest fire prevention signs are placed in prominent locations along roads and trails, at the beginning and end of portages, and in camping grounds along the common routes of travel. Lectures on fire prevention and suppression are delivered in schools and at trappers' meetings. Instruction on fire prevention is part of the natural science and social studies in the schools. Literature on these subjects is given wide circulation.

The Wildlife Division provides technical and scientific advice and maintains a staff of five field mammalogists in the Northwest Territories. Mammalogists are located at Fort Smith, Yellowknife, Fort Simpson, Aklavik, and Coral Harbor.

Forest Protection and Management—Northwest Territories

Forty-one forest fires were reported in the Northwest Territories and Wood Buffalo National Park in 1952, as compared to 88 fires in 1951. The total area burned, however, was higher because of one very large fire

which covered 113,024 acres, about 84 per cent of the total acreage burned. Comparable figures for the 1951 and 1952 seasons are shown in the following table.

	1952	1951
Number of fires	41	88
Area burned (acres)	137,124	88,614
Amount of merchantable timber burned:		
Saw timber (ft.b.m.)	35,000	2,001,000
Other material (cords)	1,410	2,732

Although only a small part of the area burned supported stands of merchantable timber, a large part was probably potentially productive. The destruction of trapping areas and caribou range are additional incalculable losses caused by forest fires.

One of the earliest spring break-ups on record, followed by hot, dry, windy weather in May and June created the worst fire hazard conditions of the season. In these two months, over half of all fires for the year were reported and the greater part of the area destroyed was burned. Only seven fires were reported in July, usually the worst month of the season, and this was due to well-distributed precipitation and a scarcity of thunderstorms. There were only five fires definitely attributable to lightning in 1952 as compared to 49 in 1951. Camp-fires were the principal known cause of 1952 fires; 18 fires resulted from camp-fires in 1952, 23 in 1951. Nine convictions were obtained for violations of the Forest Protection Ordinance, all of which were concerned with failure to properly control and extinguish camp-fires. Hot, dry weather in the first two weeks of August resulted in nine fires but cold, damp weather prevailed thereafter and the last fire of the season was reported on August 11.

Forest Protection and Management—Yukon Territory

The forest resources of Yukon Territory are a Federal responsibility. The Commissioner of Yukon Territory is responsible for field administration assisted by a forest engineer at Whitehorse. The forest engineer directs the activities of four wardens, located at Whitehorse, Teslin, Kluane Lake, and Mayo. During the fire hazard season, seasonal wardens are employed at Watson Lake, Whitehorse, Mayo, and Carmacks. Seasonal labourers, including qualified fire bosses, are also employed.

A decrease of 45 forest fires in 1952 will be observed from the following comparative table for the two years. A correspondingly large decrease in both the area burned, and losses in merchantable timber will be noted.

	1952	1951
Number of fires reported	23	68
Total area burned (acres)	31,631	463,345
Total merchantable timber burned (acres)	4,639	225,723

Above average precipitation and relative humidity in all but the Kluane District, combined with generally lower than average temperatures throughout the southern Yukon, made this a very light fire season.

The forest engineer and warden staff maintained constant fire patrols during the fire hazard season and organized fire suppression activities. In view of the large area and the almost complete inaccessibility of some portions of it, fire suppression activities were undertaken mainly in accessible timber areas within reach of the settlements and land and water travel routes. Out of 23 fires reported, 15 were fought; the remainder were inaccessible.

The increasing popularity of camp-grounds and lunch stops established at regular intervals along the Alaska Highway in Yukon Territory has largely eliminated the fire hazard created by tourists' camp-fires. Hundreds of travellers make use of the facilities provided at the 10 camp-grounds and six lunch stops and show a real appreciation for this service. The camp-grounds and lunch stops are maintained by the Warden Service.

Standard metal Prevent Forest Fires signs have been posted and maintained at regular intervals along the travelled roads in southern Yukon. Small fire signs have been posted on trails, streams and lakes frequented by campers, fishermen, and trappers. Pamphlets stressing the value of forest cover and the need for its protection have been widely distributed, particularly through the schools.

Signs were posted at telephone and telegraph stations along the Alaska Highway requesting the public to report fires to these stations. As a result, all fires observed from the highway were reported while still comparatively small. In several instances, very creditable efforts were made by local residents to prevent fires from spreading pending the arrival of fire fighting equipment and men.

Valuable assistance in reporting the location, size, and progress of fires was given by local flying services, commercial airlines, the Royal Canadian Air Force, and the Department of Transport airport tower personnel.

Wood Buffalo National Park

Wood Buffalo National Park has an area of 17,300 square miles, of which 13,675 square miles are in the northern part of Alberta and 3,625 miles in the Northwest Territories.

The field administration of the park is the responsibility of the District Administrator at Fort Smith. He is assisted by a Chief Park Warden and receives technical advice from the Superintendents of Forestry and Game. Technical advice on wildlife management is furnished by the resident mammalogist of the Wildlife Division.

Detailed supervision and administration is carried out by the Chief Park Warden, two wardens, and six patrolmen. Additional labourers are employed during the summer period to assist the permanent staff in forest fire suppression and the maintenance of roads, buildings, and equipment. A temporary staff is also employed during the buffalo slaughter.

During the year, wardens and patrolmen covered approximately 38,000 miles on patrols by boat, dog team, automobile, bombardier, and on foot. Two new warehouses, to house equipment and supplies, and an overnight patrol cabin, were built. Maintenance work was done on buildings and equipment.

During the spring of 1953, a wolf depopulation program was carried on as part of a co-ordinated program of rabies control undertaken by the Federal and Territorial Governments and the Provincial Governments of Saskatchewan and Alberta.

Amendments to the Wood Buffalo Park Game Regulations were made in order to bring them into line with sound wildlife management practices. A limited open season for marten and an open season for beaver south of the Peace River were introduced. Two hundred and sixty-five general hunting licences were issued in the licence year ended June 30, 1952. Registration of trapping areas was well established during the previous year and little change has taken place. Two hundred and five trappers in Wood Buffalo Park are on registered trapping areas; 38 of these are Metis and 167 are Indians.

Fur and game taken within the park in most cases showed a decrease in the licence year ended June 30, 1952, as compared to the previous licence year. There was a marked decrease in the numbers taken of caribou, muskrat, mink, and ermine. The reduced fur production and declining fur prices had an adverse effect on the economy of trappers in the park. Field studies are being carried out with a view to improving the muskrat and beaver habitat.

Further progress was made in developing facilities to exploit the meat producing potential of the buffalo herds, totalling about 12,000 in number, in Wood Buffalo Park and in setting up slaughtering and handling equipment which permits the production of Canada Approved Meat. The abattoir facilities were moved to the Hay Camp and a number of improvements were made. Two miles of guide fence and a holding corral enclosing 155 acres were constructed to facilitate herding, selection, and killing.

In the autumn of 1952, the Department invited tenders for the retail marketing of reindeer and buffalo meat products in the Mackenzie District. The Hudson's Bay Company was the successful tenderer and is now handling the retail marketing of government certified buffalo meat in the Mackenzie District and at Fort Fitzgerald in northern Alberta.

Considerable progress was made in setting up cold storage equipment to facilitate the distribution and marketing of buffalo meat. A walk-in freezer, located at Fort Smith, is being used as a central storage depot for frozen meat. During the summer of 1953, a number of war surplus freezers owned by the Department will be reconditioned and placed at the larger settlements, where they will be used for the storage of buffalo meat intended for retail sale.

In December 1952, 245 buffalo were slaughtered and 108,600 pounds of meat, packaged in 70- to 90-pound containers for convenience in storage and distribution, was produced. Sales included 42,000 pounds to the Roman Catholic Mission at Fort Smith; 41,600 pounds to the Indian Affairs Branch of the Department of Citizenship and Immigration for native welfare and relief purposes; and 25,000 pounds to the distributor for retail sale at points in the Mackenzie District.

Buffalo meat has been on sale at Fort Smith during the past winter and will be available at Yellowknife, Fort Norman, Fort Simpson, Fort Providence, and Fort Resolution, N.W.T., and at Fort Fitzgerald, Alberta, beginning late in the summer of 1953. By the efficient production and marketing of buffalo meat, it is hoped to make full use of this resource and to place the project on a sound business basis. At the same time a good fresh frozen meat product will be made available to residents at a reasonable price.

The gross revenue from the sale of buffalo meat products for the year 1952-53 was $25,580.

Reindeer Herding

The Reindeer Grazing Reserve comprises 17,900 square miles near the mouth of the Mackenzie River. The reindeer project is under the supervision of the Superintendent of the Reindeer Range Station. He is assisted by a park warden, three labourers, two Lapp herders, and fourteen Eskimo herders and apprentices.

There is a main Government herd on the Reserve and three smaller herds, each of which is managed by two Eskimos. At the annual round-ups in the summer of 1952 the total number of reindeer reported was 7,614. These were distributed as follows: main herd, 3,663; native herd No. 1, 600; native herd No. 2, 2,196; and native herd No. 3, 1,155.

The reduction in the total number of reindeer from the 8,412 head reported in 1951 resulted mainly from the slaughter of surplus stock for meat and skins and some straying.

About 440 reindeer from the main herd and 325 from native herds were slaughtered for meat during the fiscal year. Five hundred and fifty-seven carcasses were sold under a meat marketing plan sponsored by the Department. The meat was sold at wholesale prices to the Hudson's Bay Company for retail distribution and sale, and to the Missions at Aklavik for use in schools and hospitals. Five hundred and eighty-eight skins were shipped to the Eastern Arctic for the use of Eskimos.

The Department assists in the establishment of reindeer herds under the management of trained Eskimos who are encouraged to become self-supporting as soon as possible. Eskimo apprentices with the main herd and the native units are taught to protect the reindeer and to handle them effectively on the range and in the corrals.

The gross revenue from the sale of reindeer meat for the fiscal year 1952-53 was $15,190.48.

Education and Welfare Services

The Education and Welfare Services Section is responsible for the education of all children in the Northwest Territories except Indian children. Indian education is the responsibility of the Indian Affairs Branch of the Department of Citizenship and Immigration. Eskimo education is the responsibility of the Northern Administration and Lands Branch of the Department of Resources and Development. Education of other children is the responsibility of the Territorial Government, which responsibility is discharged by the branch.

In the field of Eskimo education, which includes the Arctic Coast, the Arctic Islands, and northern Quebec, the Department operated day schools at Aklavik, Tuktoyaktuk, Coppermine, Coral Harbour, Cape Dorset, Chesterfield Inlet, Fort Chimo, and Port Harrison. Arrangements were continued for the maintenance and education of Eskimo children in the Church of England and Roman Catholic residential schools at Aklavik, Northwest Territories and Fort George, Quebec. In the principal settlements of Eskimo territory, a number of day schools were operated by missions of the Church of England and the Roman Catholic Church. Day schools were also conducted by the Canadian Interior Mission and the Northern Canada Evangelical Mission at Maguse River and Padlei respectively. The mission day schools which were in operation during the year received assistance from the Federal Government in the form of grants and school supplies.

During the course of the year, the Department provided a teacher for Eskimo patients in the Parc Savard Hospital at Quebec City and arrangements were made to provide similar service for Eskimo patients in the Charles Camsell Indian Hospital at Edmonton, Alta. Mrs. J. A. Houston of the Canadian Handicrafts Guild conducted an experiment in education at Eskimo camps in the Cape Dorset area on Baffin Island using portable tent accommodation.

Northern Administration has now under preparation a special curriculum for use in Eskimo schools. Inspection services for those schools in the Eastern and Central Arctic and northern Quebec are being provided from Ottawa.

The Indian Affairs Branch of the Department of Citizenship and Immigration operated schools for Indian children at Fort Rae, Fort McPherson, Fort Norman, Rocher River, Arctic Red River, Fort Good Hope, and Fort Franklin. These schools were also attended by non-Indian children resident in those settlements.

Arctic Services

The Arctic Services Section is responsible for administration of the Canadian Arctic and Eskimo affairs, except education and health; making patrols and inspections of centres of population in the Arctic; studying the Eskimo economy, the health and rehabilitation problems of the natives, and administering family allowances on behalf of the Department of National Health and Welfare; administering old age assistance, old age security, and blind pensions to Eskimos; and maintaining the vital statistics records for the Northwest Territories and similar records of all Eskimos in Canada.

Economic Conditions

Although, generally, the peak of the white fox cycle in the Eastern Arctic was passed in 1950-51 and in the Western Arctic in 1951-52, and the catch throughout the Arctic during the past winter has been comparatively light, there have been marked recoveries in a few areas in northern Quebec and the District of Keewatin. The catch on Banks Island also compared favourably with that of the previous year. Despite a better market demand for white fox, prices have not risen to any appreciable extent. Most Eskimo communities have, therefore, continued to be faced with greatly reduced income from their products and greatly increased cost of everything they have to buy.

Continued consideration was given to diversifying and improving the Eskimo economy. There was a marked increase in the volume and value of handicrafts produced and the markets for these have been widened not only in Canada but in the United States and other parts of the world. Increased attention has been given to improving the quality of the products and there is a ready market for the fine pieces now being produced.

The boat-building project, which had to be postponed last year because of a measles epidemic, is proceeding with the co-operation of the Hudson's Bay Company. It is regarded as but one of a number of similar projects that may be undertaken to assist the natives in renewing necessary equipment and in becoming more self-sufficient again. It is intended to extend this project to other areas and to gradually develop small industries wherever there is a need.

Prospecting and mining activities and building and other construction projects are providing new opportunities for Eskimo employment at a number of places in the Arctic. While progress in dealing with the problems of a primitive people must necessarily be slow, the steps now being taken to educate and give technical training to Eskimos will, in time, enable them to take an increasing part in Arctic work and development.

In most areas, the Eskimos are still able to obtain a substantial part of their food and other requirements by hunting and fishing. Hunting conditions were good throughout most of the Arctic, and there is little to indicate that there is any diminution of the sea mammal and fish resources in any of the areas. It would seem that fluctuations in numbers from year to year are due chiefly to changes in migratory routes or to local changes in weather and ice conditions. There are indications that the restrictions on the hunting of caribou in Baffin Island have allowed the herds there to increase materially.

Continued progress has been made in redistributing natives from game depleted areas to areas where hunting conditions are more favourable. Many of the islands off the east coast of Hudson Bay which were uninhabited in recent years are now satisfactorily supporting small populations. It is intended to start similar small settlements on an experimental basis on some of the more northern islands. The settlement which was reopened on Banks Island two years ago has met with marked success and is now established on a self-supporting basis.

Committee on Eskimo Affairs

A general meeting of representatives of organizations and departments interested in Eskimo and Arctic affairs was held in Ottawa on May 19 and 20, 1952, at which related problems were freely discussed. As a result of this conference, a committee was formed to continue the study of the problems involved, and a sub-committee was appointed to deal exclusively with education. Members of the main committee are: Major General H. A. Young, Deputy Minister of Resources and Development and Commissioner of the Northwest Territories, Chairman; Most Reverend J. Trocellier, Vicar Apostolic of Mackenzie; Right Reverend Donald B. Marsh, Bishop of the Arctic; R. H. Chesshire, Hudson's Bay Company; Commissioner L. H. Nicholson, Royal Canadian Mounted Police; Dr. P. E. Moore, Department of National Health and Welfare; and J. G. Wright, Northern Administration Division, Department of Resources and Development.

This committee held its first meeting on October 16, 1952, when the first report of the sub-committee on education was dealt with and consideration given to the problems involved in the medical care and rehabilitation of Eskimo patients.

Eastern Arctic Patrol

The annual patrol was carried out in 1952 by the C.G.S. *C. D. Howe* which sailed from Montreal on June 27. Unfortunately, the vessel suffered ice damage off Cape Harrison, Labrador, and had to return to Quebec and Montreal for repairs. Strikes in the shipyards caused delays and it was July 26 before the ship was ready to sail again. All scheduled calls, excepting that at Fort Chimo, were made, however, and the patrol returned to Quebec on September 22. The places visited were: Koartak,

Sugluk, Ivugivik, Cape Smith, Port Harrison, Churchill, Coral Harbour, Cape Dorset, Lake Harbour, Pond Inlet, Craig Harbour, Resolute Bay, Arctic Bay, River Clyde, Padloping, Pangnirtung, and Frobisher Bay.

The personnel on board, besides the usual ship's company, included representatives from the Departments of Resources and Development, National Health and Welfare, Mines and Technical Surveys, Post Office, and the Royal Canadian Mounted Police. Inquiry was made into the economic and welfare conditions amongst the natives at all places visited. X-ray examinations were again made of the Eskimos at each port and necessary medical and dental care was given. Extensive soundings were taken throughout the voyage and at the approaches to and in the harbours visited. All post offices and other installations were inspected and serviced.

Other Patrols and Inspections

Representatives of Northern Administration paid visits by air to most centres not touched by the Eastern Arctic Patrol, and the Royal Canadian Mounted Police Detachments carried out local patrols in their respective areas. In March, 1952, an officer of Arctic Services and a doctor from Indian Health Services visited all places in the Western Arctic as far east as Spence Bay and as far west as Holman Island. Another officer from Arctic Services, accompanied by the doctor from Chesterfield Inlet, visited all posts on the west side of Hudson Bay by plane in August, 1952.

The Mackenzie Delta area, extending from Herschel Island to Paulatuk, was covered by the Sub-District Administrator at Aklavik and by Royal Canadian Mounted Police patrols. A check on conditions on Banks Island was also made by the Sub-District Administrator, the Royal Canadian Mounted Police, and a mammalogist from Aklavik.

An officer of Arctic Services acted as Senior Canadian Observer on the Joint Canadian-U.S. Arctic Weather Station Sea Supply Mission in 1952. A Canadian party consisting of representatives from various departments carried out a number of investigations with this task force during the summer.

Transportation

The C.G.S. *N.B. McLean* again patrolled Hudson Strait and Hudson Bay during the 1952 navigation season and gave necessary assistance to shipping using the Hudson Bay route. This vessel also delivered supplies to radio stations in these areas and made frequent calls on the northern Quebec coast. The medical officer was able to render valuable aid during an epidemic of measles at some of these places.

The Hudson's Bay Company's M.V. *Rupertsland* carried supplies to the Company's trading posts and to various government establishments, working out of Montreal and Churchill.

Supplies to the Western Arctic were carried on the Mackenzie River to Tuktoyaktuk and delivered from there by the Hudson's Bay Company's motor vessels *Fort Hearne, Nigalik,* and *Nechilik.*

Ice conditions in these areas were normal and no serious difficulties were encountered during the season.

Health and Welfare

A serious epidemic of measles occurred in the Ungava Bay-Hudson Strait area during the early part of 1952. Starting at Fort Chimo, it spread to Frobisher Bay, along the south coast of Baffin Island, and, finally, to the south coast of Hudson Strait. Casualties were comparatively heavy in the Fort Chimo area, where the people were just recovering from a bout of influenza; elsewhere casualties were light. Apart from this epidemic, the health of the people during the past year has been generally good. Treatment of tuberculosis continues to be the main concern of the Department of National Health and Welfare and a concerted effort is being made throughout the Arctic to detect cases and to bring them in for early treatment.

Other Government Departments

Public Health and Medical Care

Medical officers of the Department of National Health and Welfare undertake the medical care of Indians and Eskimos in the Northwest Territories. These medical officers also represent the Department of Resources and Development and the Territorial Government in matters concerning the health of non-Indian and non-Eskimo residents and in the administration of public health and other relevant ordinances. The Director of Indian Health Services was appointed Chief Health Officer of the Northwest Territories in 1952.

Law and Order

The Royal Canadian Mounted Police maintained law and order throughout the Northwest Territories. Police officers carried out many administrative functions at points where no departmental representatives were stationed, and assisted the wardens in forest and wildlife conservation work.

Commercial Fisheries

Great Slave Lake is the hub of the commercial fisheries of the Northwest Territories. During the 1952 summer and winter seasons the fishing effort increased. Two new freight boats improved fish transportation facilities. Two ice-houses and packing plants were completed, one at Ptarmigan Point on the north shore near Yellowknife and the other at Dawson Landing on the southeast shore. The total production for 1952-53 exceeded seven million pounds, made up as follows: whitefish, 4,006,977 pounds; lake trout, 2,999,711 pounds; inconnu, 141,907 pounds; and other species, 75,515 pounds.

The radio telephones and echo-sounding equipment on the two patrol boats of the Department of Fisheries of Canada gave valuable service to the fishing industry as well as to the Department itself. In addition to locating and giving assistance to overdue freighters and fishing boats, the Department discovered new fishing grounds which might not have been found by the fishermen's efforts alone.

During the 1952 summer season, 183 licensed fishermen operated from 56 boats. Fishing companies and fishing boats employed more natives than during any previous year. A total of 27 commercial fishing permits were issued to Indians, and the number of native shore workers increased more than 50 per cent.

Although strong and persistent winds prevented fishermen from taking the full summer quota of 4,700,000 pounds, the season was satisfactory with a total catch amounting to 4,114,456 pounds. Trout accounted for 60·4 per cent of the production. This species brought the fishermen 12 cents per pound compared with 8 cents for whitefish which made up the major part of the remainder of the catch.

The 1952-53 winter season was the mildest experienced in the Northwest Territories, making the production of frozen fish and their transportation more difficult. Nevertheless, 376 licensed commercial fishermen had, on the average, a successful winter season in terms of poundage landed, although lower prices reduced the net earnings.

The total landings for the 1952-53 winter season exceeded three million pounds. Whitefish was the dominant species with 2,383,396 pounds. Lake trout accounted for 528,526 pounds; inconnu, 140,772 pounds, and other species, 56,960 pounds.

Several small lakes in the vicinity of Great Slave were opened to commercial fishing during the winter season. From these, 13 licensed fishermen produced 57,476 pounds of pickerel, whitefish, and lake trout. This was made up as follows: Kakisa Lake, 35,904 pounds of yellow pike; MacDonald Lake, 17,427 pounds of whitefish and lake trout, and Frank Lake, 4,145 pounds of whitefish.

The production for the summer and winter seasons was marketed in the fresh and frozen state on the Chicago, Detroit, and New York markets. The total marketed value exceeded $1,750,000. Although there were many individuals who had a higher gross income, the average earnings of each summer fisherman was $1,840, compared to an average of $770 for the winter fisherman.

The summer of 1952 saw the greatest development of fishing for the beluga, or white whale, in the waters of Hudson Bay and the Churchill River. A total of 699 animals were taken by Eskimo, Indian, and white hunters. In 1952, a temporary increase to 700 was permitted as the original quota of 600 was filled well before the end of the season from the plentiful supply in the area. Twenty-eight hunters, mostly local residents, were paid $1 per foot length of beluga captured. Beluga average about 10 feet in length and 900 pounds in weight. One Eskimo hunter captured 283 animals, well over one-third of the entire production.

Scientific Surveys

In co-operation with the Royal Canadian Air Force, the National Research Council, and the Meteorological Service of the Department of Transport, the Department of Mines and Technical Surveys extended the shoran network of trilateration from the Fort Reliance-Coppermine area to the western limits of Hudson Strait, a distance of 1,000 miles.

Four parties, engaged in photo-topographical reconnaissance work in the Yukon, completed ground control for 26,000 square miles of difficult territory between Mayo, Dawson, and Old Crow. In the Northwest Territories, one party extended topographical controls over 1,100 square miles of islands in Great Slave Lake. Another continued the triangulation control net along the Mackenzie River to a point on the East Channel somewhat north of Aklavik. During the winter, two parties carried out control traverse on the winter road between Fort Nelson and Fort Simpson, and in the area between the Mackenzie River and Trout Lake. This traverse was extended westward to Kotcho Lake, and southward into British Columbia to tie in with the British Columbia-Alberta boundary.

The boundary between Alberta and the Northwest Territories was run 104 miles west from the Mackenzie Highway to the northwest corner of Alberta. During the winter of 1952-53, a field party extended this boundary westward 52 miles from Little Buffalo River to Buffalo River. This was the only portion west of Fort Smith still to be run.

Work done for the boundary commissions of British Columbia, the Yukon and the Northwest Territories included the establishment of two astronomical control points between the upper crossing of Petitot River and the northeast corner of British Columbia; the running of a trial line between the Liard River and the upper crossing of the Petitot; and the running of a final line from the lower to the upper crossing.

One hundred and eight mineral claims were surveyed in the Mayo mining district in the Yukon, and arrangements were made for surveys of a number of other claims in the Yukon and in the Northwest Territories, the latter chiefly in the Yellowknife area. A restoration and re-subdivision survey was carried out at Dawson, in the course of which sites were surveyed for a hospital, an old people's home, residential quarters for the Department of National Defence, and a canteen for the Canadian Legion. At Whitehorse, three parcels of land were surveyed for the Department of National Defence, and one lot for Cassiar Asbestos Corporation Limited.

At the Pine Point townsite area on the south side of Great Slave Lake, where lead-zinc explorations are being made, the area was surveyed, a contoured plan was prepared, and townsite lots were monumented.

The right of way of the Mackenzie Highway was surveyed from the Alberta boundary north to Hay River and to the fishing station to the west. The survey of 42 miles of the Snare River power-line right of way was completed.

The Geological Survey of Canada placed seven parties in the Yukon and seven in the Northwest Territories in 1952. Principal activity in the Yukon centred around the nickel-cobalt-platinum-copper deposits in the Kluane Lake area, and the hematite float found northeast of Mayo. A map showing the geology of the Northwest Shakwak Valley, including Kluane Lake, was published in 1952.

Geological mapping in Yukon Territory was carried out in the Glenlyon area, which appears to be favourable for base metal and other minerals; in the Mayo Lake and Keno Hill areas, where silver, lead, and zinc are being mined; in the Kluane Lake area, which has produced much placer gold, contains deposits of coal and gypsum, and where ore containing nickel, cobalt, and platinum has recently been found; in the Teslin area, where placer gold has been found and evidences of mineralization have been noted; and in the Wolf Lake area, where a number of mineral occurrences, including lead, silver, and tungsten have been found. A reconnaissance survey of an area in the Selwyn Mountains, where indications of a varied mineralization have been noted, was carried out.

In the Northwest Territories, the outstanding work of the year by the Geological Survey was that known as "Operation Keewatin". This involved the use of helicopters, supplemented by conventional aircraft, to conduct a geological survey of an area lying west of Hudson Bay and north of the 60th parallel. The project proved entirely successful, and the five geologists engaged on it were able, in the one season, to map an area of 57,000 square miles—something that would have taken an ordinary ground party 25 years to accomplish.

Investigation of the pegmatite dykes in the area east of Yellowknife and north of Great Slave Lake was completed in 1952. These dykes are potential sources of certain rare metals such as columbium, tantalum, and lithium.

Field work by the Geological Survey on the Yellowknife gold ores was completed, but much laboratory work remains to be done before any final conclusions as to their origin or mode of formation can be reached. Studies of methods of treating these complex ores, carried out in the Department's Mines Branch laboratories at Ottawa, have already resulted in greatly improved recovery of gold in many cases.

The process developed by the Department for extracting uranium from mill tailings by use of an acid leach was put into full-scale operation at the Eldorado Mining and Refining Limited plant at Port Radium in May. The Department has also developed a simplified process for extracting uranium from its ores by alkaline leaching. A large-scale pilot plant to test the process will be operated for Eldorado early in 1953, and it is expected that data for design of a full-scale plant will be available later in that year.

Geological mapping was carried out in the O'Connor Lake area, where lead-zinc deposits have been noted. The present program of geological exploration of the coast of southern Baffin Island was completed. The region appears to offer promise in the field of industrial minerals such as feldspar, mica, graphite, marble, and soapstone, but little in the way of metals. Geological reconnaissance work was carried out on Ellef Ringnes Island, Cornwallis Island, and Little Cornwallis Island.

The Dominion Observatories conducted magnetic surveys in the region of James Bay and southern Hudson Bay, and along the Mackenzie Highway to Hay River. Observations for magnetic declination or variation of the compass, of inclination or dip, and of magnetic force, were made at 12 stations in the Yukon and two in the Northwest Territories. The magnetic observatories at Baker Lake, District of Keewatin, and Resolute Bay, District of Franklin, were operated throughout the year. These observatories supply data for fundamental studies of the origin and character of the earth's magnetic field. At the Resolute Bay seismograph station, most northerly in the world, an additional seismograph was installed.

The Geographical Branch carried out surveys of physical geography in the Wager Bay, Resolute Bay, and Alert areas. These surveys comprised the delimitation of major land forms; studies of the extent of post-glacial emergence of land and of the history of glaciation in the area; and studies of the relation of plant cover and the distribution of wildlife to the physical environment. Photo-interpretation keys, which will serve in the interpretation of other aerial photographs taken in the vicinity, were prepared in each case.

Report of the Commissioner of the Northwest Territories

Meetings of Council

During the year the Council of the Northwest Territories met twice, the first session being held at Ottawa from July 2nd to 10th, inclusive, and the second session being held at Fort Smith, N.W.T., from December 8th to 10th, inclusive.

Legislation

At the First Session of the Council Ordinances were passed respecting business licences, coroners, dental profession, territorial elections, tax rental agreement between the Government of Canada and the Government of the Northwest Territories, fur export, game, liquor, municipalities, marriage, married women, medical profession, mine operations safety, motor vehicles, gasoline and fuel oil tax, reindeer, schools and supplementary appropriations.

At this session the School Ordinance was completely consolidated and revised, care being taken to preserve all the constitutional rights granted to minorities under Section 12 (2) of the Northwest Territories Act. This Ordinance had not been consolidated or substantially revised for more than 50 years.

At the Second Session of the Council Ordinances were passed respecting changes of names of persons, insane persons, jurors and juries, gasoline and fuel oil tax, registration of vital statistics, assignment of book debts, game interpretation of Ordinances, administration of civil justice, marriage, medical profession, motion pictures, workmen's compensation, business licences, liquor, and for the appropriation of moneys for expenditures for the public services. In addition, an Ordinance was passed to repeal certain obsolete Ordinances of the Northwest Territories.

At this session the basis of the Fuel Tax Ordinance was enlarged and the rate of tax reduced. Under the previous Ordinance fuel oil tax was payable only on gasoline or diesel oil used in a motor vehicle on a highway and the rate of tax was 6¢ per gallon. Under the new Ordinance, tax is payable on gasoline and diesel oil used in all motor vehicles, marine engines and aircraft, and the rate was reduced to 1¢ per gallon. It is anticipated that this change will make for easier administration and will not substantially affect revenue.

References for Advice

The Commissioner took the opportunity afforded by the Council meetings to seek the advice of members of Council on a number of matters concerning the administration of the Territories.

Civil Service

During the year the Department continued to provide a Civil Service for the Territories. The Territorial Government, however, reimbursed the Federal Government for the salary of the teacher who taught children other than Indians or Eskimos and for the salaries of the Superintendent of the Yellowknife Mine Rescue Station and the Edmonton Workmen's Compensation Officer. The administrative work involved was carried on at Ottawa by the Northern Administration Division of the Northern Administration and Lands Branch of the Department, and in the Territories by officers of the Mackenzie District Administrator at Fort Smith and Sub-District Administrators at Yellowknife, Hay River, and Aklavik.

Law and Order

The Royal Canadian Mounted Police maintained law and order throughout the Northwest Territories. Police officers carried out many administrative functions at points where no departmental representatives were stationed, and assisted the wardens in forest and wildlife conservation work.

Tax Rental Agreement

An important step in the fiscal relations between the Federal and Territorial Governments was taken during the year with the execution of a 5-year Tax Rental Agreement on the same basis as similar agreements between the Federal Government and the various Provincial Governments.

Workmen's Compensation

During the year the system of workmen's compensation in force in the Territories was substantially revised to increase the protection afforded to employees in the industries covered by the Workmen's Compensation Ordinance and to provide adequate measures for the fair adjudication of awards for injuries resulting in death or permanent disability, whether total or partial, and temporary disability where there was a dispute between an employer and employee. However, the basic principle of the system previously in force was retained, namely, the provision of protection through compulsory insurance. Arrangements having been made with the Alberta Workmen's Compensation Board to act as referee, a Workmen's Compensation Office was opened in Edmonton on January 1, 1953, to administer the new system.

Liquor

The Saskatchewan Liquor Control Board continued to act as agent for the Northwest Territories Administration in the operation of liquor stores and the supply of stock.

During the fiscal year 3,812 Class "A" annual liquor permits and 90 Class "E" banquet permits were issued in the Northwest Territories. Six Class "B" permits covering sacramental wine and 51 Class "C" importation permits were issued at Ottawa.

Sales at the Territorial liquor stores were about 11,521 gallons of spirits, 2,064 gallons of wine, 11,450 gallons of ale and stout and 47,236 gallons of beer. In addition, 17,640 gallons of beer were sold to the hotel licensee at Hay River. Importation permits covered 116 gallons of spirits, 206 gallons of wine and 5,503 gallons of beer.

Health

Twelve hospitals were operated in the Northwest Territories during 1952, nine by missions of the Roman Catholic Church and the Church of England in Canada, one by a mining company at Port Radium, one by an oil company at Norman Wells, and one by the Canadian Red Cross Society at Yellowknife. A tuberculosis X-ray survey was carried out in conjunction with the Indian Affairs Branch of the Department of Citizenship and Immigration. The accounts of indigent patients other than Indian and Eskimo were paid by the Administration of the Northwest Territories. In addition, a daily grant of $2.50 per patient was given to the Yellowknife Red Cross Hospital.

The aged and infirm were cared for in industrial homes operated in conjunction with mission hospitals. Hospital care for residents of the Northwest Territories in provincial institutions was provided when required, including sanatorium treatment for tuberculosis patients. Insane persons were sent to the Provincial Mental Hospital at Ponoka, Alberta, under an agreement with the Government of that Province.

Medical officers of the Department of National Health and Welfare undertook the medical care of Indians and Eskimos in the Northwest Territories. These medical officers also represented the Department of Resources and Development in matters concerning the health of non-Indian and non-Eskimo residents and in the administration of public health and other relevant ordinances. The Director of Indian Health Services was appointed Chief Health Officer of the Northwest Territories.

Game Ordinance and Fur Export Ordinance

The warden service was maintained in the Northwest Territories, wardens being located in the principal settlements who are responsible for the administration of the wildlife resources. The Canadian Wildlife Service provided technical and scientific advice and maintained a staff of five field mammalogists resident at Fort Smith, Yellowknife, Fort Simpson, Aklavik, and Coral Harbour.

Minor amendments were made to the Fur Export Ordinance, including a reduction in the royalty on muskrat from ten cents to five cents per pelt.

Fur Production

Returns from licences issued for the year in question do not become available until the autumn following the year of issue. Consequently, the following data are for the licence year ended June 30, 1952:

	1950-51	1951-52
Pelts	643,579	696,245
Value	$2,038,339	$1,448,173

The increased take of pelts was evident in most of the important fur-bearing species, such as white fox, muskrat, squirrel, beaver, marten, and mink. Ermine and lynx showed a decrease.

Despite increased fur production, the value of the catch decreased materially resulting in less income for the trappers. The prices received for pelts of all species showed a decline in 1951-52 over the average prices received during 1950-51. The average value of beaver dropped $9.25, ermine 36 cents, white fox $3.68, lynx $5.48, marten $9.27, mink $8.92, muskrat 90 cents, and squirrel 11 cents.

Education

The Department, on behalf of the Territorial Government, operated day schools at Fort Smith, Hay River, Fort Resolution and Fort Simpson. A number of welfare teachers were on the staffs of these schools, who, in addition to their normal teaching duties gave leadership to local activities designed to effect improvements in community life.

The curriculum prescribed by the Alberta Department of Education was followed in the schools of the Mackenzie District. In order to maintain instructional standards, the schools of the District were inspected periodically by a Superintendent of Schools who had his headquarters at Fort Smith.

Yellowknife School District No. 1 operated a modern, eleven-classroom elementary and high school. On March 31, 1952, there were 233 pupils enrolled in Grades I to XII. During 1952 a grant of $25,487.50 was made to the Yellowknife School District No. 1.

A school at Port Radium was operated jointly by the Eldorado Mining and Refining (1944) Limited and Northern Administration. At the Discovery Yellowknife Mine, 60 miles from the town of Yellowknife, a school was operated by the mine management assisted by a grant from the Administration. Day schools were also operated by the Roman Catholic Mission at Fort Smith and Fort Simpson, and residential schools were operated by the Church of England at Aklavik, and by the Roman Catholic Church at Fort Resolution, Fort Providence, and Aklavik.

During the year the Territorial Government instituted three bursaries of $1,200 each for vocational training of worthy students residing in the Territories. Equipment and supplies were provided for a number of schools to assist them in initiating manual training instruction. Shipments of film were made on a monthly basis to settlements in the Mackenzie District, and school broadcast programs, prepared by the Canadian Broadcasting Corporation for audiences of school children across Canada were re-broadcast over the Mackenzie District radio stations. The Territorial Government supplies free correspondence courses to adults who request them.

Finances

Territorial Revenues for the fiscal year totalled $660,026.43. The principal revenues were:

Liquor profits	$288,191.29
Fuel Tax	18,177.57
Fur Export Tax	64,244.16
Payments from Government of Canada under Tax Rental Agreement	239,276.24
Business Licences	11,967.54
Motor Vehicle and Drivers Licences	12,040.28

Territorial Expenditures for the fiscal year totalled $433,762.71. The principal expenditures were:

Education	$208,550.99
Health	119,808.21
Welfare	19,282.33
Roads	23,932.92
Aid to Municipalities	37,243.45

Unpaid accounts at the end of the fiscal year amounted to $49,103.58. At the end of the fiscal year the Territorial Government owned buildings having a book value of $64,700, held debentures purchased from the Yellowknife Public School District worth $83,250, and had cash in Territorial Revenue Account and Accounts Receivable totalling $836,680.63. Of this last amount, $400,000 was being held as a reserve for the operation of the territorial liquor business, $40,000 as a reserve for hospital construction, and $50,000 as a reserve for the construction and maintenance of trunk roads. In addition to these reserves, the Territorial Government had at the end of the fiscal year a cash surplus free from commitment amounting to $297,577.05.

Report of the Commissioner of Yukon Territory

Election of Councillors

The terms of the sitting members of the Yukon Council expired in 1952 and the Commissioner proclaimed the nomination and polling dates for the new Council. Voting took place on the 10th of August, 1952. Under the provisions of an amendment to the Yukon Act, the elective membership of the Council was increased to five members.

Meetings of the Council

The Council of the Yukon Territory held two regular meetings during the year, the first commencing on the 23rd of April and concluding on the 10th of May; the second commencing on the 15th of October and concluding on the 23rd of October.

Legislation

At the First Session of the Council, Ordinances were passed respecting the imposition and collection of a tax on persons; steam boilers and pressure vessels; tuberculosis control; wolf bounty; justices of the peace; the empowering of the Commissioner of the Yukon Territory to grant a franchise to Mayo Utilities, Limited, for the operation of a telephone system in the Mayo area; amusement tax; the regulation of speed and operation of motor vehicles on highways; legal profession; annuity plan; the amendment of the Ordinance regarding the Council of Yukon Territory; old age assistance and allowances to blind persons; game; Government control and sale of alcoholic liquors; practice of dentistry; the authorization and implementation of an agreement between the Government of Canada and the Government of the Yukon Territory; the repeal of the Ordinance to provide for the imposition and collection of a toll on the Whitehorse-Mayo Highway; the consolidation and revision of the Ordinances of the Yukon Territory; Municipal Ordinance; business, callings, trades and occupations and the issue of licences therefor; indigent persons' estates lien; registration of voters for Territorial Elections; the granting to the Commissioner certain sums of money to defray expenses of the public service of the Territory.

At this session, the three Ordinances respecting the sale of liquor in Government stores, the sale of beer in retail outlets, and the sale of liquor in cocktail lounges were consolidated into one Liquor Control Ordinance which included a provision for a tax on liquor sold through the Government liquor stores, the revenues to be allocated to the cost of education and public welfare in municipalities and settlements in the Territory.

At the Second Session of the Council, Ordinances were passed respecting the Yukon Territorial Public Service; Government liquor; Interpretation Ordinance; hospitals; protection of children; fur export tax; dental profession, the implementation of an agreement between the Government of Canada and the Government of the Yukon Territory, No. 2; steam boilers; old age assistance and blind persons' allowance; Yukon corporation income tax; compensation to be paid as a result of injuries or death caused to workmen in the course of their employment; the Municipal Ordinance; the granting of permission to the Yukon Brewery (Holding) Company, Limited, to manufacture, compound and make intoxicating liquors; the granting to the Commissioner of certain sums of money to defray the expenses of the public service of the Territory.

At this session the amendment to the Hospitals Ordinance provided for additional grants by the Territorial Government to assist hospitals to meet increasing costs of operation. The Workmen's Compensation Ordinance was repealed and a completely revised Ordinance passed, which provided for the appointment of a referee and the payment of benefits on the same scale as the Province of Alberta.

Civil Service

The Civil Service of the Territory was enlarged by the appointment of an Assessor and Collector of Taxes, and by the separation of the duties of Treasurer and Territorial Secretary. Arrangements for superannuation of Territorial civil servants were completed.

Law and Order

The Royal Canadian Mounted Police maintained law and order throughout the Yukon Territory. Officers of this organization continued to enforce Territorial Ordinances and to act as game guardians.

Tax Rental Agreement

The Tax Rental Agreement which was entered into between the Government of the Yukon Territory and the Government of Canada in 1948 expired on December 31, 1952. During the year, meetings of a financial committee were held in Ottawa, and were attended by the Commissioner and by Gordon Lee on behalf of the Council of the Yukon Territory. As a result of the meeting, a new tax rental agreement was entered into between the two governments for a period of five years. The Territorial Government will benefit by increased tax rental payments from the Federal Government.

Workmen's Compensation

The system of workmen's compensation in force in the Territory was substantially revised and brought in line with that of the Northwest Territories to increase the protection afforded to employees in the industries covered by the Workmen's Compensation Ordinance and to provide adequate measures for the fair adjudication of awards for injuries resulting in death or permanent disability, whether total or partial, and temporary disability where there was a dispute between an employer and employee. However, the basic principle of the system previously in force was retained, namely, the provision of protection through compulsory insurance. Arrangements were made with the Alberta Workmen's Compensation Board to act as referee, and a Workmen's Compensation Office was opened in Edmonton jointly with the Northwest Territories on January 1, 1953, to administer the new system.

Liquor

Government liquor stores were operated at Dawson, Mayo, and Whitehorse. Licences for the sale of beer were issued to establishments as follows: Dawson, 5; Keno, 1; Mayo, 1; Whitehorse, 3; Carcross, 1; and 12 to tourist stopping places along the Alaska Highway. Licences to sell liquor in a cocktail lounge were issued to one establishment in Dawson and to four in Whitehorse.

Sales at Government liquor stores amounted to $1,807,455. The net cost of operation was $652,771.10. Other revenues to the liquor account amounted to $202.07 and the net profit from the Liquor Control Fund for the fiscal year was $652,973.73. There was a decrease in sales at Dawson and a substantial increase in sales at Mayo and Whitehorse.

Health

Three hospitals were operated in the Yukon Territory, two being owned by the Government of the Yukon Territory and operated by local boards of governors, at Whitehorse and Mayo. The Sisters of St. Anne own and operate the hospital at Dawson. Provision is made in the Hospital Ordinance for grants to hospitals to assist in their operation.

A Chief Medical Officer for the Yukon Territory was appointed during the year. He carried out an inspection trip throughout the Territory and submitted his report to the Commissioner. A public health nurse was appointed and new additional services instituted included well-baby clinics, inoculation of school children, and advice to mothers.

The Yukon Government received assistance in its public health program by way of grants from the Department of National Health and Welfare of the Federal Government.

Game

The Territorial Government maintains a Game Department under the supervision of a Superintendent. Game laws are enforced by the Royal Canadian Mounted Police and co-operation is received from the warden service maintained by the Department of Resources and Development for forest protection.

The registration of trap-lines was continued and it is expected it will be completed in 1953. The following hunting licences were issued during the year:

62	Alien big game licences at $150	$9,300
4	Non-resident Canadian big game licences at $100	400
4	Non-resident Canadian spring bear licences at $25	100
4	Non-resident alien spring bear licences at $50	200
22	Non-resident bird licences at $10	220
2,823	Resident hunting licences at $2	5,646
10	Grade "A" guides' licences at $40	400
8	Grade "B" guides' licences at $20	160
28	Grade "C" guides' licences at $10	280

The payment of bounties on predators was discontinued by the repeal of the Bounty Ordinance.

Department of Public Works

The Territorial Government is responsible, under arrangements with the Federal Government, for the maintenance of the Whitehorse-Mayo Highway and the Atlin Road. Maintenance was carried out in a satisfactory manner during the year. In addition, approximately 400 miles

of other roads in the Territory were maintained. Construction on the road to Dawson was carried out, some seven miles being completed and the bridge over the McQuesten River constructed.

Airports at Dawson and Mayo were maintained by arrangements with the Department of Transport of the Federal Government.

Department of Education

Twelve schools were operated in Yukon Territory by the Territorial Government with 36 full-time and 2 part-time teachers employed. Average daily attendance was 776 and the maximum pupils enrolled was 1,007.

Revenues

The total revenues of the Territory for the fiscal year 1952-53 were $1,540,979.05, and the total expenditures were $1,284,243.07. The net surplus was, therefore, $256,735.98.

Forestry Branch

During the year under review a gathering of outstanding importance took place in Canada, which bids fair to have a far-reaching effect on the status of forestry in Canada. The Sixth British Commonwealth Forestry Conference was convened in Ottawa on August 11, 1952, and lasted until September 13, when the official Conference was adjourned. This was the second occasion on which this Conference was held in Canada, the other being in 1923.

The Honourable Robert H. Winters, Minister of Resources and Development, Canada, was elected President; Lord Robinson, of the United Kingdom, Vice-President, and D. A. Macdonald, Director of the Federal Forestry Branch, Canada, Chairman. Representatives from nineteen Commonwealth countries, including Canada, attended, with official observers from the United States, and the Food and Agriculture Organization of United Nations. Statements covering forestry developments since the Fifth (1947) Conference in Great Britain, were presented from 42 countries, and 76 technical forestry papers submitted.

The Conference divided its time equally between field investigation of forest conditions in the Provinces of Quebec and Ontario and formal sessions at Ottawa. Canadian representatives included those from Federal and provincial governments, forest industries, the forestry faculties of four universities, and two forestry associations.

Following adjournment of the official Conference on September 13, the majority of the overseas delegates observed forestry conditions in Manitoba, Saskatchewan, Alberta, and British Columbia, before dispersing to their homes, during the first week of October.

Forestry problems throughout the Commonwealth were discussed, with special emphasis on the forestry situation in Canada. Its chief phases were considered and the results of deliberations summed up in a series of Resolutions embodying the recommendations of foresters of wide experience. These will be invaluable as a guide in formulating forest policy and procedure in the protection and development of Canada's forests on a sound, scientific basis. Complete reports of the Conference proceedings were printed and available for distribution by March 31, 1953.

During the year, the Interdepartmental Committee on the Relation of Income Tax Deductions to Forest Management made its report. This Committee, set up under the direction of the Minister of Resources and Development, was composed of representatives of the Departments of Finance, of National Revenue (Taxation Division), and of Resources and Development. The Committee, with the Director of this Branch as Chairman, was particularly interested in corporation income tax deductions and their relation to sustained-yield forest operations. Informal representations by the forest industries and discussions by the Committee members resulted in two main changes with respect to income tax deductions, both of which will encourage sustained-yield management. Access roads and trails are now subject to a generous rate of depreciation, and forest management expenses designed to promote sustained yield are, generally speaking, recognized as current costs for income tax purposes.

Forest Economics

Production in the forest industries in 1952 declined slightly from the all-time record attained the previous year. This was brought about by generally lower price levels for forest products, and reduced overseas markets, as indicated by a 2 per cent reduction in the country's favourable balance of trade in wood, wood products, and paper. Lumber output was estimated at 6,800 million board feet, 2½ per cent lower than in 1951; and wood pulp at 3 per cent below the 1951 figure. Newsprint, however, with approximately 5,733,000 tons, showed an increase of 3 per cent over the previous high in 1951 of 5,561,115 tons.

In spite of the somewhat less favourable production picture, forest products represented almost one-third of the total value of Canadian exports to all countries, and about one-half the value of exports to the United States. They produced a favourable balance of trade of over $1,230 million and helped provide an export surplus of $325 million in the balance of trade for all commodities (excluding gold).

The average depletion rate of merchantable timber for the ten-year period 1941-50 is compared with the (estimated) rate for the year 1951, in the following table:

ANNUAL FOREST DEPLETION

	Millions of Cubic Feet of Usable Wood		*Percentage of Depletion*	
	Annual Average		*Annual Average*	
	1941-50	*1951**	*1941-50*	*1951**
Products Utilized				
Logs and Bolts	1,109	1,336	31·0	31·3
Pulpwood	893	1,281	25·0	30·1
Fuelwood	740	818	20·7	19·2
Other Products	101	107	2·8	2·5
Total	2,843	3,542	79·5	83·1
Wastage				
By Forest Fires	231	219	6·5	5·1
By Insects and Disease	500	500	14·0	11·8
Total	731	719	20·5	16·9
Grand Total	3,574	4,261	100·0	100·0

*Preliminary data.

Nearly all the wood utilized, and part of that destroyed by fire, insects and disease, grew in the occupied portions of the nation's forests. To replace the 1951 depletion in these occupied forests—privately owned, licensed and leased Crown lands, and Crown lands operated under timber sale or permit—would require an average growth rate of 30 cubic feet per acre—representing a high utilization rate. Depletion, of course, is not uniform: in many localities, the rate of depletion greatly exceeds this average figure; in others, it has been considerably less. Large areas of productive forest still remain unoccupied: while large proportions of the unoccupied areas are less accessible and of relatively low productivity, some may prove to be as productive as those now being logged. There is urgent need for more intensive management of Canada's occupied productive forests, if depletion and growth are to balance.

The following summary of principal statistics shows the relative value of the different forest industries in 1950.

Forest Industries

Summary of Principal Statistics, 1950

—	Employees	Salaries and Wages	Net Value of Products	Gross Value of Products
	No.	$	$	$
Woods Operations	142,678[1]	374,000,000	490,660,171	625,734,603
Pulp and Paper Industry	52,343	169,246,531	511,142,983	954,137,651
Lumber Industry	58,722	111,492,079	239,225,162	496,948,398
Wood-using Industries	67,447	134,833,046	224,628,348	488,911,095
Paper-using Industries[2]	25,176	55,950,907	126,968,369	297,006,474
Total	346,366	845,522,563	1,592,625,033	

[1] Man-year basis (300 working days).
[2] Excluding printing trades.

Net value of production may be used to measure the contribution of the forest industries to national output of wealth. In 1950, as indicated above, the forest industries, with a net value of production of $1,593 million accounted for 15 per cent of the total net value of production of all Canadian industries, as against 11 per cent in 1938, with a net value of $310 million.

The Forest Economics Section maintains and interprets forestry statistics and advises on many matters pertaining to the economics of forestry in Canada. The Section was represented on a continuing interdepartmental committee concerned with the United Nations Food and Agriculture Organization. The Section was prominently identified with the work of the interdepartmental committee on the relation of corporation income tax to sustained-yield forest management; this committee completed its work during the year.

Advice was also given the Department of National Defence on forest valuation procedures which could be applied in expropriation proceedings in connection with the New Brunswick army training area.

Condensation and interpretation of provincial forest legislation were continued: amendments were made to the condensation for Ontario, and the compilation for Quebec was completed.

Statistical statements presented by thirty-four countries to the Sixth British Commonwealth Forestry Conference were analysed, and a digest prepared. The Section was also represented at this Conference.

Quarterly and annual statistical reports on production and external trade in forest products were prepared for the Economic Commission for Europe and for F.A.O.

The National Forest Inventory was revised on the basis of reports received from provincial governments. The *Statistical Record of the Forests and Forest Industries of Canada* was revised with a new format, and re-issued under the title, *Forest and Forest Products Statistics, Canada.*

A study of Canada's forest economy from 1938 to 1949 was undertaken, and a bulletin entitled *Wood is Wealth,* published. This supersedes the earlier *Economic Aspects of the Forests and Forest Industries of Canada.*

An investigation in the economics of sustained-yield forest management with the co-operation of a pulp and paper company in Quebec Province was completed, and a detailed report prepared. Consultation with the co-operating company is continuing, to prepare the findings for publication.

Forest Research Division

The Forest Research Division includes three Sections at the Head Office in Ottawa, which are concerned respectively with Silviculture and Management, Forest Inventories Research, and Forest Fire Protection Research. District offices are maintained at Calgary, Alta.; Winnipeg, Man.; Valcartier, Que.; Fredericton, N.B.; and St. John's, Nfld. A special unit at Ottawa deals with forest research work in Ontario. Five forest experiment stations are operated in different parts of the country.

The great demand for lumber, pulp and paper, and other products derived from wood imposes a heavy drain upon the occupied forest lands of Canada. The importance of the forests in the Canadian economy and the need for maintaining them in a productive condition have become generally recognized. Increasing efforts are being made by governments and by forest industries to manage forests on a sustained-yield basis, and the need for information obtainable only through research is increasing rapidly. It is essential, therefore, that research efforts be directed towards solution of the most urgent problems, and that staff and funds available be used in the most effective manner possible.

During the year under review, the Forest Research Division has been guided by a new statement of forest research policy. This defines the different kinds of research activities which must be carried out, and the principal tasks facing forest research workers in this country.

At the District Offices, studies have been made, and consultations with provincial and industrial foresters held, to determine the particular problems of greatest importance in each district. In so far as possible, plans have been developed for allocation of personnel to the study of the problems selected and specific objectives established for the next five years. Past work has been reviewed in this connection.

A Joint Advisory Committee on Silvicultural Research, established by the Department of Lands and Forests of Ontario and the Forestry Branch, facilitates mutual discussion of the research programs of the two organizations. This leads to more efficient utilization of available resources and eliminates duplication of effort.

Representatives of the Division participated in planning a broad-based, co-operative study of means for securing softwood regeneration on mixedwood slopes in western Ontario. Other organizations represented in the scheme are the Research Division of the Department of Lands and Forests, the Research Council of Ontario, the University of Toronto, two of the larger pulp and paper companies, and the Pulp and Paper Research Institute of Canada. The advice and assistance of a wide variety of experts in different fields are thus secured.

Other developments of particular interest during the year included a test, conducted in co-operation with a paper company in eastern Quebec, of a new method for conducting forest inventory surveys; participation by a forestry expert in air photo-interpretation in a coastal survey in eastern Newfoundland organized by the Department of Fisheries; and completion of three-year studies of forest fire danger conditions in the Provinces of Manitoba and Newfoundland.

Silviculture and Management Section

Newfoundland

Silviculture and forest management studies are aimed at solving two broad forestry problems: rational forest management of unlicensed Crown lands near settled communities, and development of practical silvicultural techniques to assure that the limits of the two large pulp and paper companies on the island of Newfoundland are maintained in a productive state. Work on both problems is still preliminary, and confined largely to fact-finding surveys and exploratory experiments. Close co-operation on the various research projects is maintained with the Newfoundland Department of Natural Resources, the Anglo-Newfoundland Development Company, and Bowater's Newfoundland Pulp and Paper Mills, Limited.

In co-operation with the Forest Inventories Section, ground sampling was completed for a forest inventory survey of the Avalon Peninsula—the second phase of a three-part study of the principal forestry problems in this area. The first phase was an estimate of the growth potential; the third and final phase will be primarily an economic study. Estimates of volume and growth will be balanced against the present depletion and probable requirements of the communities in the peninsula.

A study is being made of regeneration failures on both burns and cut-over areas. The study of burned areas, started last year, was continued on the 1949 Cormac burn, northeast of Deer Lake, and the 1947 Cassandra burn, near Badger. Insufficient reproduction on the Cormac burn is attributed to inadequate seed supply for conifers, and to heavy browsing off white birch by moose. On the Cassandra burn, adequate seed supply from the undamaged tops of fire-killed black spruce, and good seed-bed conditions, gave excellent spruce and white birch regeneration.

A number of unburned cut-over areas were examined in the vicinity of Robert's Arm, Rattling Brook, and Southwest Gander. Natural regeneration following cutting was variable; failures were common following the cutting of very dense, moss-carpeted stands of black spruce. A cutting system ensuring an adequate seed supply and disturbance or removal of the moss may be successful, and preliminary arrangements for experimental cuttings have been made.

To develop suitable techniques for artificially reforesting barren but potentially productive forest land, 12 plantation plots were established in the Avalon Peninsula, using nine different species and strains of planting stock provided by the Provincial Government. A direct seeding experiment, established for a similar purpose in 1950 in western Newfoundland, was re-examined. It was found that, using black spruce, both spot-seeding and broadcast-seeding on the snow were moderately successful.

Miscellaneous work included cutting on the demonstration woodlot near King's Cove, a brief inspection of birch cut-over lands, and a study of existing pulpwood yield tables to assess their applicability.

Maritime Provinces

New undertakings of particular interest in the year's program were site-region mapping in New Brunswick, the beginning of a broad survey of conditions in the hardwood forests of Nova Scotia, and increased concentration of effort on obtaining material for a monograph on the silviculture of spruce–fir types in the Acadian region.

For the site-region mapping, observations of vegetation, soil, geology, and topography were made at many points, allowing for preliminary delineation of the main site regions. Preliminary work was also done on site classification in the Green River watershed.

Studies to determine the course of development in spruce–fir stands under varying conditions were expanded. Particular attention is being paid to succession after fire and changes in overmature stands. For studies of development following fire, vertical stereo photographs of small growth, taken from a height of 10 feet, were found very useful.

A number of projects concerning the influence of seed-bed factors on the germination and survival of spruce and fir, begun at the Acadia Forest Experiment Station in 1948, were completed and a comprehensive report prepared. Continuing studies concern the influence on spruce and fir seedlings of such factors as shrubs and herbs, moisture regime, microtopography, periodicity of root growth, and seed dissemination.

Work in applied silviculture was conducted at the Acadia Station and Green River in New Brunswick, and at Nuttby in Nova Scotia. The Acadia nursery produced 250,000 seedlings. Experimental nursery work was done in connection with spring and autumn seeding, and the use of herbicides for weeding. Two small plantations were established to test planting methods on wet sites and on brush covered land. All plantations on the Station were examined with a view to publishing a report to assess their development. The only new cutting experiment started was on the Green River Management Area, where 50 acres were cut by a partial cutting method designed for use with a 20-year cutting cycle. This was done on a co-operative basis with the Fraser Companies, Limited, and the New Brunswick Department of Lands and Mines. At Acadia and Nuttby, existing experimental cuttings were remeasured in the spruce–fir and tolerant hardwood types.

A project was begun at the Acadia Station to determine the degree of correlation between tree growth and site, as defined by two different systems of site classification.

In the forest management field, an extensive survey of the birch-maple types was begun in Nova Scotia to provide information on their extent, condition, and economic development, with recommendations for improved management. The survey would also determine the major research problems involved. Work was continued on 11 demonstration woodlots, some of which are maintained in co-operation with the Federal Department of Agriculture. A revised management plan is being prepared for the Sheet Harbour forest in Nova Scotia. Management advice was provided for Fundy National Park, and to two pulp and paper companies co-operating with the Forestry Branch in experimental or demonstration work. Porcupine damage, with study of possible control measures, was surveyed at the Acadia Station, where these animals are seriously disturbing experimental studies in natural stands and plantations.

Permanent improvements at the Acadia Station included erection of a carpenter shop and a storage building for fire protection equipment. Three and three-quarter miles of road right-of-way were cleared, two and three-quarter miles were built, and three miles of existing roads were widened and regraded. Telephone service was improved by installation of a metallic circuit over part of the area. About 300 cords of wood were cut in the course of silvicultural operations and road clearing; most of it is used on the Station for fuel, bridges, culverts, and lumber.

Quebec

Research work emphasis continued to be on the preparation of a site classification for the Boreal Forest Region, and on the establishment of permanent observation areas to provide information on the growth and development of cut-over stands in representative locations throughout the Province.

A site-type classification has been completed for Forest Section B.1, which extends in a broad belt some 200 miles wide along the north shore of the St. Lawrence River, from just north of Quebec City to Labrador. Eighteen site types, identified by indicator plants in the lesser vegetation, have been established to gauge the productivity of the forest for land use, research, silviculture, and forest management. Preparation of normal yield tables for these site types was begun and a report prepared for publication.

Two more observation areas, each about five square miles in extent and sampled by grids of permanent line-plots, were established in cut-over stands in Forest Section B.1. One was located on the Rivière aux Rats, north of Lake St. John, and the other on the Shipshaw River. In addition, a preliminary survey of cut-over tolerant hardwood stands in the Eastern Townships was made to study reproduction and stand development.

The diameter limit cutting experiment, which will eventually embrace an area of five square miles at the Lake Edward Experiment Area, was continued for the third season. Diameter limits were set at 16 inches for spruce and yellow birch, and eight inches for balsam fir. Results appear satisfactory.

In addition to the normal maintenance of a small nursery at the Valcartier Forest Experiment Station, twelve permanent plots were established near Lachute in plantations of red pine, Scots pine, and Douglas fir. Plantations of jack pine, lodgepole pine, and white spruce were set out on old farmland at Valcartier. Two experiments were started—one at Valcartier and one at Proulx—to investigate the effect of soil fertilization on growth of white spruce and red pine.

Permanent improvements at the Valcartier Forest Experiment Station included a new building for tractor and fire equipment. One mile of new road was built and many of the old roads were improved by gravelling. Timber cutting operations under permit, both for experimental work and land clearing for the military camp, provided a total cut of 386,000 cubic feet of sawlogs and fuelwood.

Ontario

The Ontario Research Unit, located at Ottawa, conducts research throughout Ontario in close co-operation with the Provincial Department of Lands and Forests; some work is also done in the western part of Quebec. During the past year, the principal activities included growth and yield studies and several co-operative studies with pulp and paper

companies. The growth and yield studies provided information for two monographs, one on the red and the white pine, the other on tolerant hardwoods. Research at the Petawawa Forest Experiment Station concerned fundamental studies in forest ecology, tree breeding, plantations, and applied silviculture.

Ontario Research Unit

In the Clay Belt Section (Forest Section B.4) extending from Hearst to Senneterre, 220 permanent plots were established for a growth and yield study. Remeasurement 10 years hence will provide information on the development of the major forest conditions in this important pulpwood producing area. As a prerequisite for this study, a system of site classification, to subdivide the area into units of approximately equal productivity, was developed. The system is based on land form, ecoclimate, soil moisture, and permeability. A report is being prepared for publication.

Existing information on the silviculture and ecology of the red and white pine types is being supplemented by additional information on growth, yield, and regeneration in various parts of Ontario. To obtain such information, a small research party investigated conditions in the North Bay, Temagami, Mississaugi, Temiskaming, and Madawaska districts.

In a parallel study of the tolerant hardwood type, existing experiments were remeasured and site typed in the Huntsville-Algonquin Park area of Ontario, and in the Gatineau-Lièvre drainage areas of Quebec. Co-operation was maintained on hardwood studies conducted jointly with other research organizations and industrial companies.

Mensurational studies increased during the year and a statistician was added to the Ottawa staff. At the request of the Ontario Department of Lands and Forests, a new set of form-class volume tables was prepared for the new Ontario log rule. Investigations of various growth and yield techniques were continued.

Miscellaneous co-operative studies included a second thinning in a 40-year-old red pine plantation at Rockland; assistance in site typing and analyzing results from permanent plots established by co-operating companies for a study of growth and yield; and preparation of a preliminary management plan for a demonstration sustained-yield unit near Espanola.

Petawawa Forest Experiment Station

The series of controlled experiments directed toward determination of the light, moisture, temperature, and seed-bed requirements necessary for the germination and growth of coniferous seedlings was expanded. Emphasis is on soil moisture requirements, and a number of experimental techniques have been worked out using Colman units to measure soil moisture and temperature. Also of particular interest is a recording light meter for field use, developed in co-operation with the National Research Council. These fundamental studies are carried on chiefly in the nursery, supplemented by observations and experiments in the forest.

The tree breeding program continued to expand and progress was made in building up a good assortment of selected stock on the Station for future breeding purposes. Through visits of the tree breeder to Western Canada and the Eastern United States, arrangements were made to obtain red pine, red spruce, and white spruce seed for provenance tests and scions for grafting. The latter are being used for inter- and intraspecific hybridization.

Applied research on the Station dealt largely with tests of hormones and chemicals for the eradication of undesirable species, particularly hazel. A survey of plantations was made and plots in them were site typed to provide the basis for a publication on their growth and development.

Operations continued on two demonstration sustained-yield management units, one of 60 acres and the other of 600 acres. The latter area was site typed and planted with 13,000 red pine.

Preparations were made for the Sixth British Commonwealth Forestry Conference whose members visited the Station for several days. In this connection, a bulletin was prepared on the work of the Station, and a new demonstration area was established to illustrate the major physiographic sites on which the experimental work is conducted.

Timber cut from the Petawawa Forest Experiment Station amounted to 535,000 feet board measure of sawlogs, and 1,200 cords of fuelwood and pulpwood; most of this was for the Department of National Defence.

New construction was limited; the nursery was fenced, a concrete soil bin was built, and cold frames were installed near the greenhouse. Under the normal maintenance program, two miles of the Paquette Road were improved as a truck trail for fire protection, main roads were brushed, and several dangerous curves were eliminated.

Manitoba-Saskatchewan

During the field season, six research parties carried out work in the Riding Mountain Research Area, and in northern Saskatchewan. Emphasis continued to be on the growth and reproduction of white spruce.

Spruce–aspen stands in both Manitoba and Saskatchewan were examined to establish the relationship between growth and the moisture regime and permeability of the soil. In the Riding Mountain Area, 4,400 regeneration plots in undisturbed and disturbed stands of spruce–aspen were remeasured to assess factors influencing establishment and mortality of spruce seedlings. White spruce transplants of differing ages of development were planted to compare survival on cut-over areas prepared for planting by various methods. Weekly planting was also done to study the influence of time of planting on survival. An area established in 1920 for the study of two methods of thinning in spruce stands was remeasured. For a study of stand structure and development in relation to site, 245 spruce trees were sectioned for stem analysis. A study of the influence of humus and litter on regeneration of spruce in mixedwood stands was continued; another on removal of competitive underbrush by various herbicides was expanded.

Investigative work on jack pine was done mainly at the Sandilands Forest Reserve. A 60-acre cutting experiment to assess the value of two cutting methods and seed-bed treatment on jack pine regeneration was started. Establishment work was completed for a project to investigate the effect on volume increment of maintaining various levels of stand density throughout a full rotation of jack pine. Eight plots were burned to complete the field work of a study investigating influence of different methods of jack pine slash disposal on fire hazard. In the Riding Mountain Area 800 regeneration plots were remeasured in a cut-over jack pine stand which had been disc-plowed; the logging slash was disposed of by various methods.

Black spruce was also studied on the Sandilands area. Two methods of logging with three replications were carried out on two-and-one-half-acre blocks to compare growth on the residual stands.

At the Spruce Woods Forest Reserve, 64 plantations of Scots pine, jack pine, and lodgepole pine, 25 to 48 years old, were re-assessed as to the suitability of the species planted and the technique employed.

Miscellaneous work included collection of plant specimens for the district herbarium and reconnaissance of an area in northern Saskatchewan suggested by the Provincial Government for reservation as a silvicultural research area.

Permanent improvements on the Riding Mountain Research Area were limited to road and trail construction. A 3,300-foot gravel road was built from Highway No. 10 to the headquarters site; several miles of trails within the area were reopened, and culverts installed.

Alberta

The forest research program is limited mainly to the silviculture and management of white spruce, lodgepole pine, and aspen—the most important tree species in Alberta. The program deals with growth and yield studies, experimental projects to study various types of thinnings, intermediate and harvest cuttings, and investigations to develop methods of regenerating white spruce and lodgepole pine following cutting or fire. It currently includes compilation of existing data for the preparation of a monograph on lodgepole pine.

Preliminary yield tables to predict growth and yield of white spruce in spruce–aspen stands of the Boreal Forest Region, prepared during the previous year, were revised for publication. Further field work was carried out on yields of lodgepole pine in the foothills section of the Boreal Forest Region. Permanent sample plots are being established in representative age classes and forest conditions. Initial analysis indicates that while the dominant height relationship may be used as a preliminary basis for site classification, the influence of overstocking on this relationship must ultimately be taken into account.

An investigation was carried out during the past two seasons on the growth and yield of residual stands of white spruce in logged areas of the Boreal Region. This investigation shows that there is an immediate acceleration in the diameter growth of remaining spruce, but little or no regeneration of spruce following cutting on the areas sampled. Aspen regenerates well on these logged areas and it is evident that the usual system of cutting will result in a very high proportion of it in the new stand.

Permanent sample plots established to test empirical and systematic types of thinning in lodgepole pine were remeasured. Additional field work in maturing lodgepole pine was carried out on a project to study various cutting methods and their effects on the growth of the residual stands and the development of regeneration. The influence of the cutting methods on regeneration, stand development, and logging damage will be studied by permanent sample plots.

Amount of coniferous germination and subsequent survival of seedlings following scarification of the forest floor, and relationship of the time of scarification and density of seed crops to time of logging are being studied. Results indicate that scarification is a practical means of obtaining regeneration.

To obtain further knowledge on the growth period of lodgepole pine, dendrometer studies were initiated in both the Subalpine and Boreal Forest Regions. Rooting habits of lodgepole pine are being studied to determine its site requirements for maximum growth, and its susceptibility to windthrow. An investigation was commenced into the seeding habits of lodgepole pine to answer questions regarding the time, amount, and distribution of seed, as well as the periodicity of seed crop years for this species.

Field plantings of white spruce each week from May to October, to ascertain the feasibility of extending the season for successful transplanting, gave encouraging results.

At the Kananaskis Forest Experiment Station, timber cut in connection with research projects, to study the effect of partial cutting to various densities in mature and overmature stands, amounted to 1,218,000 feet board measure of spruce and pine.

Forest Inventories Section

The technique of forest inventory surveys is being modified in order to make greater use of air photography, and research is conducted to determine timber quantities by means of values ascertainable from air photographs. Departmental requirements for forest inventories have focused attention on urgent research problems, and have provided opportunities for demonstrating new methods. Results already obtained have an important application in the forest industry for the efficient investigation and wise management of the forests.

During the year, inventory surveys were conducted and compilations completed for portions of the Yukon and Northwest Territories. Compilations based on the interpretation of air photographs, in relation to field data secured in the summer of 1951, indicated that a total of 206,000,000 feet board measure of spruce saw-timber exists on areas adjacent to that part of the Mackenzie River which lies between Providence and Norman Wells. The areas of merchantable timber were determined from some twenty-five forest maps prepared in final form following the field work.

Provisional forest maps were prepared covering 2,800 square miles which, together with previously prepared maps of 1,000 square miles, were used by a field party which operated in the central part of Yukon Territory. The Northern Administration and Lands Branch of the Department supplied assistants and equipment for this party, while the Forestry Branch provided two foresters from its Operations Division and technical advice from this Section. The maps were revised by the aid of field data and estimates were compiled indicating that, on the 3,800 square miles covered, there are 5,500,000 cords of standing timber of merchantable size of all species, which includes 387,000,000 feet board measure of spruce saw-timber. Provisional forest maps were prepared covering 1,730 square miles in the southern part of Yukon Territory, where a field party will operate during the summer of 1953. Also, 3,220 square miles in the vicinity of the McQuesten River, Yukon Territory, were covered by provisional forest maps.

In continuation of work previously undertaken, provisional forest maps covering 2,570 square miles of the Avalon Peninsula, Province of Newfoundland, were prepared and supplied to a field party engaged in a forest inventory survey of the 3,720 square miles of the peninsula. This party was employed and supervised by the District Forest Officer, St. John's, Nfld.

Forest maps were prepared covering the 1,496 square miles of Prince Albert National Park, some 550 square miles in the Eastern Rockies Forest Conservation Area, and 384 square miles in the Primrose Lake Air Weapons Range, Saskatchewan. A mosaic of the Acadia Forest Experiment Station was prepared from air photographs taken at a scale of approximately 1:9,060.

Preparation of forest inventories in Yukon Territory and Newfoundland has provided valuable tests of the forest inventories technique employed by the Forestry Branch. In this technique, field sampling is directly related to a preliminary classification of the forest stands from air photographs, and is guided by appropriate statistical principles. It depends upon recognition of differences as to height, density, and forest type, as determined by the photo interpreter, and on correct distribution of sampling on the ground. Field data secured provide a valuable check on the accuracy of forest classification as determined from the photographs.

Stand volume tables were compiled for various cover types, showing the volumes per acre in relation to height and crown closure, and the ratio of crown closure to basal area per acre. These facilitate the preparation of timber estimates from air photographs. Field parties, operating mainly within the drainage areas of the Lièvre and Sault au Cochon Rivers in Quebec, obtained additional data during the year. Related work was done on the preparation of diagrams showing the composition of stands by height classes. Some twenty dot-reading planimeters or "Moosehorns" were supplied to the District Offices and to other sections of the Forest Research Division for use in the measurement of crown closure.

A member of the Section took part in the interpretation of air photographs for the General Economic Study of Newfoundland Outports conducted by the Federal Department of Fisheries. He accompanied a party which travelled by sea along the coast of Newfoundland, his work being directed particularly towards estimation of wood and water supplies and investigation of possible road locations in the vicinity of selected coves and harbours.

During the year, the Forest Inventories Section advised the Operations Division regarding technical problems involved in administration of the Canada Forestry Act.

Instruction in the use of air photographs for forestry purposes was provided a number of foresters from provincial forest services and the forest industry—two of whom studied for extended periods in the offices of the Section.

A member of the Section resigned in order to accept a position in the Faculty of Forestry of the University of New Brunswick.

Fire Protection Section

Forest Fire Losses

Excluding Yukon and the Northwest Territories, for which long-term records are not available, there were some 5,100 forest fires in Canada during 1952. This number is about the same as the average for the preceding 10 years. The total area burned during 1952 was slightly less than one million acres, or just over 60 per cent of the average for the previous decade.

As in 1951, almost all provinces experienced a better than average fire season; in Ontario the burned area was only seven per cent of that Province's 10-year average. Similarly, the acreages burned during 1952 in Nova Scotia, New Brunswick, and Saskatchewan showed striking decreases.

Although the total area burned was well below the average, the estimated values destroyed were only a little less than the average for the previous 10-year period. No one province suffered exceptionally large fire damage; but four provinces recorded losses which were in excess of the 10-year average by amounts ranging from 12 to 20 per cent.

The total area receiving some form of organized protection was reported as being approximately 1,195,000 square miles, an increase of 27,000 square miles over the area protected the previous year. Further details regarding the forest fire situation in Canada are contained in the annual booklet, *Forest Fire Losses in Canada,* obtainable without charge from the Forestry Branch, Department of Resources and Development, Ottawa.

Forest Fire Research

Newfoundland

This was the third year that field studies in forest fire research were conducted in Newfoundland. As in the two preceding years, fire weather conditions for the project were better than average, enabling the four-man party to obtain sufficient data to complete the field program.

The year's program included detailed studies of forest fuel quantities and distribution.

Petawawa

Fire danger measurement research was continued at the Petawawa Forest Experiment Station and the following investigations were undertaken: to determine the inflammable characteristics of vegetation eradicators and soil sterilants; the comparative efficacy of six popular brands of wetting agents; the applicability of eductors for filling tankers; the performance characteristics of a new type, high-pressure power pump; the abrasion resistance of various makes of forestry hose; and the performance and handling characteristics of a new type of back-pack hand pump.

The second of a proposed series of motion picture training films was produced at this Station by the National Film Board. This 20-minute film, *Fighting Forest Fires with Power Pumps,* is based on an original script prepared by the Branch.

Whiteshell

The fire danger research program in the Whiteshell Forest Reserve, Manitoba, was concluded this year. Sufficient field data are now available to determine what modifications of the present mid-west fire danger tables are necessary to give optimum results in the Precambrian region. In co-operation with the Manitoba Forest Service, investigations were conducted on the effects of various methods of slash disposal on the resultant hazard index in the Sandilands Forest Reserve.

Kananaskis

Investigations continued at the Kananaskis Forest Experiment Station to determine the effect of prolonged drought conditions on the moisture content of heavy fuel. Weather patterns peculiar to mountainous and hilly

regions were further intensively studied to improve the validity of fire danger ratings in such areas. It was shown that significant variations in climate occurred between adjacent mountain valleys.

General

Analysis of field observations in Newfoundland and Manitoba enabled necessary modifications in the fire danger tables for those regions to be determined. Progress was made in simplifying the present system of computing fire danger ratings. A provisional hazard table for caribou moss *(Cladonia rangiferina)* was developed.

A survey of the principal causes of forestry hose failure was commenced at the request of the Associate Committee on Forest Fire Research of the National Research Council. Preliminary analysis was made of the information to date. The study will be continued.

Development of a technique for fuel type classification has been started. The work done on it by Branch and other organizations has been summarized to indicate the basic features such a system must incorporate.

Basic data have been obtained for a compendium of information concerning the salient features of "slip-on" and "drop-on" tanks used in transporting water for fire suppression.

Forestry Operations Division

The Forestry Operations Division was established in 1950, primarily for the purpose of administering co-operative agreements between the Federal and the Provincial Governments, under authority of the Canada Forestry Act. The Provincial Agreements Section is responsible for the performance of these duties. The Division also includes a National Parks and Northern Administration Section, and an Education Section. The former assists and advises the National Parks Branch and the Northern Administration and Lands Branch on forestry matters, while the latter carries out forestry educational activities and assists in processing and distributing Forestry Branch publications and photographs. The Division also provides certain editorial services within the Branch. The duties of the former Indian Reserves Section, which conducted forest surveys on Indian reserves during the past few years, have now been taken over by the Indian Affairs Branch of the Department of Citizenship and Immigration.

Liaison was maintained with the Dominion Fire Commissioner regarding the federal aspects of forest fire protection in relation to civil defence. For this purpose, a comprehensive summary of existing forest fire legislation in all provinces and federally-administered lands throughout Canada was made in co-operation with the Fire Protection Section of the Forest Research Division.

Eight of the ten provinces have now executed agreements with the Federal Government under the Canada Forestry Act. Payments by the Government of Canada to these provinces for forest inventory and reforestation operations carried out by them under the agreements in the fiscal year 1952-53 amounted to a little over one million dollars—an increase of about 25 per cent over those of the previous year.

Provincial Agreements Section

During the fiscal year 1951-52, agreements providing federal financial support for provincial forest inventory and reforestation programs were signed between the Federal Government and the Governments of British Columbia, Alberta, Saskatchewan, Manitoba, Ontario, and New Brunswick. A similar agreement was entered into on June 12, 1952, with the Government of Nova Scotia.

As a result of experience gained during the first year of the agreements, an amendment was signed with the seven provinces participating. This was designed to simplify auditing and accounting procedures, particularly with respect to reforestation. Under it, federal payments for reforestation are now made to the provinces at the flat rates of $10 per thousand trees planted and $1 per acre seeded. These payments are conditional upon the share of the reforestation program paid for by the province being maintained at or above the average level of the past three years. Federal payments with respect to new forest nurseries continue to be on a basis of one-fifth of the cost.

An agreement was executed on March 7, 1952 with Prince Edward Island. Under this the Federal Government shares, on an equal basis with the Province, the cost of carrying out a program for the reforestation of waste lands unsuitable for agriculture.

The District Forest Officers of the Forestry Branch are responsible for the administration in the field of the federal-provincial forestry agreements. Four liaison officers have been assigned to the Calgary, Winnipeg, Ottawa, and Fredericton offices of the Forestry Branch to assist in carrying out these duties. A manual for guidance in administering the agreements has been prepared.

In the fiscal year 1951-52, Parliament appropriated $1,025,000 to provide for federal payments to the provinces under the forestry agreements. Net payments actually made amounted to $802,405. The appropriation for 1952-53 was increased to $1,225,000, and actual payments totalled $1,028,236. Details are shown in the following table. Figures for 1951-52 represent net payments after deduction of any refunds made by the provinces with respect to interim claims.

Federal Payments to Provincial Governments Under the Forestry Agreements

Province	Forest Inventories			Reforestation		
	Fiscal Year 1951-52	Fiscal Year 1952-53	Total	Fiscal Year 1951-52	Fiscal Year 1952-53	Total
	$	$	$	$	$	$
Prince Edward Island	.....	.....	.....	7,500	7,500	15,000
Nova Scotia	.....	576	576	.....	436	436
New Brunswick	27,302	5,227	32,529	.....	.....	.....
Ontario	178,567	270,526	449,093	61,929	85,416	147,345
Manitoba	43,001	66,382	109,383	.....	6,220	6,220
Saskatchewan	38,725	34,227	72,952	1,235	2,537	3,772
Alberta	166,000	128,496	294,496	.....	.....	.....
British Columbia	203,000	420,693	623,693	75,146	.....	75,146
Total	656,595	926,127	1,582,722	145,810	102,109	247,919

Forest Inventories

The inventory programs to which the Federal Government is contributing under the forestry agreements are designed to provide a broad basis for the administration and management of the forests by the provinces, as well as to furnish data for a general statement of the forest resources of Canada. They include *reconnaissance surveys,* to locate areas of productive forests, and *provincial surveys,* to determine the areas of different classes of forest and provide estimates of timber volumes for large areas. Federal assistance is not extended to *working plan surveys,* which provide detailed estimates of timber volumes and other characteristics for relatively small areas.

The gross area for which inventory data will be required in programs now being carried out under the forestry agreements is currently estimated at roughly one million square miles. This estimate is substantially higher than that given a year ago, and further revision may be expected. Surveys already carried out in some provinces indicate that sizable areas of productive forest exist in regions hitherto assumed to be largely non-productive. An estimate, based on the information at present available, shows that about one-quarter of the over-all inventory programs under the federal-provincial agreements had been completed prior to the effective date of the agreements. By March 31, 1952, approximately one-third of the work had been carried out. On March 31, 1953, the inventory programs now in progress under the agreements were estimated as being somewhat less than one-half completed.

Details of work carried out on various phases of the forest inventories are given in the following table. Some of the figures are provisional, and subject to later correction.

Progress in Forest Inventories

Project Class	Estimated Area to be Covered	Approximate Area Covered			
		Prior to April 1, 1951	Fiscal Year 1951-52	Fiscal Year 1952-53	Total to Date
	Sq. Mi.	Sq. Mi.	Sq. Mi.	Sq. Mi.	Sq. Mi.
Ground Control Surveys	468,000	175,000	25,000	97,000	297,000
Air Photography:					
Small Scale	607,000	249,000	94,000	65,000	408,000
Medium Scale	432,000	209,000	55,000	42,000	306,000
Total	1,039,000	458,000	149,000	107,000	714,000
Base Maps:					
Small Scale	607,000	124,000	98,000	31,000	253,000
Large Scale	324,000	207,000	18,000	15,000	240,000
Total	931,000	331,000	116,000	46,000	493,000
Field Surveys for Forest Data	931,000	163,000	110,000	135,000	408,000
Interpretation of Photographs	931,000	159,000	100,000	138,000	397,000
Forest Maps	931,000	84,000	66,000	110,000	260,000
Inventory Reports	931,000	51,000	75,000	46,000	172,000

In British Columbia, inventory plans have been revised to cover a gross area of about 273,000 square miles in the accessible part of the Province, and over 80,000 square miles in the inaccessible region to the

north. Details for the latter area are not included in the table on inventories. Good progress was made during the fiscal year 1952-53, particularly in air photography and field surveys for forest data.

An inventory of some 80,000 square miles in Alberta, south of the 57th parallel, was virtually completed, nearly all the work being done under contract. Plans have been made to survey an additional 60,000 square miles in the northern part of the Province. With the exception of air photography, work on the northern inventory is to be carried out by the Alberta Department of Lands and Forests.

In Saskatchewan, inventory reports have been published for nearly 5,000 square miles and forest maps prepared for some 14,000 square miles. Ground control, photography, and base mapping are well advanced. The total area to be covered, including a reconnaissance survey in the northern districts, is currently estimated at about 75,000 square miles.

In Manitoba, good progress was made on all phases of the inventory program which is designed to cover about 119,000 square miles. A two-year contract for air photography of an area of nearly 26,000 square miles was practically completed during the first year.

In Ontario, where a contract for 50,000 square miles of photography was awarded on a two-year basis, weather conditions were less favourable and only 18,000 square miles were completed. An additional 8,700 square miles was photographed by the Ontario Government Air Service. Most of the work on the original forest resources inventory of Ontario was finished. A survey of the northern districts of the Province is now in progress, and the inventory is being extended to the southern agricultural region. The entire area to be covered by the Ontario inventory program is estimated at 275,000 square miles.

For the inventory of New Brunswick, base maps were completed covering some 28,000 square miles. Some field survey work was carried out, but other phases of the inventory were unavoidably curtailed. Completion of the program is anticipated, however, within the five-year period of the agreement.

Nova Scotia is preparing a forest inventory program under the federal-provincial agreement which will cover the forests of the Province's 21,000 square miles. Work was started on the preparation of base maps with a view to having the inventory of Cape Breton Island carried out under contract during the coming fiscal year.

Reforestation

Manitoba and Nova Scotia carried out reforestation programs under the federal-provincial agreements for the first time in 1952. The number of trees planted in Prince Edward Island, Ontario, and Saskatchewan was increased. Two new forest nurseries were established, one in Nova Scotia and the other in Prince Edward Island. A small amount of direct seeding was done in Saskatchewan. A combination of adverse weather conditions and other factors beyond control reduced the output of the three nurseries in British Columbia to such an extent that the Province was unable to qualify for federal participation in its reforestation program under the terms of the agreement. On this account, the total number of

trees planted under the forestry agreements was more than two million short of the previous year's figure. Details of planting and seeding operations are shown in the following table.

Reforestation Under the Forestry Agreements

Province	Number of Trees Planted		Area Planted		Area Seeded	
	Fiscal Year 1952-53	Total to Date	Fiscal Year 1952-53	Total to Date	Fiscal Year 1952-53	Total to Date
			Acres	Acres	Acres	Acres
Prince Edward Island	17,000	18,000	12	13	.....	.....
Nova Scotia	23,000	23,000	26	26	.....	.....
Ontario	8,542,000	14,135,000	8,542	14,134	.....	6,000
Manitoba	622,000	622,000	506	506	.....	.....
Saskatchewan	238,000	448,000	172	344	160	169
British Columbia	.....	5,745,000	.....	6,090	.....	.....
Total	9,442,000	20,991,000	9,258	21,113	160	6,169

Aerial Spraying Operation—New Brunswick

The pulpwood forests on an area of some 4,000 square miles in northern New Brunswick are seriously threatened by the spruce budworm. In the early summer of 1952, an aerial spraying operation against this insect was carried out by the forest industry and the Government of New Brunswick on an area of some 300 square miles.

In September, 1952, the Cabinet approved federal financial participation in an aerial spraying operation on a much larger scale, designed to cover, during a 3-year period, the entire area of more than two and a half million acres. The estimated cost is $9,000,000. The federal contribution under this arrangement will take the form of payment to the Government of New Brunswick of one-third of the cost of the operation, up to a maximum of $3,000,000. An agreement between the Federal and Provincial Governments on this basis was negotiated, but not signed, before the end of the fiscal year.

Education Section

The Education Section distributed 63,733 pieces of forestry literature to schools, universities, libraries, professional and other groups, and individuals, throughout Canada and elsewhere. Requests received from teachers and students indicate that education in the principles of forest conservation is being increasingly recognized as an important factor in the training of tomorrow's citizens.

At the beginning of the forest fire danger season, through the co-operation of the Post Office Department, mail from several key cities throughout Canada was cancelled with special stamps bearing forest fire prevention slogans. In addition, posters using the theme *Protect Our Green Forests* were displayed in post offices across Canada. New poster designs, with the Canada jay as a symbol of forest protection, were secured and two chosen for use in the 1953-54 campaign against forest fires.

Exhibits on various forestry topics displayed in the ground floor windows of the Forestry Branch head office, Ottawa, gave rise to a large number of inquiries on forestry in Canada.

Approximately 400 negatives of black and white prints and a number of colour slides were indexed and added to the photographic library of this section; a number of photographs on forestry were supplied on request.

Prints of *Fighting Forest Fires with Hand Tools,* first of a series of Forestry Branch training films on forest fire protection, were secured and distributed on loan to a number of government and private organizations. The National Film Board reports a sale of 18 copies of this film to sources outside the Federal Government.

National Parks and Northern Administration Section

The work of this section is to provide advice and assistance on forestry matters arising in the administration of the national parks and the Yukon and Northwest Territories, and to act as liaison between the several branches of the Department concerned with joint projects.

Six field trips involving a total of 69 days were made by the senior liaison officer. Two trips were made to the Mackenzie District of the Northwest Territories: one trip, made in connection with the Warden Training program, involved lectures on forestry subjects, timber administration, and fire protection; the other trip was for the purpose of inspecting timber permit berths and the organization of the Fort Smith fire protective unit, which includes Wood Buffalo National Park. Four trips, made for the National Parks Branch to Banff, Jasper, Yoho, and Kootenay National Parks, dealt with insect and disease infestations, timber administration, and fire protection.

In co-operation with the Northern Administration and Lands Branch and the Forest Inventories Section, a forest inventory was prepared for 3,800 square miles in the Stewart River area, Yukon Territory. This inventory was based on the use of air photographs and on field work done by a five-man party during a period of 3½ months. It showed that the area contains 5,400,000 cords of material 4 inches diameter at breast height or greater, all species. The total includes 387,000,000 feet board measure of spruce saw-timber. Twenty-one per cent of the area surveyed contains timber of merchantable size. The forest inventory program will be extended to include other parts of Yukon Territory.

Forest Products Laboratories Division

Interest in forest products research continues to increase with the growing awareness of the value of research findings. Publications of the Division are reaching a larger field. There has been an increase in requests for specific information; in many cases, special investigations have been necessary. A notable trend is that towards greater industrial reliance on research data in planning production and operational improvements. A widening field of interest, and greater recognition of the importance of research, are indications that forest products research continues its valuable services to the national economy.

The Division was host to a Pre-Conference on Forest Products Research, held at the Ottawa Laboratory during the week preceding the Sixth British Commonwealth Forestry Conference. Excellent opportunities

were thus provided for discussion of many phases of research activities with representatives from most Commonwealth countries and the United States of America. In and out of the Conference Room specialist personnel, through an interchange of experience and ideas, were able to gain very considerable knowledge which should prove most valuable in planning and carrying out future research.

The comprehensive agenda included discussions of future requirements in timber testing; grouping of "secondary" species; standard presentation of results; effect of recent developments in the plywood and laminated construction fields on research programs; methods of testing and assessing new materials and new prefabricated construction developments; wood identification keys; assessing natural durability properties and accelerated test techniques for evaluating preservatives; standardization of procedure for describing drying schedules and seasoning defects; new seasoning techniques; and research trends in woodcutting.

A 350-page draft *Terms and Definitions Used in Forest Products Research,* prepared by the Division for the Commonwealth Forest Products Laboratories, was discussed, and the Forest Products Laboratories of Canada accepted the task of preparing the material for publication.

Consideration was given dissemination of technical data and translation of technical information by the Forest Products Laboratories of the Commonwealth and the United States of America. Reports were presented by Corresponding Committees on Timber Mechanics, Composite Wood, and Wood Preservation. In the discussions of these reports it was apparent that co-ordination of research at specialist level was most effective and desirable. Two new Committees were formed, one on Seasoning, and the other on Fundamental Research.

The Pre-Conference made possible discussion of technical matters at the policy level. It afforded an excellent forum for the exchange of information on mutual problems, and permitted review of many subjects of purely forest products interest.

Incorporated in the Resolutions of the Sixth British Commonwealth Forestry Conference are many matters of special interest to Forest Products Research in Canada including:

1. The need for increased staff to cope with the growing legitimate demands of industry for technical assistance without detriment to long-term programs of research.
2. Continued close co-operation with all branches of forestry and the timber utilization industries.
3. Encouragement of meetings, at specialist level, of officers from Commonwealth forest products laboratories, and staff visits, to foster co-ordination of research work.
4. Increased co-operation between forest products research, the timber trade, and timber specifying authorities, aimed at more effective and economic utilization.

A very important phase of the activities of the Laboratories has been the large volume of work in connection with the preparation of specifications for the Canadian Standards Association, and the revision of the National Building Code—now nearing completion. Major responsibility rests with the Division for providing necessary data for use in the preparation of wood-use specifications.

Technical personnel from the Division on various Specifications Committees endeavour to supply technical data and research findings pertinent to the varied uses of wood. They advise and help in the preparation of specifications, written so as to provide adequate safeguards while permitting the use of species, grades, and sizes shown by research to be capable of adequately meeting stated requirements.

Valuable wood substance, in various forms of residue, is available at the sawmills of Eastern Canada. A considerable proportion is suitable for the manufacture of pulp. To provide necessary data for the economic use of this sawmill residue, the Division, on the suggestion of the Ontario Research Council, organized a Research Co-ordinating Committee on the Utilization of Sawmill Waste for Pulpwood composed of representatives from both industry and research institutions. Much work has been performed at the Ottawa Laboratory in studies on bark removal and chipping equipment, and on methods and equipment for handling and transporting mill waste in the form in which it occurs, or after barking and chipping. Several reports were issued to cover this work, and investigations are continuing.

Possibilities for chemical utilization—or transformation—of wood are also under continuing investigation. The chemical composition of wood is such that there are vast possibilities, through chemistry, for recovery of valuable substances from wood available in forms unsuited to other types of utilization. Research and analysis constantly add to the volume of basic data essential to studies of possible economic conversion.

The Division was active on a number of technical committees, including the Canadian Pulp and Paper Association; the Paint, Furniture, Packaging, Paper Products, and Building Board Technical Subcommittees of the Canadian Government Specification Board; the Packaging Committee, Canadian Standards Association; Wood Committee, American Society for Testing Materials; Preservatives Committee, American Wood Preservers Association; and Preservation Committee, British Columbia Plywood Manufacturers' Association.

Members of the staff represented the Division at many conferences and meetings and presented papers to the Sixth British Commonwealth Forestry Conference, and the annual meetings of the following organizations: Maritime Lumber Bureau; Forest Products Research Society; the British Columbia Academy of Science; Eastern Canadian Section, Forest Products Research Society; the Joint Annual Meeting, Canadian Institute of Forestry, and Society of American Foresters; the Vancouver, West Kootenay, Calgary, and Ralston Sections of the Chemical Institute of Canada; and the British Columbia Corrosion Group.

Industrial interest in forest products research has continued to increase, and there has been close co-operation with the staffs of the Ottawa and Vancouver Laboratories, in order to meet the research need of many of the forest products industries. It should be noted that in a great many instances inquiries received at the Laboratories concerned problems linked with better and closer utilization of wood. Realization of the importance of more complete, effective, and economic use of available wood substance has been an important guide in the planning and organization of research work in the laboratory and in the field.

Brief reports of the more important work completed or under way at Ottawa and Vancouver follow.

Ottawa Laboratory

Timber Mechanics Section

The volume of basic data on the mechanical and physical properties of Canadian timbers is continually being expanded by testing new species and timbers from sites not previously sampled. Testing, computations, and summaries for eastern red hemlock were completed. Variability statistics were computed for white pine, red pine, sugar maple, and eastern red hemlock. A statistical study was made to determine the relationship between specific gravity and strength in small clear specimens of jack pine. Another was aimed at showing the relations between specific gravity, rate of growth, percentage of summer-wood, and maximum crushing strength in eastern white hemlock. A short examination of the technique of sampling was made in an attempt to establish a basis for predicting the accuracy of results of different sample arrangements from the same population.

An investigation was undertaken on fire-killed timber to determine to what extent the presence of worm-holes and fire-scars weaken the timber for ordinary construction purposes. Samples were obtained from a forest of jack pine killed by fire in 1948. Test results showed that the worm-holes had little, if any, effect on the strength, and that such lumber is quite suitable for most construction purposes where appearance is not a factor.

A number of miscellaneous investigations involving strength testing of timber and timber products were carried out. These included tests on new types of fibreboard developed at the Laboratory; tests of red pine sapwood infected by a blue staining fungus under controlled conditions; tests of beech and sugar maple, kiln-dried by different methods; and tests of white pine and white spruce matched specimens which were air-seasoned or kiln-dried at high temperatures.

Several special investigations were undertaken at the request of Crown companies and government departments. These included tests to determine the adequacy of plywood roof sheathing with unsupported edges; tests of plywood as a nailing base for cedar shingles, machine-grooved shakes, and asbestos-cement shingles; tests of fibreboards produced by various manufacturers; and stud-wall racking tests on several sheathing materials. An investigation on a shipment of aspen poplar logs from Saskatchewan, made in the research veneer plant of the Ottawa Laboratory, showed that aspen poplar can be converted into a good grade of plywood, suitable for a variety of uses.

A project was initiated to investigate the factors affecting the quality of rotary-cut veneer from yellow birch logs which have curly-grained wood, with a view towards developing a technique for rotary-cutting smooth veneer from this type of log. Cutting trials were designed to determine the effects of heat treatment, lathe knife angle, and pressure bar adjustment on the quality of veneer produced.

Outdoor exposure tests, to assess the durability of plywood adhesives, were continued, and a study of the gluing characteristics of eastern Canadian wood species completed. Most of the research on wood adhesives pertained to special investigations for the Department of National Defence on the production of prefabricated army huts. A considerable number of special tests on glues and glued wood products were also made for inspection services and other government departments.

To determine basic causes of package failures, special instruments have been acquired, which register the intensity of the shocks to which packed commodities are subjected in transit. Impact stress intensities to which one-man packs (75 lbs. weight) are subjected are being studied with special reference to the correlation of registers obtained from two types of instruments.

Experiments were carried out on the development of special containers for the Department of National Defence for use in the transportation of ammunition of various types. Studies were also extended to include strength determinations of several designs of pallets for palletizing unit loads in ordnance depots, and for handling special naval stores more efficiently.

Standards for nailed wooden boxes and crates for overseas shipment were developed in co-operation with the Canadian Standards Association. The Department of Agriculture was assisted in developing suitable packs for domestic and export shipment of dairy products.

Wood Preservation and Pathology

The collection of data on the service life of treated and untreated timbers has continued during the year, in co-operation with commercial and government organizations. Yearly reports were received for 849 active installations, and records are now complete for 378 other installations. This valuable information on the performance of timber in service is used extensively as a basis for the proper planning of structures and many types of installations.

Tests were continued on the determination—by accelerated laboratory and field tests—of the relative effectiveness of lignite tar distillate and standard creosote. Attempts are being made to correlate various methods of laboratory weathering with natural outdoor weathering. Indications are that lignite tar distillate has greater initial toxicity than creosote, but is not as permanent.

Further to the tests on determining the effectiveness and economy of applying pentachlorophenol, copper naphthenate, and other preservatives by brush or dip treatments to millwork exposed to conditions of mild decay hazard, tests were undertaken to determine the efficiency of such treatments for timbers used for railway car flooring. Panels of three non-durable, Canadian species, assembled with bolts and screws as in actual use, have been treated and are being exposed under conditions of mild decay hazard.

Tests were carried out, by standing the butt ends in a solution of copper sulphate, to determine the effectiveness of various degrees of bark removal on the treatment of green posts of four non-durable species. Best results were obtained when all bark was removed. Tests are also being carried out to determine the effectiveness of the application of a water-proof coating to exposed parts of treated posts in contact with the ground.

The study of decay in freshly felled poplar has been continued. Piles of pulpwood bolts maintained for one and two summers in the field and in pit storage have been dismantled. One of the organisms under investigation—possibly responsible for one of the common heartwood rots—was found to reduce the weight of poplar blocks in culture by as much as 27 per cent in four months; it is common in the living tree and also active in log storage.

It was previously reported that the fungus which causes chocolate brown stain in the sapwood of red pine poles does not reduce the strength of the wood. Tests now completed indicate that some of the fungi associated with brown stain do cause serious reduction in bending strength and toughness. Brown-stained wood should not be used where maximum strength is required.

Some one hundred and forty fungi obtained from the air of lumber-seasoning yards and considered capable of causing wood rots are being cultured on red pine sapwood to test their ability to cause decay.

Work on the effect of ageing on the efficiency of fire-retardant paints was continued. Experiments have been carried out on coatings aged for periods of up to two years.

Exposure tests on nine different Canadian woods, covered with various exterior paint coating systems, are continuing at Ottawa and Petawawa. After almost three and one-half years it is noted that western red cedar has caused practically no breakdown of the paint films, and that almost equally good results were obtained with white pine. Most deterioration occurred in the case of eastern hemlock, with jack pine, and white spruce giving slightly better results. In the coating systems used, oil-base primer was found to be superior to aluminum primer.

Testing of painted plywood and hardboard exterior panels was expanded. Douglas fir plywood and representative commercial hardboards were covered with four different topcoats over five different primers. Panels are being exposed at five locations across Canada for comparative tests under weather conditions varying from extreme dampness to Arctic climatic conditions.

Wood Chemistry Section

Possibilities of utilizing various forms of mill waste for the production of structural boards were further investigated. Studies of fibre length distribution in pulps from mill waste led to simplification of production methods. The natural resins in white pine were found to be sufficient for adequate sizing, and boards with adequate water resistance were produced from white pine pulps without addition of water repellents.

High quality cellulosic pulps were obtained from spruce sawdust by treating it with chlorine dioxide in conjunction with mild alkali and acid pretreatments. An alkali wash following the chlorine dioxide treatment yielded pulps with alpha-cellulose contents in the range of high grade commercial dissolving pulps.

Studies are continuing to investigate possible methods of transforming wood substance through microbiological means. The breakdown of cellulosic material by rumen fluid, essential to cellulose fermentation, has been found to be replaceable by peptone, trypticase soy, and corn steep liquor. The dialysable portion of the fluid contains two fractions essential for fermentation; these can be separated by extracting the freeze-dried dialysate, first with absolute ethanol, and then with water. The fractions obtained have been further separated chromatographically. Control of acidity has been found to be extremely important in cellulose fermentations. Conditions have been determined under which cellulose suspensions of relatively high concentrations (up to 5 per cent) can be readily fermented.

One member of the staff was on a 5-month mission to Yugoslavia, on loan to the Food and Agriculture Organization of the United Nations. The task of the mission was to survey the status of wood utilization in Yugoslavia, and to advise on possibilities for better utilization.

Wood Utilization

Fundamental studies were started at the Research Sawmill to provide essential data on the variables that affect lumber production and quantity. Basic tests were completed to determine the relationship between the specific gravity of wood sawn and power requirements; the relationship between bite per tooth and power; and the relationship between depth of cut and power. A straightline relationship was found to exist in all cases, and it appears that progress has been made towards understanding the basic factors involved in circular head-saw operation. Another study involved comparison of a chrome-plated saw to two conventional saws.

Studies of logging waste in Eastern Canada, initiated in 1950, were continued. Results from studies of 34 operations indicate that the average volume of merchantable wood left after logging amounted to 18·7 per cent of the original volume on the area. This represents 430 cubic feet per acre in stands averaging, before cutting, approximately 2,300 cubic feet per acre. Considerable variation in the amount of waste was found on different operations; in a number of cases this occurred even where similar stands had been logged. Figures varied from 6 to 33 per cent depending upon the species being cut and the degree of effectiveness of the supervision. Firms which have initiated surveys of a similar nature have substantially reduced the volume of waste in their logging operations.

A number of problems of pressing importance in connection with the use of sawmill waste for pulpwood were investigated. These investigations included the determination of the cord-cubic volume relationship of spruce and white pine slabs and edgings; further trials on the "Curv-cut" head on a buzz barker; design and construction of an underfeeding machine for barking slabs and edgings; the collection of information on chip storage; the effect of hot water, steam, and other treatments on the ease of bark removal; and the investigation of machines and methods for transporting and handling sawmill waste suitable for pulping.

A high-temperature kiln was installed at the Ottawa Laboratory to investigate the use of temperatures in excess of 212°F. for the drying of lumber. Two series of exploratory tests have been completed on white spruce, eastern white pine, western hemlock, Douglas fir, and western red cedar. Further work is necessary before definite recommendations as to the commercial use of this process can be made.

A preliminary survey was made at 25 air-seasoning yards in Ontario during which approximately 140 lumber piles were examined to secure preliminary information on piling methods. These data will be used to plan specific investigations aimed at developing improved practices for piling and yarding lumber for air-drying.

Answering requests for technical information, carrying out minor investigations, and holding a lumber seasoning course occupied a considerable portion of the time of the staff.

Wood Structure

Dimensional changes undergone by wood in response to changes of moisture content necessitates constant consideration in all phases of utilization, from the original mill processes to the finishing and actual use of wood products in service. Some critical investigations of the mechanism of shrinkage and swelling were undertaken to determine the contribution of the various significant kinds of wood tissue to the dimensional changes of wood caused by variations of the moisture content.

"Compression-wood" causes wood to shrink along the grain in drying and to be weak in resistance to bending, tension, and impact. Variable in nature, its presence in traces may go undetected on superficial inspection. A special investigation was made regarding structure and physical properties of the different forms of compression-wood.

The specific fibre saturation point of different woods is a property of great significance. Investigations were made to test the feasibility of a simple procedure for determining fibre saturation point by centrifuging moist wood specimens. These experiments have indicated that in sapwood samples of reasonable size, the moisture content can be reduced to the fibre saturation point by a technique of centrifuging.

Preparation of a revised edition of a bulletin *Identification of Canadian Woods* has been advanced. Identifications of wood samples were made in response to technical inquiries.

Vancouver Laboratory

Requests for specific data on numerous industrial problems necessitated special studies and investigations covering a wide range and including the following: durability of western cedar, corrosion in pulp digesters, treatability of plywood, examination of sap stain preventives, corrosion in dry kilns, toxicity of water-soluble phenolic fractions of western red cedar, study of specifications, suitability of western Canadian woods for new uses, efficiency of different types of joints, strength properties in relation to use value, evaluations of new processing methods, species identification, rate of decay in buildings, kiln-drying schedules, causes of development of defects in seasoning, strength of different types of built-up plywood panels, paintability of yellow cypress, and stresses in bent plywood. Some of these investigations were of major interest and were suggestive of sustained or new project work for the future.

A number of integrated projects were planned and undertaken in co-operation with the British Columbia Forest Service, the Pacific Biological Station, and trade associations.

Timber Mechanics

Testing of standard specimens to determine basic data on the physical and mechanical properties of western Canadian woods was continued. Computations and checking of test data were completed for a number of tests and are in progress for others. Testing was commenced to determine the mechanical properties of white spruce from Alberta. Test and computation work were completed in the study of the static bending strength of untreated and pressure-treated 25-foot poles of Douglas fir (Mountain type) and western hemlock. All poles were air-seasoned for one year before the tests were made. Small clear test pieces were cut from each pole subsequent to failure and tested to determine the relation between the strength of clear wood and full size poles. Periodic measurements were made of the circumferences of all poles at marked sections, and it was shown that a single set of measurements of any pole when in a green condition is adequate to determine its class; and no other measurements need be made unless the pole has been subjected to a shaving operation.

In Alberta, much accessible lodgepole pine of mining timber size has been fire-killed. To obtain comparative data on green-cut trees and trees fire-killed in 1949, 1943, and 1936, a series of tests were undertaken. Trees selected by the District Forester of the Department at Calgary were shipped to the Vancouver Laboratory. Testing of these timbers as booms and posts is nearing completion.

Studies are progressing to determine the gluing properties of spring-wood and summer-wood of Douglas fir; the effect of time and temperature in the dryer upon the strength and gluing properties of Douglas fir veneer (increasingly important because of the high temperatures used in veneer dryers); and the character of fractured glue-lines and adjacent unbroken glue-lines. A staining method, developed at the Laboratory, makes it possible to distinguish between wood fibres, resin adhesive, and adhesive extenders.

Some exploratory work was done to investigate the force required to flatten cupped and twisted dry Douglas fir in nominal 2-inch thicknesses. Indications are that such material cannot be used satisfactorily in glued laminated construction.

Wood Preservation and Pathology

Wood Preservation

The impregnation of Coast Douglas fir with creosote by means of the boiling-under-vacuum process is generally satisfactory. However, when applied to Interior Douglas fir railway ties or to western hemlock poles, it is not so generally effective. A series of experiments were undertaken, therefor, for the purpose of analyzing some of these various relationships.

In the course of these experiments it was shown that water boils from green wood at a lower vacuum than from seasoned wood, also that western hemlock at any given moisture content and temperature has, in general, a definite vapour pressure. The vapour pressure–temperature relations were sufficiently consistent to justify further investigation, and tests of wood conditioning preliminary to treatment are being continued.

Before any application of vapour pressure–temperature relations to the boiling-under-vacuum process can be made, the rate of change of wood temperatures must be known. With this objective, a series of 38 charges containing western hemlock specimens approximately 8 inches in diameter by 28 inches long, were boiled under vacuum, some for periods of 8 hours, others for 16 hours. Thermo-couples were sealed into selected points in the specimens and half-hourly readings of the wood temperatures and of the condensate were recorded.

Studies were initiated on the impregnation of Interior Douglas fir with creosote in order to determine an effective and satisfactory method of treatment.

Western hemlock heartwood specimens 2 by 2 by 30 inches were impregnated after conditioning by the Boulton process, and by a modified Boulton process which consisted of alternating vacuum and atmospheric pressure. When specimens were impregnated easily, a dense uniform penetration was obtained; but refractory specimens accepted impregnation in the summer-wood only. This indicated that distribution of preservative takes place tangentially and/or longitudinally in summer-wood rings before it penetrates into the spring-wood.

Pathology

The wood–soil contact culture technique has attracted attention during recent years as a rapid means of inducing and controlling wood decay in the laboratory, either for measuring relative durability or for toxicity tests of wood preservatives. Experience has shown that, at times, erratic results are obtained. Experimental work showed this to be partly caused by uncontrolled or unstandardized aeration. Methods for standardizing aeration in soil culture jars were devised.

The salvage of small trees and logs left in the forest after the primary logging operation is over (and their use for pulp making) is being increasingly practised. Consequently there is a demand for information as to how rapidly such logging residue deteriorates, and the decays which cause such deterioration. Two groups of sample plots containing freshly-felled residue were laid out, one at Port McNeill on Vancouver Island (1949), the other at Sandspit in the Queen Charlotte Islands (1950). Examination of the western–amabilis fir residue at Port McNeill in 1952 showed that some 75 per cent of the volume was affected by incipient or advanced decay. These studies are continuing.

Preliminary studies were made on the cause and significance of common reddish heartwood colouration of lodgepole pine. When the identity of the causal fungi is known with certainty, it may be possible to relate the information obtained at the Ottawa Laboratory on the durability and strength of jack pine affected by "red stain" and "red heart" to lodgepole pine in Western Canada.

Wood Chemistry

Work on the chemical investigation of the extractives of western red cedar was continued. Pure crystalline samples of thujaplicins, methyl thujate, and thujic acid were prepared for investigation of their potential usefulness in pharmacology, insecticides, and repellents. An analytical method for the thujaplicins was devised and samples of the steam volatile oil from cedar were analysed. The oil proved to be a mixture of thujaplicins, methyl thujate, and thujic acid.

By means of colour tests and corrosion experiments, the water-soluble phenols were found to contain very active metal complexing agents suggestive of a number of important potential uses in metallurgy, electroplating, and other industries for this readily prepared extractive of western red cedar.

Experimental laboratory pulping cooks showed that the digester corrosion encountered in the alkaline pulping of cedar is due to the presence in the heartwood of the metal complexing agents, the thujaplicins and the phenols. Based on this information, methods of preventing the corrosion are being studied.

Work on the ethanolysis of the lignin model compound, oxy-coniferyl alcohol, was completed. The same four derivatives previously found in the ethanolysis products of lignin in wood were isolated and identified. An ethanolysis of the lignin extractable from wood with alcohol yielded the same four products. Their preparation from a lignin model compound, an isolated lignin, and lignin in situ has thus been demonstrated.

Wood Utilization

A study in co-operation with the British Columbia Forest Service, and the Division of Forest Biology, Department of Agriculture, on log and lumber recovery of balsam (*Abies lasiocarpa* (Hook.) Nutt.) in the Bolean Lake area near Falkland, British Columbia, found that the chief problems in the harvesting of this species are: difficulty in identifying defective standing trees by visible signs; difficulty in scaling the logs owing to the incidence of rot; and the comparatively low net recovery of balsam compared with that of spruce. The study also showed that one-man falling and bucking is more efficient than a two-man operation.

When the logs from the study area were cut in the sawmill it was found that the recovery of No. 4 and No. 5 Common (low value material) was 54 per cent for the defective group of logs and 73 per cent for the cull group.

A study was conducted on butt logs of western larch. This species contains much shake in the butts, especially in the older trees. This results in the "long butting" of larger trees, in which case the butts are left in the woods. It was found that in the green lumber from "long butts", although there was a high percentage of clears, there was also a high percentage of low value material due to shake. After air seasoning, shake may or may not become more apparent in the clears, and studies are being made to determine the extent of de-grade.

Investigations on the effect of sawdust on soil conditioning were completed and a report is being prepared.

Studies on the kiln-drying of western red cedar are continuing. Schedules for kiln-drying 3-inch and 4-inch cedar, suitable for solid construction, were developed. It is planned to continue this study with particular emphasis on the elimination of "wet spots" and "collapse".

In co-operation with the British Columbia Forest Service, over 500 fire indicator sticks for predicting forest fire hazard conditions in the woods were prepared.

Branch Publications

General

Sixth British Commonwealth Forestry Conference:
Proceedings
Summary Report
Digest of Statistics

Bulletins and Periodicals

Annual Report on Active Research Projects, 1951-1952. (Forest Research Division).
Effect of Exposure on Douglas Fir Crossarms. W. E. Wakefield.
Forest and Forest Products Statistics, Canada.
Forest Conservation (French edition).
Forest Fire Losses in Canada, 1951.
Forest Fire Protection (Revised edition).
Forest Fire Protection Abstracts, Vol. III, Nos. 1 and 2.
Moisture Content Changes in Seasoned Lumber in Storage and in Transit.
The Petawawa Forest Experiment Station (New edition).

The Preservative Treatment of Fence Posts by Non-Pressure Processes. M. J. Colleary.

Silvicultural Research Programme of the Forestry Branch. A. Bickerstaff.

The Utilization of Sawmill Residue in the Southern Coast Region of British Columbia. F. W. Guernsey.

Wood is Wealth.

Wood Waste Utilization in Canada. J. H. Jenkins.

Research Notes

A Lightning Protection System for Forest Lookout Structures (Revised edition). J. G. Wright.

Nipigon Growth and Yield Survey. G. H. D. Bedell and D. W. MacLean.

White Spruce Reproduction Resulting from Various Methods of Forest Soil Scarification. D. I. Crossley.

Leaflets

Canada's Forests, 1953. (French edition: *Les Forêts du Canada, 1953*).

Comparative Growth of Spruce and Fir Seedlings in Sandflats. I. C. M. Place.

Discing in Overdense Lodgepole Pine Reproduction. D. I. Crossley.

The Dot-Reading Overlay for the Measurement of Map Areas. J. M. Robinson.

The Influence of Microtopography on the Survival of Spruce and Fir Reproduction. A. C. Dixon and I. C. M. Place.

Logging Damage to Spruce and Fir Advance Growth. A. B. Vincent.

Polarizing Screens and Range-Finders as Aids in Forest Fire Detection. D. G. Fraser.

Seed-Spotting of Conifers Under a Mixed Hardwood Stand. J. W. Fraser.

Some Observations on Lodgepole Pine Regeneration after Clear Cutting in Strips. D. I. Crossley.

Spruce Regeneration on Deep Moss after Logging. H. A. Parker.

Squirrel Damage to White Spruce. J. S. Rowe.

The Survival of White Spruce Reproduction Originating from Mechanical Disturbance of the Forest Floor. D. I. Crossley.

White Spruce Standard Volume Tables for the Boreal and Sub-Alpine Regions of Alberta. A. W. Blyth.

Technical Reports

Handling and Transportation of Sawmill Waste for Pulpwood. G. E. Bell.

Hot- and Cold-Bath Preservative Treatment of Jack Pine. J. Krzyzewski.

Preliminary Investigation of Veneer-Cutting Properties of Aspen Poplar. D. G. Miller.

Results of Logging Waste Survey in the Maritimes. Interim Report. J. A. Doyle.

Sawmill Residue in the Prince George Area of British Columbia. C. F. McBride.

Articles

The Aerial Environment of the Forest. H. Cameron. Royal Meteorological Society, Canadian Branch, Vol. 4, No. 1, 1953.

Automatic Sweep for a Sawmill Carriage. Canada Lumberman, February, 1953.

Bark Extracts in Adhesives. H. MacLean and J. A. F. Gardner. Pulp and Paper Magazine of Canada, August, 1952.

Bark Removal Methods and Machines. G. E. Bell and P. E. Martin, Canada Lumberman, October, 1952.

Forest Products Research—Active Partner of Canadian Industry. J. H. Jenkins, Industrial Canada, September, 1952.

Forest Products Research in Canada. J. H. Jenkins. Timber News (U.K.), September, 1952.

Glue Joint Failure. E. G. Bergin. Canadian Woodworker, June, 1952. Also. Australian Timber Journal, March, 1953.

Logging Waste in the Maritimes. J. A. Doyle. Canada Lumberman, August, 1952.

Production of Hard-Pressed Fibreboards from Western Red Cedar Shingle Waste. F. W. King and F. Bender. Pulp and Paper Magazine of Canada, May, 1952.

Pulpwood Decay and Its Effect on Yield and Quality. D. W. Glennie and H. Schwartz. Paper Industry, 1952.

Sawmill Residue in the Prince George Area of British Columbia. Synopsis. B.C. Lumberman, July, 1952.

Variation in Moisture Content in Wood Exposed to Indoor Conditions. R. S. Millett. Timber of Canada, March, 1953.

Wood is Necessary to Canadian Economy. J. H. Jenkins. Prairie Lumberman, April, 1952.

Papers

Chemical Research in Relation to Western Red Cedar Utilization. J. A. F. Gardner. Vancouver Section, C.I.F., November, 1952.

Curved Plywood, Its Production and Application in the Furniture Industry. D. G. Miller. First Annual Meeting, Eastern Canadian Section, Forest Products Research Society, Toronto, March, 1953.

Development of Glueline Cleavage Test. P. L. Northcott. Annual Meeting, Forest Products Research Society, Milwaukee, June, 1952.

The Ethanolysis of 3-hydroxy-1-(4-hydroxy-3-methoxyphenyl)-2-propanone. J. A. F. Gardner. Western Regional Conference, Chemical Institute of Canada, Saskatoon, October, 1952.

The Evaluation of Two Modern Wood Preservatives. H. P. Sedziak. Annual Meeting, Forest Products Research Society, Milwaukee, June, 1952.

Good Logging Practices Increase Forest Yields. J. A. Doyle. Annual Meeting, C.I.F.-S.A.F., Montreal, November, 1952.

Paper Chromatography of Phenolic Substances. G. M. Barton. Annual Meeting of B.C. Academy of Science, Vancouver, April, 1952.

Steel Corrosion by Western Red Cedar Extractives. H. MacLean. B.C. Corrosion Group, Vancouver, October, 1952.

Utilization of Sawmill Waste for Pulpwood. J. H. Jenkins. Annual Meeting, Maritime Lumber Bureau, Halifax, May, 1952.

The Utilization of Wood Waste in Eastern Canada. J. H. Jenkins. First Annual Meeting, Eastern Canadian Section, Forest Products Research Society, Toronto, March, 1953.

Western Red Cedar—Chemistry and Utilization. J. A. F. Gardner. Vancouver Section, West Kootenay Section, Calgary Section, Ralston Section, Chemical Institute of Canada, October, 1952.

Reprints of Articles and Papers

Brown Stain and Its Effect on the Strength of Pine Poles. C. W. Fritz.
Brown-Stain in Red Pine Sapwood Caused by Cytospora sp. C. W. Fritz.
Chemical Composition of Canadian Woods—II. L. P. Clermont and H. Schwartz.
Development of Glueline Cleavage Tests. P. L. Northcott.
Economics of Tannin Production from Sea-Water Floated Bark. D. S. Scott and J. A. F. Gardner.
Edge-Gluing by Dielectric Heating. R. W. Peterson.
The Evaluation of Two Modern Wood Preservatives. H. P. Sedziak.
Good Logging Practices Increase Forest Yields. J. A. Doyle.
Microbiological Degradation of Lignocellulose Material. D. W. Stranks.
Paper Chromatography of Phenolic Substances. G. M. Barton, R. S. Evans and J. A. F. Gardner.
Radio-Frequency Power Requirements for Edge-Gluing. R. W. Peterson.
Trends in Wood Utilization in British Columbia. K. G. Fensom.
Wood Flour Production in Canada. E. H. Buckley.

Separates

Chapters 2, 11, 12 and 13 of the book *Canadian Woods* were published as separates. (This makes a total of ten chapters now available as bound separates.)

Chapter 2—*Commercial Timbers of Canada.* T. A. McElhanney; and *Classified Uses of Canadian Woods.* J. B. Prince.
Chapter 11—*Glued, Laminated Construction.* D. E. Kennedy.
Chapter 12—*Shipping Containers.* W. Butterworth.
Chapter 13—*Timber Fastenings.* J. M. Rudnicki.

Canadian Government Travel Bureau

Tourists from other countries spent $276,000,000 in Canada in 1952, of which $258,000,000 came from the United States.

There were 26,300,000 individual entries into Canada during the year, an all-time record. This figure includes commuters and other repeat visitors, and represents a gain of more than five per cent over 1951. There was a 2·6 per cent increase in long-stay automobile entries during 1952. Automobile entries under traveller's vehicle permits, issued for stays of more than 48 hours or for leaving Canada at a port other than that of entry, totalled 2,277,836 for the year.

The new record for tourist volume was established despite exchange problems arising from the premium on Canadian funds in relation to United States currency, the possible adverse effect of a major steel strike in the United States early in the year, and the fact that it was a presidential election year in that country.

Canadian travel spending abroad soared to new high levels. Canadians spent $294,000,000 on travel in the United States, and an additional $42,000,000 in other countries. The total of $336,000,000 is the greatest amount ever spent by Canadians on international travel in a single year. In 1938, a typical prewar year, Canadians spent $86,000,000 on such travel. Spending by Canadians on travel to the United States in 1952 was 20 per cent greater than in 1951. The total number of Canadian visits to the United States and other countries in 1952 was in excess of 21,500,000.

Functions of Travel Bureau

The Canadian Government Travel Bureau is the federal agency responsible for the promotion of travel to and within Canada and for the interests of the tourist industry in general.

The Bureau's activities include an information service for prospective tourists, extensive advertising in United States magazines and newspapers on behalf of travel to Canada, travel publicity campaigns in the United States and Canada on behalf of Canadian travel generally and the National Parks of Canada in particular, production of printed and multilithed travel literature and information booklets and folders, and establishment and maintenance of 16 mm. film libraries throughout the United States, in co-operation with the National Film Board of Canada. The Bureau prepares and distributes National Parks literature as well as its own publications.

The Bureau operates a ground-floor information office in New York City, located at 11 West 49th Street in Rockefeller Center, and maintains a staff representative at an information office in the Canadian Consulate-General, Chicago. At Los Angeles, there is a special travel consultant in the Canadian Consulate at 510 West 6th Street.

Advertising Campaign

The Bureau's expenditures for newspaper and magazine advertising and films in 1952 were more than $900,000. Media used included more than 50 United States magazines and about the same number of newspapers in large U.S. cities. Readership interest in Travel Bureau advertising continued at a high level, according to independent surveys. There were 294,665 individual inquiries serviced by the Bureau during 1952, of which 267,169 came from the United States, 14,125 within Canada, and 13,371 from other countries. The increase in inquiries was 44,368 or 17·7 per cent over 1951. In the first ten months of 1952, the New York office handled a recorded total of more than 28,000 inquiries. During the year the Chicago representative handled more than 5,000 inquiries.

Publications

Five hundred thousand copies of a completely new edition of the Bureau's principal piece of promotional literature, *Canada—Vacations Unlimited,* were delivered early in 1952. The booklet, 48 pages in full colour, was the largest all-colour publication of its kind yet printed in Canada. A new and revised highway map was produced during the year, and revised editions of nine multilithed information booklets were produced, as well as a tenth completely new one, *Canadian Havens From Hay Fever.* Several new National Parks publications were produced, including a full-colour pictorial folder.

More than 1,500,000 printed publications produced by the Bureau were distributed in 1952, in addition to some 600,000 multilithed publications. The Bureau also distributed more than 900,000 National Parks publications and nearly 200,000 provincial publications.

Motion Pictures

Motion pictures are being used for many television programs and at least 40 Canadian travel film subjects were telecast on a total of 404 occasions to many thousands of viewers throughout the United States.

Travellers' Cheques, a new educational film produced for the Bureau, was a further attempt to bring home to the man on the street the meaning of the Canadian tourist industry. All ten provinces contributed footage for this picture and at a special preview at the 7th Federal-Provincial Tourist Conference in December, official delegates expressed favourable comments as to its effectiveness. By a special promotional campaign, this film will be shown throughout Canada to ensure a better appreciation of the tourist industry.

By the end of 1952, the supply of prints of all Canadian travel films in the U.S. was again increased and now totals 2,804 prints of 111 subjects. Within Canada, a total of 2,491 prints of 82 subjects are now in circulation.

Through distribution channels of the National Film Board in the U.S.A. Canadian travel films appeared at 33,569 showings to audiences totalling 2,698,485 people.

Canadian travel films form the major part of the special summer tourist program in Canada and resulted in 7,277 showings to audiences totalling 924,436 people.

Publicity

The Bureau's Publicity Division distributed 4,068 Canadian travel photographs, most of them in the United States to magazines, newspapers, and feature syndicates. Distribution of the Travel News Letter and other publicity releases was made to nearly 1,300 U.S. and Canadian editors regularly throughout the year.

Distribution of picture-stories promoting Canadian travel included a general winter vacation article with five photographs, which was requested by 128 editors through *Feature* magazine, and also went to some 20 more for special winter travel sections. A story on Laurentians developments, with four photographs, which went to some 35 United States newspapers and magazines, was produced. Considerable amounts of National Parks publicity were placed in magazines in both the United States and Canada.

A story, with photographs, on a highway holiday through Eastern Canada was distributed through *Feature* magazine; 115 editorial requests were received. Press releases mailed during the year, and widely used in the United States, included *Havens From Hay Fever in Canada, Highland Holiday—Canadian Style, Dude Ranch Vacations in Western Canada, Pacific Coast Honeymoons, Honeymoon in French Canada, Canada's Population Gains, Honeymoon Cruises in Canada, A Call to Canada, Canada 1952—A Nation on the March, Waterton Lakes National Park, Prince Edward Island National Park,* and others.

In addition to the highway holiday and 1952 winter vacation stories advertised in *Feature,* this medium was used to advertise two other picture-stories, one on 1951-52 ski vacations and the other on tulip time in Ottawa. Special placements of editorial and picture material were made throughout the year. The Publicity Division is responsible for processing all multilithed booklets produced by the Bureau.

Still Photographs

Extensive photographic schedules were carried out by the National Film Board of Canada on the Travel Bureau's behalf during June, July, and August. A publicity representative of the Bureau accompanied a National Film Board photographer during coverage in June of a series of travel situations in the Ottawa-St. Lawrence area, and one went with the photographer on a picture-taking tour of the provinces of Quebec, Nova Scotia, New Brunswick, and Prince Edward Island. Special attention was given to the National Parks. In Western Canada, a National Film Board photographer secured pictures for the Bureau in British Columbia, Alberta, Manitoba, and Saskatchewan. In 1951, practically the whole of the Travel Bureau coverage was in Ontario, and the 1952 schedules filled many gaps in the Bureau's files of both black-and-white and colour photographs. The pictures were used for advertising, publicity, and publications. About 40 per cent of all travel publicity photos mailed out were National Parks subjects.

Visual Aids and Technical Planning

The volume of work handled by this division during 1952 totalled more than 50,000 requests, of which 5,634 called for individually dictated letters. In addition 5,554 routings were marked on maps and 1,180 mileage itineraries were computed.

The new edition of *Canada—Vacations Unlimited* was prepared by this division, in co-operation with the Publicity Division. Revisions and reprints were made of other printed publications, and texts for several multilithed information booklets were prepared. All resort literature submitted to the Bureau for distribution was screened prior to approval. During the year, 2,228 photographs were distributed by this division.

Seventh Federal-Provincial Tourist Conference

The Seventh Federal-Provincial Tourist Conference was held in Ottawa on December 1st, 2nd and 3rd, 1952, with the Honourable Robert H. Winters, Minister of Resources and Development, as chairman. The Conference discussed all phases of Canada's tourist promotional efforts, and approved a report of a special committee recommending the use of the Canadian Government Travel Bureau's slogan, "Canada—Vacations Unlimited", in all advertisements and promotional material sponsored by Canadian travel advertisers.

National Parks Advertising

In the spring of 1952, the Canadian Government Travel Bureau launched a series of CBC network broadcasts on the National Parks of Canada, with the object of increasing Canadian interest in the parks and stimulating travel within Canada. The series ran for 13 weeks, and the half-hour programs combined musical entertainment with commentaries on the parks' attractions and recordings of interviews with visitors made the previous summer.

Director's Special Activities

During the 12 months ended December 31st, 1952, the Director of the Canadian Government Travel Bureau delivered addresses on Canadian travel subjects to various organizations in Halifax, Cornwall, Calgary, Banff, Niagara Falls, Peterborough, and Toronto. In the United States he spoke in New York, Los Angeles, San Diego, and Bay City. In February, he represented Canada at the First Pacific Area Travel Conference, held in Honolulu. In May he accompanied a group of business executives to Bermuda to confer with tourist officials there.

CANADA

DEPARTMENT OF
RESOURCES AND DEVELOPMENT

MAP SHOWING

CENTRES OF ACTIVITY

Scale of Miles

100 0 100 200 300

Other Game Reserves are scattered throughout Northwest Territories and Yukon

LEGEND

- Water Resources Office
- Forestry Office
- Wildlife Office
- Wildlife Warden Post
- R.C.M.P. Office (Where Agent for Northern Administration and Lands Branch)
- Engineering Office
- Trans-Canada Highway Office
- Trans-Canada Highway Route
- Northwest Territories Administrative Office
- National Park
- Historic Park
- Game Reserve
- Road Built and Maintained
- Road Built
- Special Project
- School
- Power Station (N.W.T.P.C.)
- Eastern Arctic Patrol Route
- Eastern Rockies Forest Conservation Area
- Canadian Government Travel Bureau

NATIONAL PARKS

1 Cape Breton Highlands
2 Prince Edward Island
3 Fundy
4 St. Lawrence
5 Point Pelee
6 Georgian Bay
7 Riding Mountain
8 Prince Albert
9 Elk Island
10 Jasper
11 Banff
12 Waterton Lakes
13 Yoho
14 Kootenay
15 Glacier
16 Mount Revelstoke

A.R. 52-53

Ottawa - Edmond Cloutier, C.M.G., O.A., D.S.P.
Queen's Printer and Controller of Stationery, 1953