PROVINCE OF BRITISH COLUMBIA

DEPARTMENT OF LANDS, FORESTS, AND WATER RESOURCES

HON. R. G. WILLISTON, *Minister*

E. W. BASSETT, *Deputy Minister of Lands* A. F. PAGET, *Deputy Minister of Water Resources*

REPORT

of the

LANDS SERVICE

and the

WATER RESOURCES SERVICE

YEAR ENDED DECEMBER 31

1962

Printed by A. SUTTON, Printer to the Queen's Most Excellent Majesty
in right of the Province of British Columbia.
1963

VICTORIA, B.C., January 31, 1963.

To Major-General the Honourable GEORGE RANDOLPH PEARKES,
V.C., P.C., C.B., D.S.O., M.C.,
Lieutenant-Governor of the Province of British Columbia.

MAY IT PLEASE YOUR HONOUR:

Herewith I beg respectfully to submit the Annual Reports of the British Columbia Lands Service and the Water Resources Service of the Department of Lands, Forests, and Water Resources for the year ended December 31, 1962.

R. G. WILLISTON,
Minister of Lands, Forests, and Water Resources.

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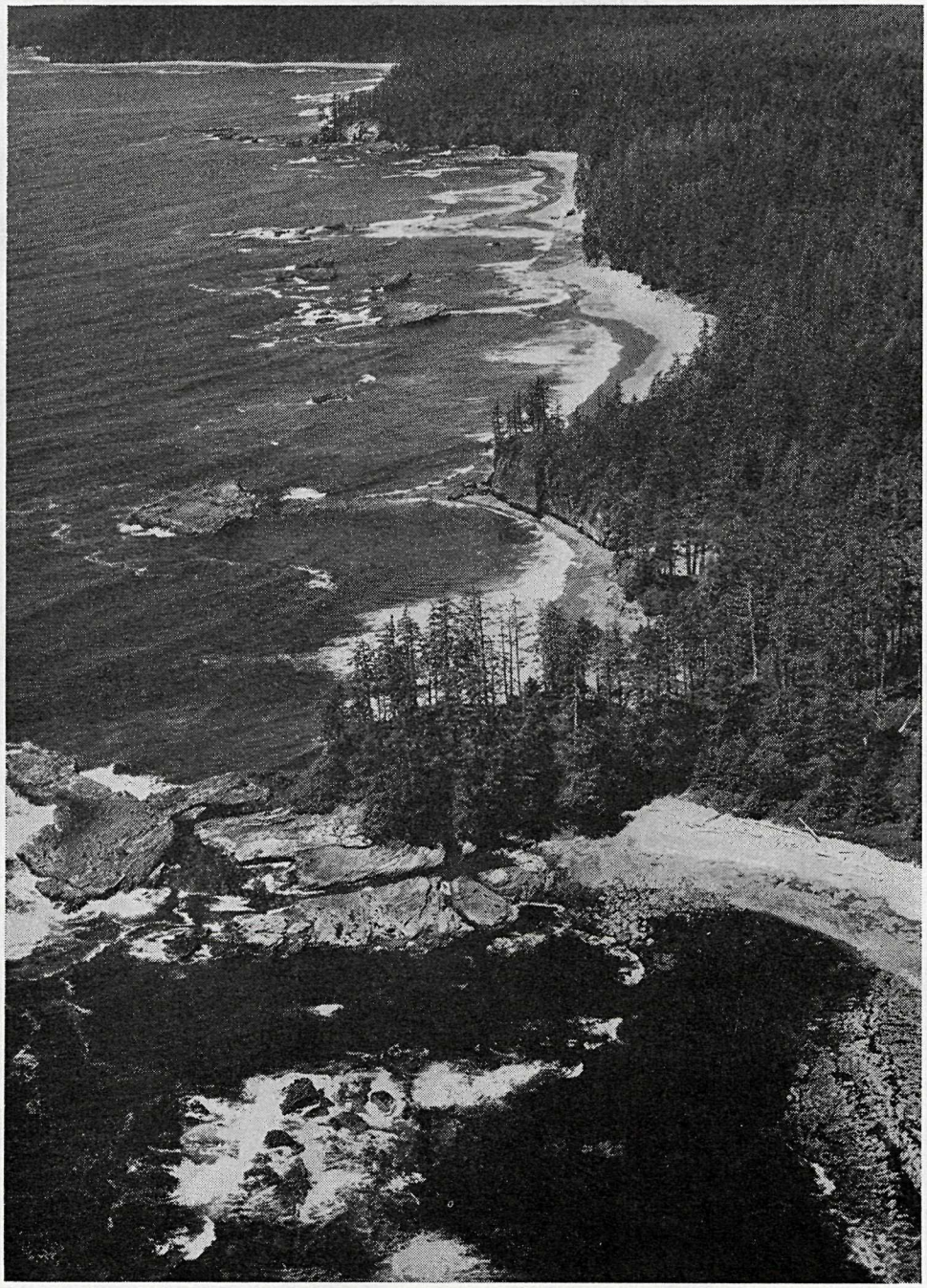
LANDS SERVICE

VICTORIA, B.C., January 31, 1963.

The Honourable R. G. Williston,
Minister of Lands, Forests, and Water Resources,
Victoria, B.C.

SIR,—I have the honour to submit the Annual Report of the British Columbia Lands Service of the Department of Lands, Forests, and Water Resources for the twelve months ended December 31, 1962.

E. W. BASSETT,
Deputy Minister of Lands.



Scenic west coast of Vancouver Island.

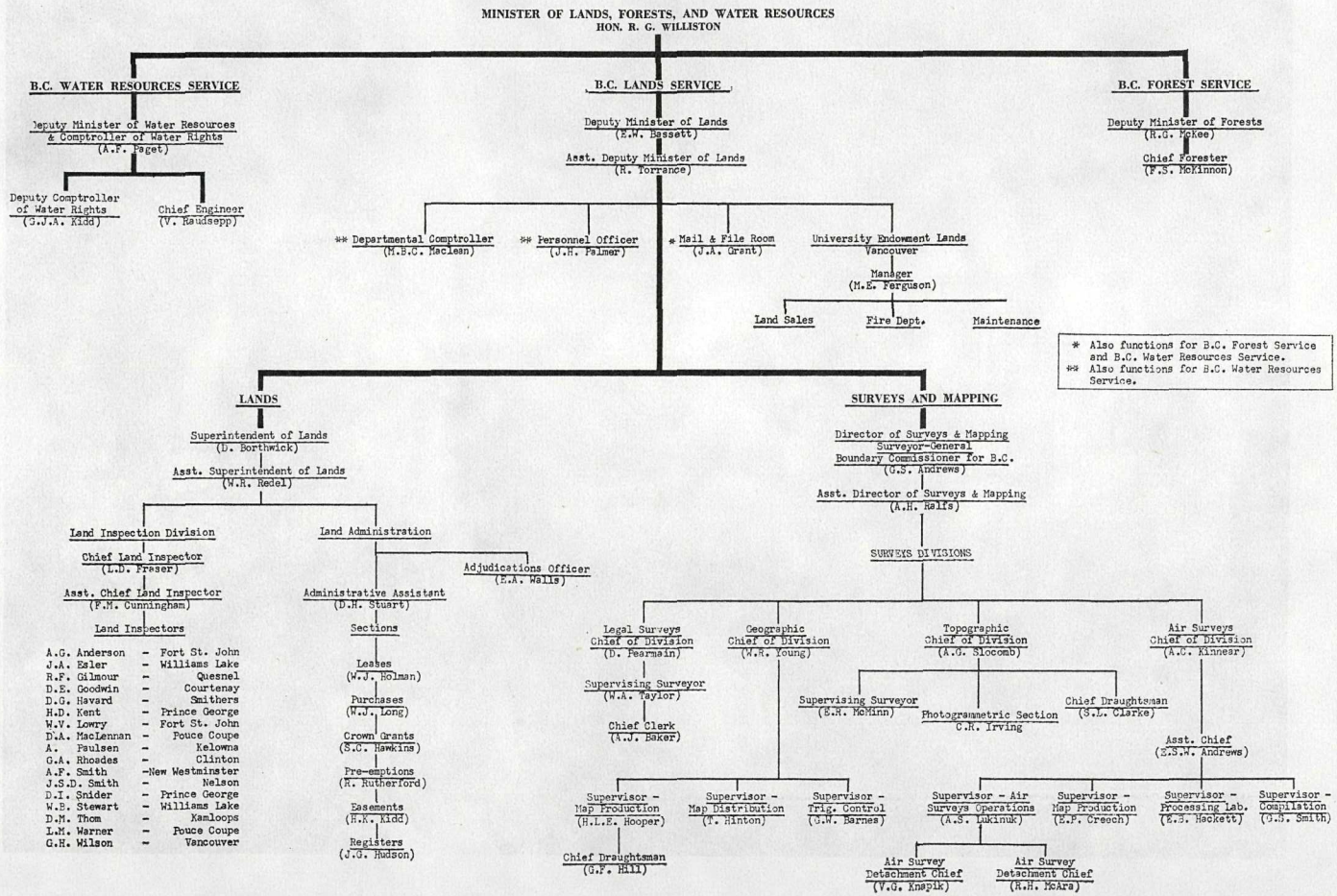
ORGANIZATION

BRITISH COLUMBIA LANDS SERVICE

DEPARTMENT OF LANDS, FORESTS, AND WATER RESOURCES

Victoria, B.C.

Year ending December 31, 1962



Report of the British Columbia Lands Service

E. W. Bassett, Deputy Minister of Lands

As a result of an amendment to the *Department of Lands and Forests Act,* administration of the water resources of British Columbia was, on April 1, 1962, transferred from the Water Rights Branch of the Lands Service to the newly created Water Resources Service. The Department is now composed of three principal units—the Lands, Forests, and Water Resources Services. Apart from the separation of the former Water Rights Branch, the affairs of the Lands Service proceeded normally through 1962. The Lands and the Surveys and Mapping Branches both had a very active year and continued to reflect the high level of social and economic activity which has been characteristic of British Columbia during the past decade.

There were several changes in the senior staff during 1962, resulting in new personnel for the following positions: Superintendent and Assistant Superintendent of Lands, Chief and Assistant Chief of the Air Division, and Assistant Chief Land Inspector. It is especially gratifying to note that these five positions were filled by promotion within the Lands Service.

Certain features pertaining to the settlement and administration of Crown lands deserve comment. The Peace River region continued to attract a large volume of applications for agricultural land, although there was also a notable upswing in the Burns Lake-Smithers belt and in the vicinity of Quesnel. Arrangements were made to have the provisions of the *Grazing Act* extended to include the Peace River District, and grazing requirements of prospective ranchers in this area will generally now be handled on a grazing permit basis. Leases for ranch headquarters and agricultural development purposes, such leases not to exceed 1,280 acres in total area, will be granted covering predominantly arable lands, subject to conditions designed to ensure that the lessees shall make bona fide use of the property.

The Lands Branch continued to develop subdivision lots where there is high public interest, and seven Crown subdivisions were planned and serviced. The disposal of Crown land by public auction or tender also continued to be popular. Forty-four acreage parcels were offered for sale and eight for lease by sealed tender, while public auctions offered 323 lots for purchase and 75 lots for lease.

The staff of the Land Inspection Division recorded 4,150 examinations of Crown land, a slight increase over the 1961 figure. Among this total were 44 appraisals on behalf of other Government departments and public agencies. A three-day conference held at Kamloops in February was attended by the full staff of the Land Inspection Division and by the Superintendent and Assistant Superintendent of Lands. The conferees benefited from the exchange of ideas, problems, and opinions.

The Legal Surveys, Topographic, Geographic, and Air Divisions of the Surveys and Mapping Branch continued to expand the survey framework and cartographic coverage of British Columbia.

In connection with cadastral surveys of Crown lands, the Legal Surveys Division issued 967 sets of instructions in 1962; this was 204 more than during the previous year. The Division also processed 12,541 clearances of Crown land applications, timber sales, water licences, and Crown grants. Other office work included preparing 2,941 plans for use by Land Inspectors and compiling 59 large-scale composite maps.

Introduced in 1961, the system of checking Land Registry Office plans by electronic computer was enlarged on October 1, 1962, to embrace the Land Registry Offices at Kamloops, Nelson, and Prince Rupert.

Field work conducted by the Legal Surveys Division was essentially similar to that performed in 1961. Subdivisions of Crown land produced 21 town lots and 222 rural lots, with Land Settlement Board lands at Ootischenia accounting for 166 of the latter. Survey notes were also received for 247 waterfront lots, five acreage parcels, 82.7 miles of highway right-of-way, 435 acres of parks, and three recreational reserves.

The Topographic Division introduced an editing system to review compilations of topographic, cadastral, and cultural detail on photogrammetrically produced sheets. In the Clinton and Bridge Lake areas a field check was made of 15 map-sheets which had been compiled from 1951 aerial photographs.

Field control for 15 standard National Topographic map-sheets was extended north-west of Fort St. James, and a survey crew aboard the motor-vessel "B.C. Surveyor" conducted photographic identification of 236 coastal triangulation stations on the Mainland between Jervis Inlet and Douglas Channel. Another Topographic Division field crew began a programme for extending second-order survey control from existing geodetic stations in the Lower Fraser Valley.

Eight entirely new Provincial maps were published by the Geographic Division in 1962. Particularly noteworthy was completion of the sixth and final sheet of a regional series covering the Province at 1-inch-to-10-miles scale and publication of land-status sheets at 1:250,000 scale for the Alberni, Victoria, and Vancouver areas. The complexity of cadastral detail shown on these status maps reflects the variety of cultural endeavour in this heavily settled section of British Columbia. Altogether, five such status maps were issued, completing the replacement of three older sheets, and the latter were removed from distribution.

Continuing a programme begun in 1961, the Geographic Division examined 366 well-site plans made from surveys under the *Petroleum and Natural Gas Act*. A new record of 99,324 maps were sold and distributed in 1962, an increase of 14 per cent over the previous 12 months.

The Air Division continued to concentrate on the production of interim maps at 4-inches-to-1-mile scale for the Surveys and Inventory Division of the British Columbia Forest Service. Besides the 15,000 square miles covered by slotted templet lay-downs at the above scale, another 14,000 square miles of cadastral detail were plotted and 60 final tracings prepared for public distribution.

The Air Division also commenced a special project on behalf of the Department of Finance. The entire 3,297-square-mile area of the Esquimalt and Nanaimo Railway land grant will, over a period of three years, be mapped at a scale of 2 inches to 1 mile to show the latest cultural and cadastral detail. A total of 2,400 square miles of ground survey data had been plotted by the end of the year.

Though poor photographic weather hindered flying operations, 19,726 aerial photographs were exposed in 1962. Slightly more than three-quarters of the photographs were for forest inventory purposes and the remainder for such uses as forest-development road engineering, water resources studies, highway projects, and land inspection.

This introduction has touched on a few highlights of the accomplishments of the Lands Service during the past year. The following pages contain, in detail, an account of these accomplishments.

ACCOUNTING DIVISION

ACCOUNTING DIVISION

M. B. MacLean, B.Com., Departmental Comptroller

The Division increased its establishment during 1962 by the addition of a junior clerk. This was the first increase in staff in over 10 years despite substantial increases in volume of expenditure, revenue, and number of active lease and purchase accounts.

Lease accounts increased from 4,886 as at December 31, 1961, to 5,452 at December 31, 1962, while purchase accounts increased from 1,810 to 1,874 during the same period.

The decrease in "land leases, rentals, fees, etc." revenue is accounted for by the fact that one large sand and gravel lease expired early in 1962 and operations on two other sand and gravel leases were considerably reduced.

Table 1.—Summary of Revenue Collections for the Year Ended December 31, 1962

Land leases, rentals, fees, etc.	$933,607.66
Land sales	836,270.32
Sale of maps and air photos	77,579.85
Water rentals and recording fees	2,115,738.00
Total	$3,963,195.83

Table 2.—Comparison of Revenue Collections for 10-year Period 1953–62, Inclusive

1953	$3,705,480.02
1954	2,065,181.52
1955	2,248,293.16
1956	2,518,722.51
1957	2,454,435.40
1958	2,596,050.13
1959	2,687,816.62
1960	3,224,498.27
1961	3,618,860.72
1962	3,963,195.83
Total	$29,082,534.18

Ten-year average, $2,908,253.41.

Table 3.—Classification of Revenue Collections for the Year Ended December 31, 1962

Land sales—		
Country lands	$645,983.22	
Town lots	182,701.05	
Surface rights, mineral claims	7,586.05	
		$836,270.32

Table 3.—Classification of Revenue Collections for the Year Ended December 31, 1962—Continued

Land leases, rentals, fees, etc.—			
Foreshore leases—			
Booming and log storage	$275,164.38		
Commercial (marinas, etc.)	229,330.52		
Oyster	8,533.60		
Miscellaneous (foreshore protection, etc.)	679.26		
		$513,707.76	
Land leases—			
Grazing and (or) agriculture)	$59,264.30		
Quarrying (limestone, sand and gravel)	32,044.23		
Camp-site (lodge, fishing)	5,554.79		
Home-site	1,783.82		
Miscellaneous (residential, etc.)	72,761.95		
		171,409.09	
Land-use permits		1,391.20	
Licences of occupation		7,451.67	
Royalty collections		75,466.44	
Easement collections—			
Annual rentals	$3,392.16		
Outright considerations	74,379.41		
		77,771.57	
Fees—			
Crown grant	$10,400.00		
Assignment	2,530.00		
Miscellaneous (lease, search, etc.)	7,494.00		
		20,424.00	
Sundry collections (occupational, rental, survey charges, etc.)		65,985.93	
			933,607.66
Sale of maps and air photos—			
Legal Division		$26,784.10	
Geographic Division		26,578.86	
Air Division		24,216.89	
			77,579.85
Water rentals and recording fees			2,115,738.00
Gross revenue for year			$3,963,195.83

Table 4.—Comparison of Land Leases, Rentals, Fees, etc., Revenue for 10-year Period 1953–62, Inclusive

1953	$1,608,773.65
1954	330,397.09
1955	425,595.79
1956	576,331.17
1957	472,415.55
1958	605,229.73
1959	668,367.70
1960	842,413.17
1961	1,001,071.13
1962	933,607.66
Total	$7,464,202.64

Ten-year average, $746,420.26.

NOTE.—The year 1953 includes coal, petroleum and natural-gas revenue.

Table 5.—Comparison of Land Sales for 10-year Period 1953–62, Inclusive

1953	$594,004.08
1954	488,303.49
1955	605,469.42
1956	573,976.49
1957	522,825.65
1958	677,036.15
1959	589,975.24
1960	806,723.54
1961	703,705.71
1962	836,270.32
Total	$6,398,290.09

Ten-year average, $639,829.

LANDS BRANCH

THE LANDS BRANCH

At the time of the Fraser River gold-rush in 1858 the demand for land in British Columbia was greatly intensified and pre-emptions predated surveys. Within four years 254 pre-emptors had taken up more than 50,000 acres of land. To facilitate the transfer of real estate and provide for the registration of titles, the *Land Registry Act* was passed in 1860. The Government of the Province of British Columbia was now in the real-estate business in a big way; the more than 366,000 square miles of land and water that constitutes British Columbia was the real estate in question.

With the entrance of British Columbia into Confederation in 1871, the demand for land quickened to a rush, and over the next thirty years the land-settler (and the promoter) succeeded the gold-miner in importance. Railroads were built and land grants passed, cities came into being, and companies became established. Land was at the core of all developments.

The task of land administration became very heavy and necessitated the formation of a Department of Lands in 1908. In 1912 a Forest Branch was included in the Department of Lands. Today the Department of Lands, Forests, and Water Resources exercises control of more than 90 per cent of the surface of British Columbia.

How does the Lands Branch fit into the total organization of the British Columbia Lands Service of today? The relation may be expressed briefly. **The Lands Branch has jurisdiction in matters pertaining to the disposition of Crown land, and is charged with so administering and disposing of the land that the general welfare, present and future, of the Province must be protected at all times.**

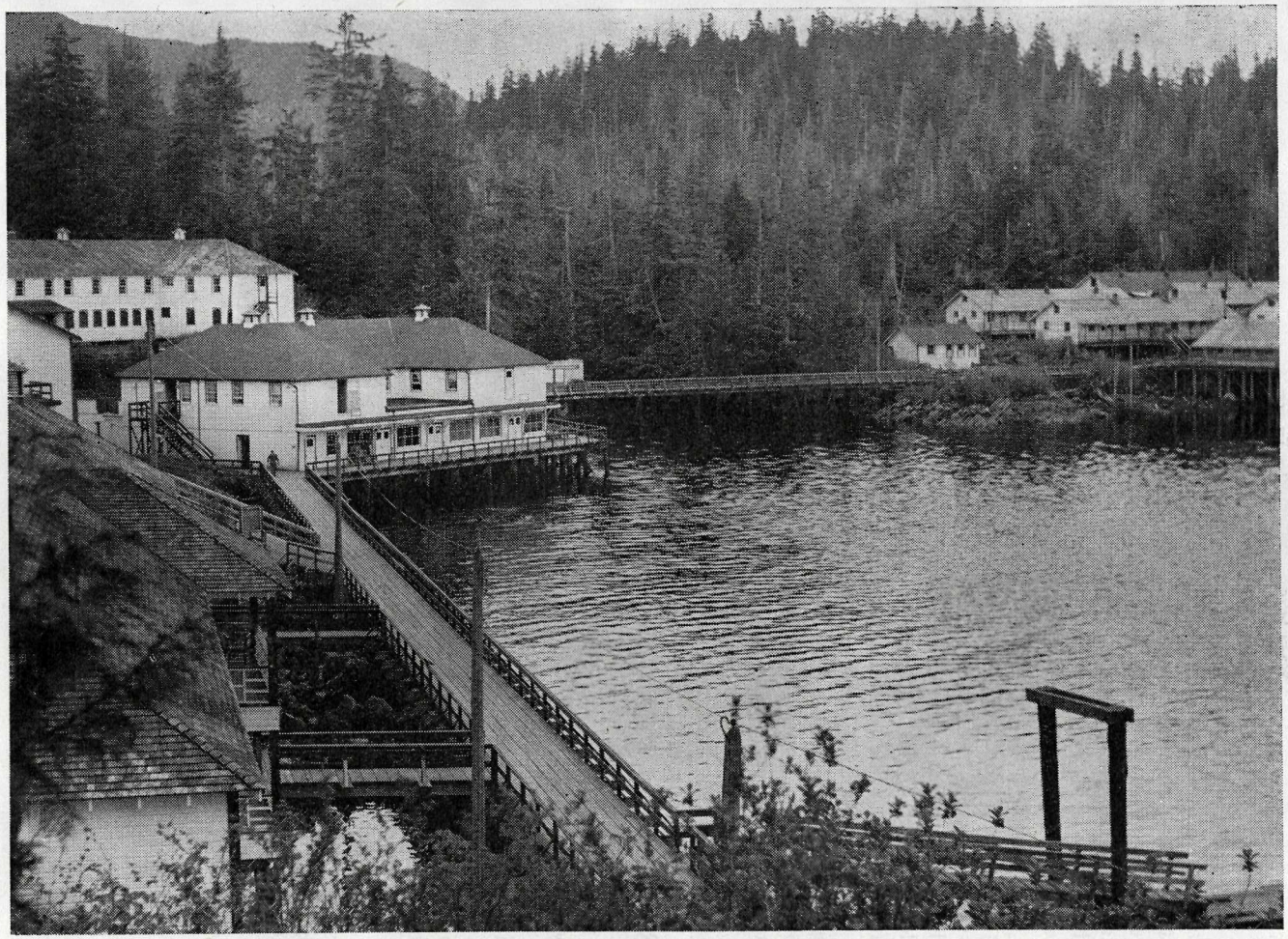
When an individual, or group, desires to purchase or lease Crown land, the application is directed to the Superintendent of Lands, head of the Lands Branch. His authority governs the following matters:—

- Sale, lease, and pre-emption of Crown lands for such purposes as agricultural, industrial, commercial, and home-sites.
- Preparation and issuance of Crown grants under the *Land Act* and the *Mineral Act*.
- Preparation and issuance of right-of-way easements for power, telephone, pipe lines, etc.
- Reservation of suitable Crown lands and foreshore for national defence, use and enjoyment of the public, forestry experimentation, fisheries research work, highways, etc.
- Granting railway rights-of-way under various Statutes.
- Protection of historic sites from alienation.
- Reservation and conveying of Crown lands for such purposes as school-sites, cemeteries, and fair grounds.
- Leasing of land and foreshore for such varied purposes as wharf-sites, booming-grounds, canneries, oyster and other mollusc fisheries, and for boat-houses, quarry-sites, cattle-ranching, trappers' cabins, ship-building, and aircraft bases.

To perform these and other functions efficiently, the Lands Branch works in close co-operation with a great number of other agencies, such as municipal and city administrations, town-planning authorities, the British Columbia Forest Service, the Water Resources Service, the Surveys and Mapping Branch within the British Columbia Lands Service, and all the departments in the Government of the Province, notably Highways, Education, Attorney-General, and Agriculture.

Outside the Provincial departments there is much business transacted with Federal departments, such as the Department of National Defence, the Veterans' Land Settlement Act administration, the Public Works Department, and the Indian Affairs Branch of the Department of Citizenship and Immigration.

Direct service to the people of British Columbia is the first duty of the Lands Branch and this takes the bulk of the time of the Lands Branch personnel. Associated with this prime duty is the important function of the maintenance of the records, which in many cases are the only ones in British Columbia showing the correct legal status of the surface of the Province.



Isolated west coast settlement, Namu, B.C.

LANDS BRANCH

D. BORTHWICK, B.S.A., B.ED., A.A.C.I., SUPERINTENDENT OF LANDS

During 1962 the most active region of the Province with respect to agricultural land applications has been the Peace River District. The suitability of this area for stock-raising and the growing of coarse grains has stimulated public interest, with a resultant influx of settlers from the United States and Prairie Provinces. A trend toward large grazing-lease applications for marginal agricultural land precipitated the adoption of a revised lease policy late in the year. The benefits of the *Grazing Act* were extended to the Peace River District, and henceforth grazing rights will generally be by permit. Leases for agricultural development and (or) ranch headquarters not exceeding 1,280 acres in extent will be accepted over predominantly arable lands, subject to the lessee making bona fide use of same within the initial three-year period of the lease. It is hoped that this change in policy will encourage development of the land and discourage speculative applications which restrict the influx of bona fide settlers.

In addition to the Peace River area, there has been considerable interest in agricultural lands in the Burns Lake-Smithers area. Most of these applications have been for grazing purposes, and the interest stems from local settlers as well as from new residents to the district.

The Lands Branch policy to provide Crown subdivision lots in the unorganized areas of the Province where sufficient public interest is manifest was continued in 1962. Seven subdivisions were laid out and serviced by roads on Green Lake, Ryder Lake, Tie Lake, Wasa Lake, Horse Lake, Young Lake, and Marshall Lake.

The policy of granting financial assistance toward the cost of extending rural electric lines where such lines traversed unalienated parcels of vacant Crown land was continued in 1962.

Work was continued on the compilation and revision of the Land Series bulletins in 1962. A new bulletin on the Peace River District was compiled and is now available. The Kootenay bulletin, Fort Fraser-Fort George bulletin, Lower Coast bulletin, and the bulletin covering the acquisition of Crown lands were revised during the past year.

The activities of the Department continued at a high level during 1962. The volume of work handled was almost identical to last year, but the gross revenue received was the highest on record for the past 10 years, representing a 3.8-per-cent increase over 1961 and a 40-per-cent increase over the average income for the past 10 years.

A brief summary of the activities of the various sections of the Administration Division of the Lands Branch is set out hereunder:—

Lease Section.—The work load of this Section showed a slight decrease, from 2,363 applications received in 1961 to 2,246 applications in 1962. However, the number of lease indentures prepared increased by about 10 per cent, rising from 1,033 in 1961 to 1,133 in 1962.

Purchase Section.—The work load of this Section rose from 2,165 applications in 1961 to 2,246 applications in 1962, representing an increase of 3.7 per cent.

Crown Grant Section.—There was a reduction in the number of Crown grant applications received, but an increase in the number of Crown grants prepared.

Pre-emption and Reserve Section.—In this Section there was a decrease in the number of applications received, dropping from a total of 804

applications in 1961 to 709 applications in 1962. There was, however, a sharp increase in the number of reserves established, ranging from 545 in 1961 to 623 in 1962. In addition to the above work, this Section dealt with 2,411 general inquiry letters.

Status Section.—Once again the activity of this Section reflected a very sharp increase over the previous year. In 1962 the number of statuses completed was 18,671, as compared to 14,611 in 1961, representing an increase of 28 per cent.

Easement Section.—There was a marked increase in the activities of this Section. The applications received climbed to 207 in 1962, as compared with 145 in 1961, depicting a percentage increase amounting to 48 per cent.

In addition to the above activities, 30,351 letters were received by the Lands Branch and 2,091 counter inquiries were handled by the staff.

A total of 44 acreage parcels was offered for sale by tender, of which 24 were sold for a bid price of $32,867.32. In addition, eight acreage parcels were offered for leasehold by tender.

Twenty-six public auction sales involving 323 lots were offered for purchase by auction. One hundred and forty-six lots were sold on the date of the sale, realizing in total the sum of $153,733. Six public auctions of leases, comprising a total of 75 lots, were also held during the year.

The tables following indicate in some detail the work carried out by the Administrative Division of the Lands Branch. The report of the Inspection Division is presented separately by the Chief Land Inspector.

Table 1.—Country Land Sales, 1962

	Acres
Surveyed	99,845.69
Unsurveyed	27,310.06
Total	127,155.75

Table 2.—Certificates of Purchase Issued, 1962

Land Recording District	Total
Alberni	21
Atlin	------
Cranbrook	45
Fernie	13
Fort Fraser	78
Fort George	137
Fort St. John	204
Golden	17
Kamloops	61
Kaslo	6
Lillooet	48
Nanaimo	30
Nelson	11
New Westminster	12
Osoyoos	6
Pouce Coupe	102
Prince Rupert	37

Table 2.—Certificates of Purchase Issued, 1962—Continued

Land Recording District	Total
Quesnel	43
Revelstoke	7
Similkameen	28
Smithers	66
Telegraph Creek	------
Vancouver	41
Victoria	8
Williams Lake	85
Total	1,106

Table 3.—Town Lots Sold, 1962

Town	Lots	Value
Barkerville	10	$1,315.00
Barriere	4	1,320.00
Beaverdell	4	275.00
Bralorne	1	275.00
Carmi	1	25.00
Cascade	4	250.00
Celista	2	450.00
Chetwynd	1	285.00
Coalmont	9	450.00
Cowichan Station	1	145.00
Elko	7	310.00
Extension	2	200.00
Falkland	4	1,250.00
Fernie	5	711.00
Fort Fraser	35	2,480.00
Fort Nelson	4	1,795.00
Gold Bridge	7	885.00
Harrison Hot Springs	1	25.00
Hedley	1	120.00
Hope	1	200.00
Hosmer	28	1,214.00
Houston	10	1,600.00
Huntingdon	1	200.00
Lac la Hache	9	2,410.00
Masset	5	130.00
Merritt	3	750.00
Montrose	2	20.00
New Hazelton	14	460.00
Port Clements	3	250.00
Port Edward	4	920.00
Prince George	38	31,685.00
Prince Rupert	7	5,720.00
Princeton	1	260.00
Qualicum Beach	1	225.00
Queen Charlotte	74	2,990.00
Ste. Marie Lake	15	3,440.00

Table 3.—Town Lots Sold, 1962—Continued

Town	Lots	Value
Salmo	4	$344.00
Slocan	1	72.00
Smithers	41	5,205.00
Sointula	4	1,400.00
South Fort George	7	4,225.00
Stewart	20	2,590.00
Telkwa	1	70.00
Topley	3	200.00
Union Bay	7	980.00
Vancouver	1	10.00
Vanderhoof	1	90.00
Wells	16	2,200.00
Williams Lake	1	31,200.00
Willow River	1	50.00
Wilmer	25	720.00
Yale	1	100.00
Ymir	4	363.00
Miscellaneous	61	14,815.00
Totals	518	$129,674.00

Table 4.—New Leases Issued, 1962

	Number	Acreage
Land—		
Agriculture	52	16,823.00
Hay and grazing (pasture and hay-cutting)	478	165,711.81
Quarrying (sand, gravel, limestone, etc.)	11	674.59
Home-site (section 78, *Land Act*)	10	146.00
Residential	304	640.86
Miscellaneous (resorts, service-stations, camp-sites, mill-sites, etc.)	50	872.08
Foreshore—		
Booming, log storage, log-dumping, etc.	90	1,350.51
Oyster and shellfish	9	60.13
Industrial (canneries, mill-sites, wharves, etc.)	13	75.22
Quarrying (sand, gravel from river-beds)	2	22.50
Commercial (boat rentals, marinas, marine service-stations, etc.)	46	224.55
Miscellaneous (private wharves, boat-houses, etc.)	29	205.14
Totals	1,094	186,806.39

Table 5.—Temporary Tenure Leases Renewed, 1962

Number	93
Acreage	12,804.27

Table 6.—Land-use Permits Issued, 1962

Number	21
Acreage	63.50

Table 7.—Licences to Occupy Issued, 1962

Number	18
Acreage	2,200.87

Table 8.—Assignments Approved, 1962

Leases, land-use permits, licences of occupation	434

Table 9.—Easements Granted, 1962

	Number	Miles	Acres
Foreshore			
Water pipe-line	3	1.535	6.057
Sewer pipe-line	2	0.063	0.076
Submarine cable	1	1.119	95.450
Oil pipe-line	1	0.155	7.490
Totals	7	2.874	109.073
Land			
Oil pipe-line	15	93.566	553.720
Gas	15	17.020	108.230
Television cable	1	0.140	0.933
Television and radio sites	3	.....	5.500
Sewers	7	0.776	2.510
Access roads	3	1.164	3.099
Water pipe-line	10	3.174	12.649
Ground beds	1	.....	1.290
Well-sites	9	.....	133.720
Totals	64	115.840	821.651
Grand totals	71	118.714	930.724

In line with current Departmental policy, 62 letters of consent for the construction of access roads were issued during the year.

Table 10.—Crown Grants Issued, 1962

Purchases (country lands)	678
Purchases (town lots)	287
Pre-emptions	21
Surface rights (*Mineral Act*)	26
Public Schools Act	19
Veterans' Land Settlement Act	5
Home-site leases	14
Pacific Great Eastern Railway Company	12
Supplementary timber grants	1
Miscellaneous	18
Total	1,081

Certified copies of Crown grants issued, 2.

Table 11.—Crown Grants Issued for Past 10 Years

1953	1,829
1954	1,276
1955	1,498
1956	1,518
1957	1,426
1958	1,043
1959	1,471
1960	1,399
1961	1,074
1962	1,081
Total	13,615

Ten-year average, 1,361.

Table 12.—Total Area Deeded by Crown Grant, 1962

	Acres
Purchases (country lands)	61,508.78
Pre-emptions	3,264.79
Surface rights (*Mineral Act*)	998.84
Public Schools Act	31.18
Veterans' Land Settlement Act	636.32
Home-site leases	190.16
Pacific Great Eastern Railway Company	1,131.55
Supplementary timber grants	20.00
Miscellaneous	208.25
Total	67,989.87

Table 13.—Pre-emption Records, 1962

Land Recording District	Pre-emptions			C. of I. Issued
	Applications Received	Applications Allowed	Cancelled	
Alberni	----	----	----	----
Atlin	----	----	----	----
Cranbrook	----	----	----	----
Fernie	----	----	----	----
Fort Fraser (Burns Lake)	3	3	1	1
Fort George (Prince George)	19	8	9	2
Fort St. John	42	36	14	2
Golden	----	----	1	----
Kamloops	2	----	----	----
Kaslo	----	----	----	----
Lillooet (Clinton)	----	----	----	----
Nanaimo	1	----	----	----
Nelson	----	----	----	----
New Westminster	----	----	----	----
Osoyoos (Vernon)	----	----	----	----
Pouce Coupe	79	73	60	14
Prince Rupert	----	----	----	----
Quesnel	11	6	3	1
Revelstoke	----	----	----	----
Similkameen (Penticton)	1	----	----	----
Smithers	2	----	----	----
Telegraph Creek (Prince Rupert)	----	----	----	----
Vancouver	----	----	----	2
Victoria	----	----	----	----
Williams Lake	2	1	----	----
Totals	162	127	88	22

Table 14.—Reserves, 1962

	Applications Received	Reserves Completed
Use, recreation, and enjoyment of the public	171	250
British Columbia Department of Highways (rights-of-way, gravel pits, bridge sites, etc.)	169	164
Federal Government (defence purposes, wharf-sites, etc.)	46	52
British Columbia Forest Service (Ranger stations, grazing, radio-sites, reforestation, etc.)	64	69
Miscellaneous (Game Branch, water-power projects, garbags dumps, school-sites, cemeteries, etc.)	97	88
Totals	547	623

General Summary

	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	Ten-year Average
Pre-emption records issued	53	97	48	35	66	99	53	77	147	127	80
Certificates of improvements issued	77	71	41	52	43	67	39	27	18	22	46
Certificates of purchase issued	1,743	1,043	1,084	935	1,012	1,151	1,114	1,248	944	1,106	1,138
Crown grants issued	1,829	1,276	1,498	1,518	1,426	1,043	1,471	1,399	1,074	1,081	1,361
Total acreage deeded by Crown grants	99,036	73,461	65,941	80,308	89,907	58,798	91,294	79,766	75,486	67,989	71,399
New land sales—											
Number	1,743	1,043	1,084	935	1,012	1,151	1,114	1,248	944	1,106	1,138
Value	$745,874.44	$391,989.96	$578,487.16	$546,702.70	$511,895.02	$676,627.48	$669,899.78	$857,060.67	$673,655.53	$779,746.36	$643,193.91
Leases under *Land Act*	353	366	311	264	276	479	513	802	1,013	1,094	547
Acreage leases, *Land Act*	46,089	50,064	67,195	51,301	56,808	77,912	51,777	107,474	104,029	186,806	79,945
Temporary tenure leases renewed	75	52	62	65	72	66	88	103	100	93	77
Land-use permits	28	27	25	21	22	9	8	21	13	21	19
Licences of occupation, easements, etc.	40	35	40	87	55	46	27	35	7	18	39
Clearances of reverted mineral claims	461	400	663	783	361	245	291	303	282	458	425
Reservations for use and enjoyment of public and other purposes	332	440	392	422	430	454	640	550	581	547	479
Land Act collections	$944,679.01	$818,700.58	$1,031,056.01	$1,140,178.27	$980,411.88	$1,282,265.85	$1,258,342.94	$1,649,136.71	$1,704,776.84	$1,769,877.98	$1,262,942.61

LAND INSPECTION DIVISION

L. D. FRASER, B.SC.A., P.AG., A.A.C.I., CHIEF LAND INSPECTOR

The trend established in past years toward an ever-increasing volume of work handled by this Division continued during 1962. The increase in completed inspections this year over last was only 2 per cent, which is nominal; the backlog of 571 inspections at the end of 1962 represents a 26-per-cent increase over last year.

During the past year this Division examined and submitted appraisal reports for many outside departments and agencies. Although the total number of examinations involved was only 44, or slightly better than 1 per cent of our total work load, the hours of work required for each examination were far above the average devoted to most reports. This is due to the complexity of the appraisals concerned and to the fact that up to one or two weeks have been spent on one appraisal. Detailed appraisals were made for the Pacific Great Eastern Railway Company, Capital City Planning Board, Department of Highways, British Columbia Forest Service, Department of Public Works, Department of Recreation and Conservation, Southern Okanagan Lands Project, Land Settlement Board, Veterans' Land Act, and Fort Steele Restoration Committee.

The following increases or decreases in requests for land examinations received by each land inspection district are noted below:—

	Per Cent		Per Cent
Clinton	—31	Prince George	—9
Courtenay	+12	Quesnel	+35
Fort St. John	+7	Smithers	+33
Kamloops	+26	Vancouver	—23
Kelowna	—12	Victoria	—20
Nelson	—21	Williams Lake	+32
New Westminster	+43	British Columbia Forest Service and others	+71
Pouce Coupe	—5		

There was an increase in eight districts and a decrease in seven, counting the Coast.

The number of requests for land inspections in the Peace River District shows signs of levelling off, but the acreage involved in each application is increasing.

There was a distinct increase in the Smithers district due to greater demand for land. This is probably a sign that the district is emerging from the pioneer stage to a more stable farming economy.

The increase in the Kamloops area was due primarily to boundary changes. Portions of the Clinton, Kelowna, and Prince George districts were added to Kamloops. Without these changes, the work load would have been down from last year. The shifting of district boundaries resulted in a decline in the three other districts involved.

In Quesnel there was a noticeable increase in inspections for agricultural land. In most instances the applicants were established farmers, interested in expanding their own holdings. This is a desirable situation and should result in a more stable farm economy. About 20 per cent of the applications were from new settlers moving into the district.

The trend to acquire ranches in the Cariboo region by ranchers from Washington, Oregon, and California is continuing. This influx of new settlers has increased land inspections. It has also prompted local ranchers to make application for

Crown lands formerly grazed under permit. As a result, many problems dealing with the management of Crown range have arisen in the Williams Lake and Clinton districts.

An increase in the New Westminster district was due to the transfer of the Indian Arm area from the Vancouver district. The work in this area is predominantly summer-home site inspections and accounted for 41 examinations during the past year. While this transfer resulted in an increase in work for the New Westminster district, it caused a decrease for the Vancouver district. Indications are that the work volume should increase in this latter district in the next year or two due to the proposed extension of the Squamish Highway to Pemberton. The proposed increase in ferry service to the Sechelt Peninsula should also result in increased activity in that area.

Although the work load is down this year in the Nelson district, it is anticipated that this condition will be short lived. There will undoubtedly be a decided increase in tourist traffic in future years due to the completion of the Rogers Pass section of the Trans-Canada Highway and the Christina Lake-Kinnaird Road. The anticipated influx of tourists should result in a demand for land for many purposes associated with the tourist industry.

The work load in the Victoria district has remained fairly constant when compared to past years but is increasing in the Courtenay area and upper Coastal regions. Much of the latter work is currently being done by the British Columbia Forest Service.

There is a growing need for the use of float-equipped aircraft to examine applications in remote and inaccessible parts of the Province. Inspections which used to take several days by boat can now be done in a matter of hours. The Topographic Division of the Lands Service has made its float-equipped Beaver aircraft available for inspection work before and after its field season. Unfortunately, inclement weather in the spring and fall of this year prohibited advantageous use of this aircraft.

STAFF

During the past year several changes were made in the location of the field staff. Mr. W. R. Redel, Assistant Chief Land Inspector, was promoted to the position of Assistant Superintendent of Lands, effective August 16, 1962. The position of Assistant Chief Land Inspector remained vacant until September 1, 1962, when it was filled by the appointment of Mr. F. M. Cunningham, who subsequently transferred from Vancouver to Victoria on November 1, 1962. Mr. G. H. Wilson, Land Inspector 2, was promoted to Land Inspector 3, effective October 15, 1962, and transferred from Kamloops to Vancouver, effective November 1, 1962. On October 26, 1962, Mr. D. I. Snider, Land Inspector 2, Prince George, was selected for transfer to Kamloops. However, the actual transfer has not been effected to date. As a result of this transfer, a vacant position exists in the Prince George office at the present time. Mr. L. M. Warner, a recent graduate in agriculture from the University of British Columbia, was taken on the staff, effective May 22, 1962, and assigned to the Pouce Coupe district.

DISTRICT PROBLEMS

During the past year it was found necessary to rush temporary assistance to various land inspection districts throughout the Province where the backlog of outstanding inspections had reached a critical stage. Some temporary measure of

relief was provided by shifting Inspectors from other districts where the work load was less critical.

Some changes were made in district boundaries to distribute the work load more evenly. In some cases the development or extension of roads resulted in particular areas being more accessible from one district headquarters than from another.

In the Peace River area the average size of each lease application increased from 200 acres in 1958 to 480 in 1962. This alone has necessitated extra field work, which is not reflected in the work load. Petroleum and hydro projects continue to encourage settlement by providing access to Crown lands and employment for prospective settlers. Unfortunately the access roads provided by exploration companies are often abandoned, which creates an access problem in subsequent years to good farm land, which is becoming increasingly scarce in the Peace River District.

In the Prince George area the same notable increase in the size of the applications was apparent. In 1959 the average size for each application was 90 acres. In 1962 this had increased to 150 acres. Time devoted to inspections, particularly applications for agricultural land, is increasing due to poor road access and increasing conflict in land use between agriculture and forestry.

Another problem is the conflict between established ranchers and new settlers over the acquisition of favourable grazing areas. This problem will continue to increase as more lands are placed under lease tenure or sold. The Land Inspector is placed in the position of having to interview interested parties personally where conflicts are known or anticipated.

A problem facing the Inspectors in the Williams Lake area is the rapid growth in the beaver population. This has resulted in damming and flooding, and access is hampered thereby.

LAND INSPECTORS' CONFERENCE

A conference was held at Kamloops on February 7, 8, and 9, 1962. All Land Inspectors attended, as well as the Chief Land Inspector, the Assistant Chief Land Inspector, the Superintendent of Lands, and the Assistant Superintendent of Lands.

Each Land Inspector prepared a paper on a special appraisal or land-use problem. These were presented at the conference and contributed a great deal toward an increased understanding of each other's problems. Special district problems were raised, which resulted in beneficial discussions.

STATISTICS

Table 1 presents a comparison on a year-to-year basis of the volume of field work completed by the Land Inspection Division over the past five years. Table 2 presents a breakdown of the number and type of inspections completed during 1962.

A review of Table 2 indicates that inspections for applications to purchase Crown land decreased by 11.4 per cent in 1962 compared to 1961. On the other hand, inspections for applications to lease Crown land for various purposes increased by 19.5 per cent over 1961. This is attributable to an increase in applications for grazing leases. Foreshore lease inspections increased 15 per cent in 1962 over 1961, with the increase mainly due to foreshore lease reviews, which increased from 73 in 1961 to 146 in 1962.

Table 1.—Land Inspection, 1958–62

Land Inspection District	Examinations Made during—					Outstanding at the End of—				
	1958	1959	1960	1961	1962	1958	1959	1960	1961	1962
Clinton	173	259	249	234	185	49	31	28	41	16
Courtenay	168	187	219	199	187	31	29	40	18	33
Fort St. John	409	428	435	580	584	33	52	63	60	100
Kamloops	189	154	163	229	277	23	12	10	8	22
Kelowna	175	216	226	198	160	34	39	24	25	13
Nelson	189	201	221	290	211	22	54	38	19	42
New Westminster	149	175	164	133	177	6	8	2	1	12
Pouce Coupe	250	308	330	436	512	11	42	4	44	30
Prince George	342	382	395	503	474	34	66	51	67	73
Quesnel	123	141	205	195	218	14	23	28	24	43
Smithers	205	225	215	217	290	57	33	33	66	116
Vancouver	200	184	258	287	219	7	12	16	11	19
Victoria	116	112	119	129	100	3	11	3	2	3
Williams Lake	318	276	280	389	457	24	50	121	68	49
B.C.F.S. and others	37	59	85	56	98	----	----	----	----	----
Totals	3,043	3,307	3,564	4,075	4,150	348	462	461	454	571

Table 2.—Types of Inspections, 1962

Purchases—	
Agriculture (other than grazing)	455
Access (roads, etc.)	5
Commercial (resorts, service-stations, hotels, airfields, etc.)	68
Community (cemeteries, church-sites, parking areas, etc.)	18
Grazing (pasture, range)	233
Home-sites (permanent)	296
Industrial (mill-sites, power-sites, manufacturing plants, etc.)	31
Summer-home or camp site	33
Wood-lots or tree-farms	3
Purchase Crown F.S.	4
Leases—	
Land—	
Agriculture (other than grazing)	289
Commercial (resorts, service-stations, hotels, airfields, etc.)	29
Community (parks, cemeteries, dump-sites, etc.)	24
Grazing (pasture, range, hay-cutting, etc.)	624
Home-sites (section 78 of *Land Act*)	5
Home-sites (permanent, other than section 78 of *Land Act*)	50
Industrial (mill-sites, power-sites, manufacturing plants, etc.)	19
Summer-home or camp site	279
Quarrying (sand, gravel, limestone, diatomaceous earth, etc.)	29
Reviews (rental and (or) diligent use)	48
Trap cabin	1
Foreshore—	
Booming and log storage or log-dumping	102
Commercial (boat rentals, marine service-stations, wharves, etc.)	52

Table 2.—Types of Inspections, 1962—Continued

Leases—*Continued*	
Foreshore—*Continued*	
Industrial (mill-sites, canneries, factory-sites, wharves, etc.)	28
Quarrying (sand and gravel from river-beds)	2
Oyster and shellfish	3
Private (floats, boat-houses)	15
Reviews (rentals and (or) diligent use)	146
Recreational, public use, mill waste	4
Land-use permits	41
Licence of occupation	23
Easements and (or) rights-of-way	9
Pre-emptions—	
Applications	89
Annual inspections (including applications for Crown grant)	208
Subdivisions—	
Valuations	30
Survey inspections	5
Plans cancellation	1
Proposals (lake-shore, residential, etc.)	10
Reserves—	
Grazing	3
Gravel pits	1
Recreational	58
Others	21
Veterans' Land Act	3
Land Settlement Board—	
Classification	5
Valuations	7
Doukhobor lands	4
Southern Okanagan Lands Project	2
Pacific Great Eastern Railway Company	14
Department of Social Welfare	1
Other agencies—Highways, British Columbia Forest Service, Department of Public Works, Game Branch, Fort Steele Restoration Committee	8
Miscellaneous inspections—	
Assignments	1
Delinquent accounts	19
Escheats Act	1
Lake reconnaissance	48
Land-use surveys	37
Land values (current market values)	24
Protests	18
Section 53 (2) of *Land Act* (verifying improvements)	413
Section 65 of *Land Act* (free grants)	2
Section 78 of *Land Act* (*re* compliance with provisions of)	42
Section 130 of *Land Act* (lands vested in Crown under *Taxation Act*)	------

Table 2.—Types of Inspections, 1962—Continued

Miscellaneous Inspections—*Continued*	
Section 131B of *Land Act* (cases of doubt regarding inclusion of body of water in Crown grant)	12
Trespass (land)	36
Trespass (water)	36
Quieting Titles Act	14
Others—River-bank erosion, dump-site (garbage), permission to waive royalty payment, check building removal, exchange with Indian Affairs Department, lake-bottom improvements	9
Total	4,150

Included in this table are 98 inspections completed by the British Columbia Forest Service and Department of Finance. These inspections were made in the more remote areas of the Province. This amounts to a 71-per-cent increase over the work done last year for this Division by outside branches.

SURVEYS AND MAPPING BRANCH

THE SURVEYS AND MAPPING BRANCH

The framework of maps and surveys so necessary for the orderly development and settlement of British Columbia is provided through the Surveys and Mapping Branch. That such scientific foundations were necessary even in the earliest days is shown by the fact that in 1851 the position of Colonial Surveyor for the young Crown Colony of Vancouver Island was created. In more than 100 years which have passed since Joseph Despard Pemberton was appointed first Surveyor-General, British Columbia has expanded immensely in all spheres of human endeavour. Much of the foundation for the way of life we have in British Columbia today rests on the reliability of our basic surveys. As British Columbia has progressed through time, so the surveys and maps of the Province have increased in magnitude and complexity.

It is the responsibility of the Surveys and Mapping Branch, through the Boundary Commissioner, to establish and maintain co-operatively the boundaries between this Province and the other adjacent Provinces and Territories of Canada. Within the Province, the Branch has established and is ever extending a basic network of triangulation surveys which are fundamental to determining geographical locations and co-ordinating property boundaries. The surveying procedures vary according to the intended purposes. Topographic surveys are constantly improving the portrayal of various physical features. Cadastral (legal) surveys, on the other hand, delineate the parcels of Crown lands subject to alienation under the *Land Act*. Finally, it is necessary to show on published maps the combined survey effort in order to give a visual account of the position of land alienation and geographic features of British Columbia. Maps must satisfy a wide range of uses, whether it be by the sportsman searching for an untapped valley or virgin lake, the homesteader seeking unsettled lands, or the industrialist planning new ways and new places to develop the resources of this Province.

So much for the uses of maps and surveys and their necessity. Also interesting is the great variety of techniques and equipment which must support our complex surveying and mapping organization. This includes photography from aircraft using precise cameras calibrated to less than a thousandth of an inch, modern optical surveyors' theodolites which read directly to seconds of arc, other instruments such as the tellurometer (a distance-measuring device which operates on a principle similar to radar), and plotting devices which are capable of precise mapping directly from aerial photographs. Helicopters and other aircraft speed surveyors to the remotest locations. Surveying is also expanding into the realm of electronic computers which can process the contents of field-notes in seconds compared with hours by manual methods. In all these ways, the science of surveying and mapping continues to serve the people by keeping pace with their needs and with the continual technological advances of our age.

The following is a brief summary of the functions of the various divisions of the Surveys and Mapping Branch:—

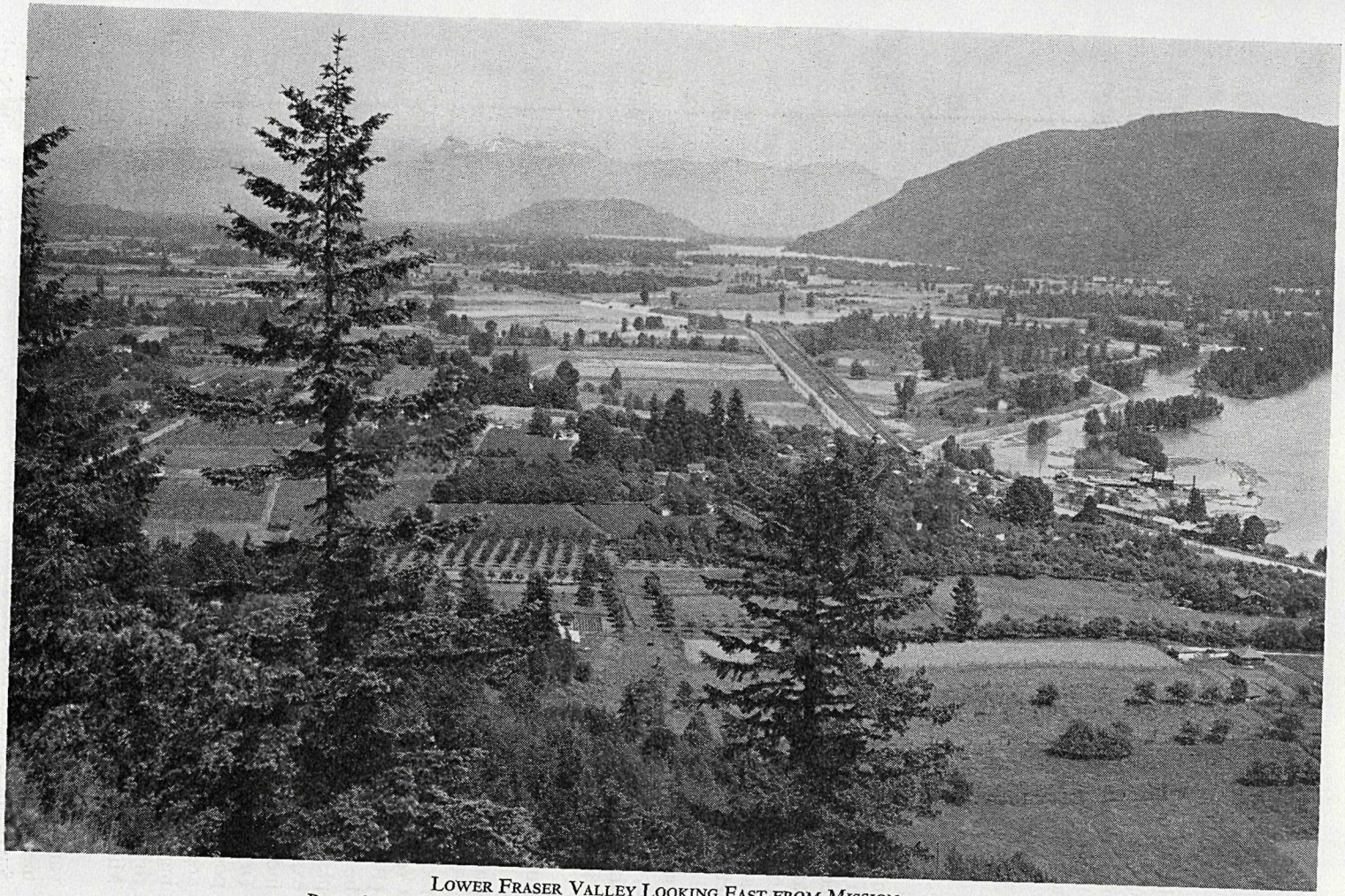
I. Administration.—General co-ordination of the four divisions of the Branch, being Legal Surveys, Geographic, Topographic, and Air; delineation and maintenance of boundaries under the Provincial Boundary Commissioner—namely, (*a*) Alberta-British Columbia Boundary and (*b*) British Columbia-Yukon-Northwest Territories Boundary; interdepartmental and intergovernmental liaison, such as the Fraser River Board.

II. Legal Surveys Division.—Regulations for surveys under the various Provincial Acts, such as Land, Land Registry, Mineral, Petroleum and Natural Gas; instructions to British Columbia land surveyors regarding surveys of Crown lands and subsequent check of field-notes and plans of same; preparation and custody of official plans; preparation and maintenance of Departmental reference maps, mineral reference maps, and composite (cadastral) maps; processing for status of all applications concerning Crown lands; field surveys of Crown lands, highway rights-of-way, etc.; preparation of legal descriptions; operation of blue-print and photostat sections; computational scrutiny of certain land registry subdivision plans; inspection surveys; restoration surveys.

III. Geographic Division.—Map compilation, drawing and negative engraving, editing, and reproduction; map checking, distribution, geographical naming—Gazetteer of British Columbia; field and culture surveys for preparation of land bulletins and maps; preparation of legal descriptions for and delineation of administrative boundaries; compilation and distribution of annual Lands Service Report; trigonometric computation and recording of geographic co-ordinates; general liaison between this Department and Federal and other mapping agencies on exchange of survey and mapping data; checking well-site survey plans under the *Petroleum and Natural Gas Act*.

IV. Topographic Division.—Propagation of field survey control—namely, triangulation, traverses, and photo-topographic control; operation of Beaver float-plane and M.V. "B.C. Surveyor"; helicopters on charter; compilation and fair drawing of manuscripts for standard topographic mapping; special field control for composite and photogrammetric mapping and other special projects; precise mapping from aerial photographs through the use of the most modern plotting-machines.

V. Air Division.—Aerial photographic operations involving maintenance and operation of three aircraft; photographic processing, air-photo distribution, and Provincial air-photo library; compilation of interim base maps, primarily for the forest inventory; air-photo control propagation; instrument-shop for the repair, maintenance, and development of technical equipment.



LOWER FRASER VALLEY LOOKING EAST FROM MISSION
Part of the area where control is being established for an integrated survey system.

SURVEYS AND MAPPING BRANCH

G. S. ANDREWS, M.B.E., B.SC.F., P.ENG., B.C.R.F., B.C.L.S., F.R.G.S.,
DIRECTOR, SURVEYOR-GENERAL, AND BOUNDARIES COMMISSIONER

A synopsis for this Branch, including pertinent statistical highlights, for the calendar year 1962 has been reported by the Deputy Minister of Lands in preceding pages. Details of the year's activities may be found in four divisional sections following, under the headings Legal Surveys, Topographic, Geographic, and Air Divisions. It may therefore be convenient to review here some special aspects of surveys and mapping which broadly affect the welfare of British Columbia.

RESTORATION SURVEYS

An increase in the 1962/63 budget allotment to the Legal Surveys Division for restoration surveys from $10,000 the previous year to $15,000 was an endorsement of the value of this work. The purpose, as the name implies, is to renew important survey monuments which, by the ravages of time, have disappeared and thus impose an unfair burden on citizens having interest in nearby land when resurvey becomes necessary in connection with safeguard or transfer of title, subdivision, trespass, etc. Part of the restoration allotment is used to finance field surveys by one Departmental land surveyor and crew, whose efforts are directed to areas of greatest need from the standpoint of dereliction of the old survey structure in relation to current public activity in land settlement, development, and subdivision. Another channel for beneficial use of these funds is to assist land surveyors in private practice who encounter unusual difficulty in tying in surveys for individual clients to the surrounding structure, as required by statutory regulation, which cases, upon review by this Branch, are found to impose an unfair burden, cost-wise, on the client. This type of restoration is more sporadic over the whole Province and more localized in each case.

Preservation and restoration of survey monuments raise the question of division of responsibility between the individual private owner of land and the public collectively in several levels of government—Municipal, Provincial, and Federal. Fundamentally it is assumed that each individual owner is responsible for the boundary markers of his own property. A simple case is the pioneer whose isolated rectangular property is marked by four corner posts. Surrounded by unoccupied Crown land, he shares the responsibility for his four corner posts with the Crown (Provincial), in this case the adjoining owner. His net responsibility thus should be two post units, so to speak. The more general case is when each owner is completely surrounded by adjacent owners, in a sizeable rectangular subdivision. For example, if there are n lots in each row and n rows of lots in a complex, each owned individually, the total number of owners is n^2 and the total number of posts is $(n + 1)^2$. As n increases, in large subdivisions, the responsibility approaches one post per owner. Other variables enter the case. Legal boundaries of rights-of-way are usually posted at each intersection with lot boundaries, thus materially increasing the number of survey monuments requiring protection and maintenance. Public rights-of-way for roads, highways, etc., should further increase the responsibility at Municipal and Provincial Government levels.

Other Government activities result in placing additional survey monuments of various kinds, all sacrosanct, to be preserved with vigilance. The Federal Government sets up primary survey control for the whole nation through the Geodetic Survey of Canada, most commonly in the form of triangulation stations and benchmarks located and co-ordinated with extreme precision on the continent-wide North

American Datum (1927). These stations are relatively sparse, normally 10 to 50 miles apart, and are confined to main routes across certain parts of the country, as in British Columbia along the 49th parallel, up the West Coast, along the Alaska, Cariboo, and Hart Highways. They are established mostly on or near mountain-tops and often set in bedrock, so are comparatively invulnerable, although building of forestry lookouts and, more recently, microwave stations has, through ignorance or carelessness, destroyed a few or encumbered them to the point of uselessness.

In connection with standard topographic mapping, both Provincial and Federal agencies, including the Army, for many years have been and are continuing to propagate a denser incidence of mapping control monuments of secondary and tertiary precision, but based on and co-ordinated with the aforementioned primary geodetic network. These monuments are established at greater density, 5 to 10 miles apart, and in British Columbia follow generally the pattern of standard mapping, as indicated on Index 4 appended to this Report.

Although the above-mentioned first, second, and third order control monuments (and bench-marks for elevation) are not directly of legal significance in connection with property boundaries, they constitute the ubiquitous survey framework over the whole area of the Province, with which eventually all survey markers should be integrated. Of this, more is said in later paragraphs. As the network of control is further broken down and integrated with the property or cadastral survey structure in densely settled areas of the Province, these monuments, too, will become vulnerable to the same destructive influences which menace property markers. The importance of survey control monuments to the public collectively makes the responsibility for their preservation that of the Provincial Government, although the Geodetic Survey of Canada does restore its primary stations and bench-marks, which action, however, depends on incidental reports of damage rather than systematic inspection.

Another aspect of safeguarding survey monuments derives from the Government practice from time to time of surveying Crown land into lots, anticipating disposal sooner or later by Crown grant. In the years prior to the First World War, very large tracts of land considered suitable for settlement were surveyed into district lots, up to 640 acres in size. However, many of these remained as vacant surveyed Crown lots, some of which are only now, after half a century, encompassed in the path of current settlement. In those earlier times, survey regulations countenanced wooden survey posts, which have since proven vulnerable to decay, forest fires, and logging operations. It is clearly a public responsibility to either restore these corners, which legally govern all subsequent surveys for land alienation or subdivision, or to cancel them under provisions of the *Land Act* (section 10). With the reversion to the Crown of any previously alienated lands, it would seem that the responsibility for the condition of the pertinent survey monuments also reverts with title, calling for inspection, and restoration if necessary, prior to redisposal as surveyed land.

INTEGRATION OF SURVEYS

Reference has been made to the integration of all surveys on the continental North American Datum (1927) by co-ordination of all monuments or markers governing the legal boundaries of property, engineering projects, bench-marks, and indeed man-made structures of a substantial and permanent nature with the survey control network. Only on this basis can both relocation and restoration of lost points, as well as detection and equitable reconciliation of errors accruing from the past, right back to the earliest colonial times, be effected with confidence, simplicity,

accuracy, and economy. This ideal conception is the real solution to the problem of lost monuments and contentious confusion arising from survey anomalies of the past.

Integration of surveys has received increasingly widespread support in recent years. It will be the theme of the forthcoming annual convention of the nation-wide Canadian Institute of Surveying in Ottawa, February, 1963. The question arises, if co-ordinate integration of surveys is such a panacea for survey problems, including high costs, why is it only now being advocated with such vigour? The facts are that it is only in recent years that the necessary over-all control surveys have been extended sufficiently to provide a widespread structure for survey integration. Also, it is only recently that certain revolutionary technical equipment has been available to make practicable, for the first time in history, the rapid and economic breakdown of the primary control structure into a density of stations necessary for effective universal survey integration. These technical developments come mainly from electronics as applied to distance measurement and computations, from precise aerial photogrammetry, from air-borne field transport, and radio communication. Even with these new technological aids, the task of catching up with the integration of the enormous aggregation of cadastral surveys from the past is colossal.

Actually the integration of surveys has been a feature of British Columbia survey policy for several decades, but due to the enormity of the task, catching up with more or less a century's lead in primary lot surveys under the *Land Act* and subdivision and right-of-way surveys under the *Land Registry Act,* in relation to limitations of staff, budget, and available survey techniques, only sporadic ties could be made between the new expanding mapping control system and nearby district lot corners, as opportune. In spite of these limitations, a very creditable array of co-ordinated points has been established. Some 33,000 are now documented in our control records, of which about one-quarter are cadastral corners, the balance being geodetic and mapping control stations. Along the Alaska Highway right-of-way, for example, where the cadastral structure is already co-ordinated, the survey markers have been invaluable for well-site locations under the requirements of the *Petroleum and Natural Gas Act.*

Another significant trend is that since World War II the major control survey potential of this Branch has been almost fully absorbed in extending the standard topographic mapping into remote and thinly populated regions, where interest in resource development of all kinds has been of primary Government concern. For this reason these remote areas, ironically, have been better served with integration of the primary cadastral structure than the older, more densely congested communities. It is only in very recent times that the benefits of integration in the latter have been brought into focus and the demand for them more clearly articulated.

Considering primary cadastral surveys under the *Land Act,* there are now approximately 104,000 district lots surveyed and identified, plus some 300 townships surveyed into 36 sections (each of which in turn may have four quarters of 160 acres) in the Province, exclusive of the old Dominion land surveys in the former railway (C.P.R.) belt, and in the Peace River Block. These, with both urban and suburban subdivisions, imply an astronomic number of property corners eventually to be co-ordinated with the control network datum.

The density of control monuments will vary according to development in an area. In cities they must be spaced about 1,000 feet apart; that is, 25 per square mile. The suburban density may thin out to four or five, and rural to about one per square mile. However, if an average of, say, only three monuments per square mile were struck for the whole of British Columbia, it would imply over 1,000,000 monumented control points, over 30 times the number we now have. And this

would merely set the stage for the final act of integrating the galaxy of cadastral lot corners. Full realization of the system will be in the million-dollar cost category, but will be justified by savings of greater magnitude. Because of its enormity, the programme must be one of many years' duration. Nevertheless, all leading authorities testify to the necessity of it. We know that work already done, and to continue, we hope at an increased pace, will be of great value. On a practical basis it is obvious that these operations should be focused to complete small areas, one at a time, according to the greatest need.

One mitigating feature of the integration of surveys problem is that with the control survey network established to the required density, only new work need be co-ordinated, including, of course, such old corners as are pertinent to the new work. Fortunately there are many areas of dense subdivision which enjoy for the time being at least a condition of maturity in the survey sense; that is to say, individual property boundaries are well established, and a climax condition of survey stability prevails. These areas may well be left in their quiescent condition, on the principle "let sleeping dogs lie," until such a time as some new development calls for resurvey in whole or in part, and with it co-ordination of the points involved.

With the gratifying approval of the Honourable the Minister of this Department, a modest beginning on a specific programme for integrated surveys in British Columbia was undertaken during the past field season in the Lower Fraser Valley. Due to difficulties with weather, smog, and rather expensive helicopter access to key mountain-top geodetic stations, only 23 new stations were established, instead of some 40 originally planned. However, the accuracy achieved was of a very high order, and the stage is now set for a further breakdown and intensification of this control structure. Experience gained will also prove valuable in continuing the programme. Various problems have also become more clearly appreciated.

One is specifications for siting and construction of the control monuments. Difficulties of using private property for these are obvious, hence the preference for placing them on vacant Crown land or in public rights-of-way. In certain cases the use of private property may be unavoidable, and these should be formalized by legal consent. This points up the need of statutory provision for Crown reserves of the land surrounding every survey monument, and in special cases for the resumption by the Crown of title, to provide a sanctuary against depredation. The area surrounding such points could be small, within a radius of 6 feet or less (about one four-hundredth of an acre).

Another problem is the best form of monument itself. Should it be a substantial conspicuous concrete obelisk for all to see and to revere, or should it be a sizeable but hidden buried installation, known only to the authorized few—surveyors, engineers, and ilk? Intervisibility between monuments and subordinate reference marks are other desirable features. In any case, specifications should be flexible for the best application to local conditions encountered by the surveyor in charge, providing permanency, intervisibility, and accessibility are achieved.

The statutory aspect of legalizing identity and authenticity of co-ordinate locations is an important and essential part of the scheme, and will depend on support of the Attorney-General's Department, the legal profession in general, and Land Registrars in particular. Probably amendments should be incorporated in appropriate Statutes, making provision for the following:—

(1) Legal authenticity of co-ordinates for property markers once officially approved against all challenge where there is no other overriding evidence available.

(2) Proclamation, from time to time, of co-ordinated areas by Order in Council as the necessary control surveys are set up and declared ready by the

Surveyor-General, with the requirement that all new property monuments and all repostings be co-ordinated on the control datum with adequate precision.

(3) The revision of official co-ordinate values, from time to time, as survey control improves and becomes more accurate. This takes care of the progressive transformation from rural to suburban and to urban development, and allows the desirable flexibility of accuracy specifications in relation to land values, and for the rectification of errors which may come to light.

(4) The basis of co-ordinates to be on technical specifications, such as the shape and size of the ellipsoid and suitable rectangular grid projection, under authority of the Surveyor-General.

(5) Provision for the sanctity and preservation of survey control monuments and the plot of ground surrounding them.

The division of responsibility between three levels of government for establishment, maintenance, and monitoring the use of the co-ordinate control structure should be clearly defined and accepted. Logic and precedent place the primary first-order control framework under the Federal Geodetic Survey of Canada. There are some conspicuous gaps in this in relation to our population distribution, a glaring one being along a route from Osoyoos to Salmon Arm via the Okanagan Valley. Breakdown of the primary net into second and third order would logically fall to the Provincial survey authority, and this would include the maintenance of such monuments in unorganized territory. Municipalities and cities should take responsibility for co-ordinating the detail cadastral structure as well as provision and maintenance of the control monuments within their boundaries. Furthermore, it should fall on the pertinent approving officers under the *Land Registry Act* to ensure that all subdivisions and other plans are properly co-ordinated to the control datum.

COMPUTATIONAL SERVICE TO LAND REGISTRY OFFICES

The Deputy Minister has noted that the mathematical checking of Land Registry Office plans by the Legal Surveys Division was expanded, from the trial basis initiated in 1961 with the Victoria Land Registry Office, to include those at Prince Rupert, Kamloops, and Nelson. A satisfactory work-flow routine was established, whereby plans received in Victoria by Monday's mail were checked and in return mail by the following Friday.

AIR-PHOTO SERVICES

In accordance with the French proverb that the appetite grows with eating, British Columbia, having thrived on a generous diet of air-photo services for the past 16 years, exhibits an ever-increasing penchant for this form of nourishment. Demands from a widening circle of government agencies now exceed the potential of the Air Division in this particular service. The current conversion to Beechcraft Expediters from the old wartime Ansons, noted elsewhere in this and prior Annual Reports, will not materially improve our picture-taking capacity. We have now arrived at the point where either a third similar photo aircraft should be added or a higher performance unit or units be obtained. A higher operational ceiling from 20,000 feet to, say, 28,000 feet, better air speed from 150 miles per hour to 250 miles per hour, an operational range of nine hours instead of eight, and greater pay load are all urgent desiderata if we are to bring in the bigger harvest of air photos now in urgent demand.

A NEW AIR-PHOTO PLOTTER

A new air-photo stereoplotter, of original design, built in the Surveys instrument-shop during the second half of the year, was completed and placed on trial in December (*see* Plate 1). It is a relatively simple plotter, based on an optical principle* first proposed by the late Dr. E. G. Deville, I.S.O., LL.D., D.T.S., Surveyor-General of Dominion Lands, Ottawa, 1885 to 1924, the acknowledged " Father of Photogrammetry " in Canada.† The original Deville proposal was conceived for terrestrial survey photographs from mountain stations many years prior to the advent of aerial photography. A method of applying the Deville principle to vertical air

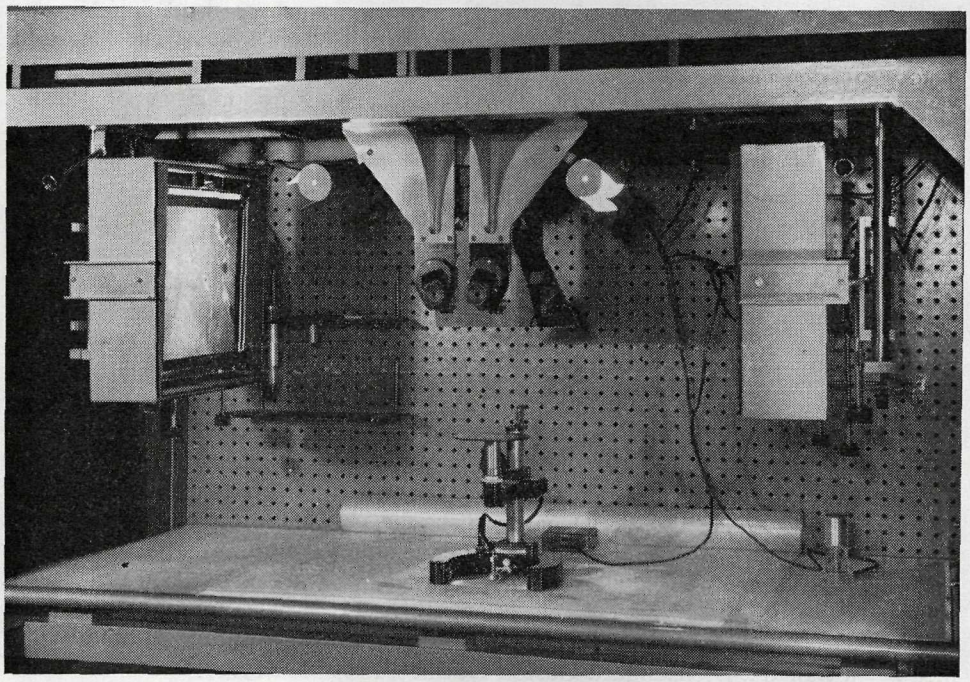


Plate 1. The Deville Plotter.

photos was contrived by the writer as long ago as 1934, when aerial photogrammetry in British Columbia was still very much in embryo.

After some preliminary experiments, a prototype plotter was made in 1937/38 with funds from a Charles Lathrop Pack Fellowship Award then held by the writer. While this prototype validated the general optical approach, provision of further mechanical adjustments for the haphazard conditions of camera orientation in flight was necessary, for which the mechanical design was interrupted by the incidence of war in 1939. A second prototype was built during the limited opportunities of overseas war service, mainly to demonstrate the principle for possible development under military auspices in the United Kingdom in connection with war mapping. There was a great need for a simple and portable stereoplotter. However, due to the exigencies of war, nothing significant could be done at that time. A third experimental plotter was designed and built here in the Surveys instrument-shop about 1950. This model had all the spatial adjustments necessary for achieving stereo

* Deville, E. G.: Transactions, Royal Society of Canada 1902, Section III, page 63.

† Field, R. H.: The History of Photogrammetry in Canada. The Canadian Surveyor, Vol. XI, No. 3, January, 1953.

correspondence of the air photos covering an overlap and for levelling the stereo-model to the survey control datum, and while it proved too cumbersome for efficient plotting, it served to clarify the practical range of the various adjustments so that refinements in design could be specified for a much simpler, more efficient operational instrument. Also the (1950) Mark III prototype clarified certain operational features which remained to be solved. The (1962) Mark IV " Deville Plotter," on preliminary tests at the end of the year, shows promise of being an effective and much-needed addition to the array of standard photogrammetric equipment now in use in our mapping operations. Its main function is to take off accurate contour and other map detail from the stereo air-photo model, for which vertical and horizontal control has been set up by a machine of first-order precision, such as the Wild A7, thus reducing the bottleneck on the latter. The new plotter uses ordinary (non-distortion) paper prints from the Air Photo Library, instead of expensive and fragile glass diapositives required by the other plotters, so that its cost is fractional in comparison. It has distinct visual advantages over the anaglyphic principle in wide use, and plots at the desired map scale.

In connection with the production of the new Mark IV " Deville Plotter," it is appropriate to acknowledge the valuable participation of Mr. A. D. Wight, B.C.L.S., of the Topographic Division, who not only drew up the specifications for the new model based on trials with the Mark III unit, but contributed certain basic ideas, without which the new plotter could not have been fully operational in the production sense. Much credit is also due Mr. A. R. Best, instrument-maker, on the staff of the Air Division, for many elegant features of machine handiwork which realized the instrument's workability and compactness. Finally, since this is the first official announcement of the new plotter, it is appropriate to express appreciation for the interest and helpful suggestions made some 25 years ago by Dr. Gordon Shrum, Co-Chairman of the British Columbia Hydro and Power Authority, when he was, then, head of the Physics Department at the University of British Columbia. It is anticipated that the coming year will provide ample operational basis for further refinements in design, as well as for a report on accuracy and efficiency a year hence. Meanwhile indications of its value have led to the choice of its name, the " Deville Plotter," as an appropriate tribute to the acknowledged " Father of Photogrammetry " in Canada, Dr. Edouard Gaston Deville (1849–1924).

ADMINISTRATION

In 1962 the authorized personnel establishment of the Surveys and Mapping Branch was 174 permanent employees, all grades, plus seven temporary so-called " casual " positions. Ten years ago the authorized establishment of the Branch was 192 permanent employees plus more than 14 temporary positions, the highest establishment on record. The work load and output, in both quantity and quality, have however increased significantly in this period, in keeping with the well-known growth of the Province. The reason that it has been possible to accomplish more work, better, with smaller staff is due largely to automation, but also significantly to improved training, experience, and skill of the staff, as has been remarked in previous Reports. The time has now come, however, when these advantages can no longer be expected to offset the unbalance between ever-growing demands and limited staff. Important aspects of the work are being necessarily neglected due to staff shortage, one instance being the Departmental reference maps of the Legal Surveys Division. Some of these are so shop-worn that they are almost illegible. These are the basis for status clearances by the said Division for all applications under the

Land Act, the *Forest Act,* and the *Water Rights Act,* as well as many other status queries.

Early in the year the Surveys and Mapping Branch sustained the loss of an outstanding staff member by resignation, in the person of Mr. William Hall, M.C., B.A.Sc.F., P.Eng., B.C.R.F., who had been Chief, Air Division, since 1952, when he succeeded the writer in that position. Mr. Hall joined the Department first in 1925 as a messenger with an annual salary which he proudly boasts was $360. Between the years 1927 and 1932, he took time out to attend the University of British Columbia, obtaining the forestry degree, but during concurrent summer seasons served on various British Columbia forest survey parties. In the low years of the depression, Mr. Hall obtained a teacher's diploma at the Provincial Normal School, Victoria, and then gained experience in the logging industry. He re-entered the Forest Service in 1935, and late in 1937 joined the writer in the Air Survey section of the Forest Surveys Division. Overseas war service occupied the years 1940 to 1945 in the United Kingdom, North Africa, where he won the Military Cross, and in Italy, where he was severely wounded. As Assistant Chief, 1948 to 1952, he took a large share with the writer in setting up the Air Division of the Surveys and Mapping Branch. Thus for many years Mr. Hall was closely associated with the writer in pioneering air photography and air surveys in British Columbia, and contributed materially in its application to base maps for the Province-wide forest inventory. Having served on the Council of the Association of Professional Engineers of British Columbia for several years, he became president in 1961. Early in 1962 he was offered and accepted the position of registrar of that organization. It is gratifying that Mr. Hall's talents will continue to serve with distinction in his new field, as they did so conspicuously during his many years in both Provincial Government and military service.

LEGAL SURVEYS DIVISION

D. PEARMAIN, CHIEF

The Legal Surveys Division, under the direction of the Surveyor-General, is responsible for cadastral surveys of all Crown lands of the Province. This entails the issuing of instructions to the land surveyors engaged to make each survey and supplying them with copies of the field-notes and plans of adjoining or adjacent surveys. After the completion of the survey, the returns are forwarded to this office for checking and plotting. Included in the above returns are all right-of-way surveys, including those for highways, railways, and transmission-lines. During the year, 967 sets of the above instructions were issued, this being an increase of 204 over 1961.

In 1962, 455 sets of field-notes covering the survey of 621 lots were received in this office and duly indexed, checked, plotted, and official plans prepared therefrom. Of the above-mentioned surveys, 598 were made under the *Land Act* and 23 under the *Mineral Act*. At the present time there are approximately 97,330 sets of field-notes on record in our vaults.

There were 503 plans received from land surveyors covering surveys made under the *Land Registry Act*. These were duly indexed and checked, and certified copies deposited in the respective Land Registry Offices.

In order that a graphic record may be kept of alienations of both surveyed and unsurveyed Crown lands together with reserves, a set of reference maps, 210 in number, covering the whole of the Province must be maintained. These show all cadastral surveys which are on file in the Department, and are kept up to date by adding new information as it accrues from day to day. Prints of them are available to the public (*see* Indexes 1 to 7 in the envelope attached to the back cover of this Annual Report). A start was made last year on the recompilation of the four reference maps covering the Lower Fraser Valley between Vancouver and Hope. These reference maps are presently drawn at the scale of 1 mile to 1 inch, and on the recompilation will be drawn at the scale of one-quarter mile to 1 inch. It is most regrettable that through the pressure of other work it has been impossible to carry the above recompilation through to completion. Likewise, the renewing and redrawing of the reference maps which become worn through constant use and handling has fallen very far behind. Whereas we should be renewing a minimum of 25 of these maps a year, only 13 could be done in 1962.

All applications to purchase or lease Crown lands or foreshore which are received by the Lands Branch and all applications to purchase Crown timber received by the Forest Service are channelled through this Division for clearance. The orderly processing of these applications requires that an exhaustive status be made from the reference maps, official plans, and Land Registry Office plans. From the reference maps, together with other information and facilities maintained by this Division, it is possible to give an up-to-the-minute status on any parcel of Crown land in the Province.

It has been necessary during the year, for status and compilation purposes, to obtain 1,594 plans from the various Land Registry Offices. Copies of these have been made, indexed, and filed as part of the Division's records.

This Division co-operates with the other departments of Government by preparing and checking legal descriptions which they require. Those assisted in this way were the Attorney-General's Department (descriptions of Small Debts Courts), the Department of Agriculture (descriptions of disease-free areas and pound districts), the Department of Municipal Affairs (descriptions for the incorporation or

amendment of municipal areas), the Forest Service (descriptions of tree-farm licences and working circles), and the Lands Branch (descriptions for gazetted reserves, etc.). During the year 119 of the above descriptions were prepared, and this entailed 270 man-hours.

REPRODUCTION SECTION

The Legal Surveys Division, through this Section, continues to supply a service to all departments of Government and to the public, as well as supplying all the prints and photostats, etc., required by the Surveys and Mapping Branch. The total number of prints made during the year was 268,515, in the preparation of which 170,400 yards or 96.7 miles of paper and linen were used. The number of photostats, films, and autopositives made was 68,688.

It is interesting to note that of the 268,515 prints made during the year, 79,723 were for the Surveys and Mapping Branch, 72,752 for other branches of the Department of Lands, Forests, and Water Resources, 106,800 for other departments of Government, and 9,240 for the public. Likewise, of the 68,688 photostats, films, etc., made, 29,031 were for the Surveys and Mapping Branch, 19,663 for the other branches of the Department, 10,648 for the other departments of Government, and 9,346 for the public.

The multilith machine turned out 163,436 copies during the year.

In the latter half of December a Xerox 914 copier was set up in the Reproduction Section to replace the Unicop machine which we have had in operation for some years. The copying of letters, field-notes, etc., will be improved both in regard to speed, quality, and cost.

COMPOSITE MAP SECTION

This Section is responsible for the compilation and fair drawing of composite maps, mostly at a scale of 500 feet to 1 inch, of the more densely subdivided areas of the Province and especially where they occur in unorganized territory.

During the year 59 sheets were completed and covered areas as follows: Gulf Islands, 46 sheets; Revelstoke, 4 sheets; Smithers, 4 sheets; Burns Lake, 3 sheets; Hazelton, 1 sheet; and Clinton, 1 sheet.

LAND EXAMINATION PLANS SECTION

This Section is responsible for the preparation of plans for the use of the Land Inspectors in their examination of applications for Crown lands. These plans are a consolidation of all the information available in this Department and pertinent to the application requiring inspection. A synopsis of the work accomplished by this Section during the past six years is as follows:—

Year	Plans Prepared	Year	Plans Prepared
1957	2,290	1960	2,609
1958	2,192	1961	2,660
1959	2,473	1962	2,941

GENERAL

As of October 1st of this year, the Legal Surveys Division undertook the task of giving a thorough mathematical check to all plans tendered for deposit in the Land Registry Offices at Kamloops, Nelson, and Prince Rupert. The Victoria Land Registry Office has been similarly assisted since April, 1961. Already some prob-

lems have been encountered relative to staff shortages in the I.B.M. 650 electronic computing section, so that for a short period at the end of the year the checking service broke down. It is hoped that no further disruptions in electronic computing will occur, since so many departments are thereby adversely affected.

The receiving and distribution of survey posts, which are stored at 859 Devonshire Road, has operated smoothly and efficiently. The following synopsis shows the quantities of posts shipped during the past year and to whom:—

	Standard Pipe	Standard Rock	B.C.L.S. Bars
Purchased by private surveyors from headquarters	370	87	181
Supplied to Departmental surveyors	645	29	2,725
Shipped to Government Agents for resale	3,635	458	1,600
Totals	4,650	574	4,506

Summary of Office Work for the Years 1961 and 1962, Legal Surveys Division

	1961	1962
Number of field-books received	457	455
,, lots surveyed	631	621
,, lots plotted	453	447
,, lots gazetted	445	418
,, lots cancelled	14	16
,, lots amended	157	163
,, mineral-claim field-books prepared	38	22
,, reference maps compiled or renewed	11	13
,, applications for purchase cleared	2,368	2,465
,, applications for pre-emption cleared	196	147
,, applications for lease cleared	2,988	3,193
,, water licences cleared	125	158
,, timber sales cleared	5,605	5,422
,, Crown-grant applications cleared	1,129	1,156
,, cancellations made	5,272	5,027
,, inquiries cleared	1,578	1,504
,, placer-mining leases plotted on maps	324	------
,, letters received and dealt with	6,247	6,019
,, land-examination plans	2,660	2,941
,, Crown-grant and lease tracings made	4,106	4,675
,, miscellaneous tracings made	6	10
,, photostats made	68,932	68,688
,, blue-prints made	268,779	268,515

FIELD WORK

The pattern established in recent years of legal surveys for many departments of Government repeated itself in 1962. Another increase in funds available for restoration surveys made it possible for a modest expansion of the work through the use of the services of some private surveyors.

Two Topographic Division surveyors were made available for legal surveys in order to maintain the work programme and to fill a vacancy created by the resignation of a land surveyor from this Division.

As a measure to reduce time and cost of setting permanent survey monuments, a new type of driveable pipe post was produced by this Division and is now available for use in the northern areas on winter work. Whether or not the post will be used through the Province will depend on its performance there in the current year.

Subdivision of Crown Land

Town lots were surveyed at various locations—six at Savona, six at Sointula, one at Westbank, and eight on the University campus. Rural lots this year were greatly increased due to the Department being requested to participate in the subdivision of Doukhobor lands at Ootischenia, where 166 lots were created. Further areas of subdivisions of this type at Nelson, Pemberton, Tulameen, Howser, 100 Mile House, Cheakamus, and Isle Pierre brought this total to 222.

Waterfront lots for residential lease were up again this year, with the largest subdivision being made at Green Lake in the Cariboo, of 133 lots. Other lake-front surveys at Clearwater, Sharpes, Heffley, Charlotte, Tie, and Young Lakes made a total of 247 of this type of lot. Five surveys of acreage parcels at 70 Mile House, 100 Mile House, Lac la Hache, Cranbrook, and Cobble Hill completed the subdivision programme.

Public Reserves and Forestry Sites

Sanitary reserves in unorganized areas at Rock Creek, Beaverdell, Cache Creek, and Endako were surveyed, as is the usual custom to encourage the proper disposition of refuse of a gregarious population.

Park and Recreational Reserves

Recreational sites were surveyed in nine areas. Seven of these were parks at the request of the Department of Recreation and Conservation. One was located at China Beach near Jordan River, where a beautiful fine sandy beach is now available for public use. Another was an addition to Thomas Francis Park near Victoria, and a fine large site at Beaver Creek, just south of Trail, will soon be a popular campsite for the touring public. Another acquisition at Rolley Lake near Mission and the whole of Rosedale Island in the Fraser River will be welcomed by the Fraser Valley population. Thirty acres were surveyed near Victoria for the Capital Improvement Commission as part of a green belt on approaches to the city. The last 10 acres of unsurveyed land in the vicinity of Goldstream were surveyed and became an addition to that park. Four hundred and thirty-five acres in all became park, with recreational reserves in addition at Charlotte, Young, and Sharpes Lakes.

Restoration Surveys

The road survey programme continues to provide the best means of restoring old corners when surveyed land is encountered. One hundred and eleven district lot and section corners were permanently remonumented in this manner during the current year. The total is smaller than in previous years as much of our highway survey was through old Dominion township areas, which were well monumented with metal posts in the beginning. Restoration work was continued in the Chief Lake area near Prince George. Areas like this are practically devoid of posts, and the work progresses very slowly because of the unusual amount of searching required for evidence in rotten condition. An additional 51 main corners were restored on Departmental surveys. Six district lots at Shirley, on Southern Vancouver Island, were remonumented early in the season, and a few corners of town lots at Crescent Beach and Golden were also renewed.

The Department was able to assist, through private surveyors, in a small restoration of five lots at China Lake in the Cariboo and a large resurvey of 12 sections in the Chemainus district, where 22 section corners were renewed. In addition, there were several cases where the Department was able to assist in bearing the cost of locating old evidence in conjunction with private work.

Highways

The Trans-Canada Highway between Griffin Lake and Malakwa Cemetery, a distance of 14.2 miles, was completed between previously surveyed areas. East of Revelstoke the survey was completed between Albert Canyon and Glacier National Park and from the east boundary of the Park to Donald—in total, 28 miles. Another 10 miles between Golden and Blueberry Creek was completed, leaving only 6 miles unfinished between Sicamous and Golden. On the Southern Trans-Provincial Highway 13 miles between Christina Lake and Grand Forks was filled in where very old lot and right-of-way surveys were encountered, making this new survey important from a restoration standpoint. Our Northern Trans-Provincial Highway programme, begun in 1956, was extended another 17 miles westward between Endako and Burns Lake. A grand total of 82.7 miles of highway survey was completed this year.

INSPECTIONS

Only one request for field inspection of a survey was received this year, and this was through a Land Registry Office. Field work turned up evidence not apparent from plan inspections, which again proves the worth of this service. However, the much-reduced activity necessary in this work is a development we are pleased to note. What was commenced as a park-site survey on Saltspring Island resulted in quite an extensive investigation into records and occupation pertaining to the property. The fault in this case was that no surveys of the numerous transactions through the last 70 years had been made, and owners had no idea where the registered boundary lay.

TOPOGRAPHIC DIVISION

A. G. SLOCOMB, B.C.L.S., CHIEF

Field control was completed for 15 standard National Topographic map-sheets covering approximately 5,000 square miles. In addition, partial control was obtained for 21 standard Topographic map-sheets in the Coastal areas where the M.V. " B.C. Surveyor " was able to operate. A helicopter operation to obtain the mountain control required to complete these sheets was kept in mind throughout the survey, and such operation appears entirely feasible. The use of a scow, suitably decked, as a mobile landing-site, offers a good means of helicopter access to the Coast mountains. The " B.C. Surveyor " would be used for towing such a unit, and also as the supply ship.

The first stage of a proposed Fraser Valley co-ordinate system was commenced. Completed was the establishment of some 23 second-order control stations from Chilliwack to Vancouver. The Geodetic network over this 75-mile portion of the valley was broken down to supply second-order stations that would be more readily accessible for a future programme of an integrated survey system.

Five National Topographic Series projects, covering 41 map-sheets of approximately 14,000 square miles, were completed in the Photogrammetric Section. In addition, there were 14 large-scale plots, ranging in scale from 50 feet to 1,320 feet to 1 inch. These include pondage maps, dam-sites, and large-scale detailed plots.

The Draughting Section reports the completion of nine standard topographic manuscripts at the scale of 2 inches to 1 mile, 161 large-scale mapping plans at various scales, plus 8 large plans at 20, 50, and 100 feet to 1 inch, of the Essondale Mental Hospital site, and the Nelson and Kelowna Vocational School sites. In addition, the plotting of the cadastral survey on two Federal Government 1:50,000 manuscripts was completed. Six mosaics were assembled and rephotographed, to the scale required by the department involved, for use in planning.

The Federal Government now has 82 of our 1:50,000 scale manuscripts on hand for printing, which are in various stages of reproduction.

This Division has used the helicopter as a means of mountain transportation each year since 1948; in fact, it was the first in Canada to land surveyors at the site of their mountain work. In the first year, many trips were required to lift the men and equipment into position, mainly because of the critical load limit. This past year the Division had the services of a Hiller 12E on charter, and this machine, with the advantage of more than double the old load-limit, was able to lift two men and all their equipment to an elevation of 7,500 feet in one trip. The three contributing factors for this speed-up are, (1) modern equipment, (2) lighter loads, and (3) method. The use of the tellurometer has cut the instrument work required at each station down to a few hours, and has also enabled a reduction in weight. Control requirements for modern photogrammetric equipment has changed the *modus operandi* to the careful selection of relatively few points well spaced rather than the great numbers which were formerly required.

The helicopter operation this year was a continuation northward of the 1961 control, and commenced generally at the 55th parallel of latitude (*see* Fig. 1). The towns of Prince George and Smithers were used as supply centres, with Tabor Lake (Six Mile), near Prince George, and Tyee Lake, near Telkwa, the supply bases. The helicopter contract was for 200 flying-hours or a two-month time-limit, whichever came first. The main weakness with a short contract such as this is that the weather can be the governing factor. One hundred and eighty-seven hours flying-time was recorded, which indicates that weather conditions did hamper the operation. The

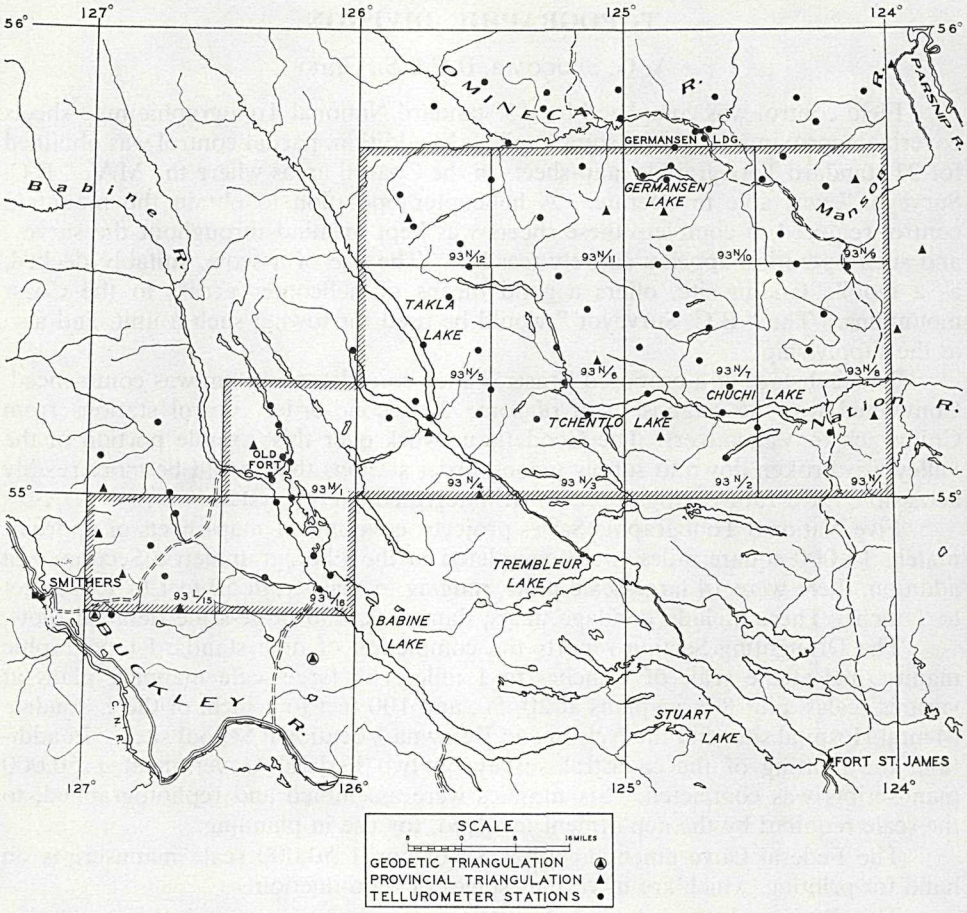


Fig. 1.

Department's DeHavilland Beaver was used in conjunction with the helicopter, and also kept the camps supplied. The supply of aviation fuel was simplified by the fact that both aircraft used the same octane-rated gasoline.

On the Coast, the M.V. " B.C. Surveyor " sailed approximately 3,600 miles to allow the crew to photo-identify 236 triangulation stations. In the course of their work they " tied " the Sir Alexander MacKenzie monument to the triangulation system in Dean Channel. Particular attention was paid at all times to the possibility for helicopter operation, and the surveyor reported that the mountains in all areas appear suitable. While in the Gardner Canal, the " B.C. Surveyor " developed serious manifold trouble, and the voyage was curtailed rather than risk the safety of the crew. The engineer was able to make temporary repairs to allow the ship to return to Victoria under her own power late in August.

The Fraser Valley operation was the first stage leading to a co-ordinate system for all surveys in the area. Angular measurements made with Wild T2 and T3 theodolites sighting on lights were combined with the distance measurements made with tellurometers. The results were used to establish second-order control from the existing geodetic station. This was the Division's first attempt at this particular type of operation, and some difficulties were encountered. The Vancouver " smog "

delayed observations, and we also found that it can rain hard enough to make distance measuring with the tellurometer impossible.

Communication between lightkeepers and observers is most essential, particularly because of the haze conditions. This Division's Model B sets were too cumbersome as they require a 150-foot antenna, and the radio traffic close to their frequency was very heavy in the evenings. Eventually three Motorola F.M. portables on a rental basis were obtained, and that proved very satisfactory. For any future work of this nature, good reliable radio contact will be mandatory.

It was found that tower-building using finished lumber was costly and time-consuming. Permission had to be obtained from the property-owner to allow such an erection, and usually it had to be removed by a specified date. Recommendations for any future operation in an urban area would most likely include the rental of Sarnia scaffolding and the use of a giraffe-type lift for reconnaissance.

The preservation of permanent monuments has been, and most likely always will be, a major problem in urban areas where development is in continual progress. It is certain that, before the second stage of this operation is commenced, a definite solution will have to be found for the siting of these monuments, and responsibility for their preservation will have to be assigned to the proper authority.

A fourth crew with a roving commission completed six separate projects. Two of these were detailed plots of vocational-school sites at Kelowna and Nelson, required by the Public Works Department for planning and siting purposes. Ground control was obtained in the Haney Forest for a detailed map of approximately 23 square miles requested by the Forest Service. The fourth was a detailed topographic map of a specific area on the Clearwater River between Dam-site No. 141 and Dutch Lake, at a scale of 100 feet to 1 inch with a 10-foot contour interval. This was an addition to work previously requested and completed for the Fraser River Board in that locality. The crew completed the season in the Fort St. James area. Firstly, a line of double levels was run up the Tachie River to establish a bench-mark at the spawning-ground of the salmon. Following this, some additional levels were run at Fort St. James for the Fraser River Board, to supplement work done in 1961.

To meet a need which was developed along with the times, a Review and Edit Section was formed, its main function to bridge the gap between compilation and fair drawing that developed after new equipment and methods produced a general speed-up in all stages of our work. In the early years of the post-war era, the surveyor and his crew who went into an area to be mapped became intimately acquainted with its topography through rugged climbs to the triangulation stations and week-long hikes across the country on barometer runs. The classification of the detail on the air photographs used for compilation could be quickly resolved from personal reminiscence. The surveyor was personally involved in compiling the project, which seldom exceeded a map-sheet in area.

Today modern photogrammetric plotters have reduced the amount of field control necessary for mapping to the point where the surveyor gains only superficial knowledge of his area, which now averages about 10 map-sheets. He is seldom involved in the plotting, and the previous personal supervision of his maps is lost. The multiplex operator has no personal knowledge of the terrain, and can only map to the extent of what can be seen in the air photographs.

High-altitude photography was another tool that helped increase production and also posed new problems. Identification of culture that is always difficult to see, such as roads, trails, buildings, etc., became invisible on the high-altitude photographs. Either additional photographs taken at lower altitude or a field visit

becomes necessary. The Review and Edit Section, as one of its duties, will visit those areas requiring a field check.

During a period of two months this year the section visited and completed a field check on 15 topographic map-sheets in the Clinton and Bridge Lake areas. The need for such a visit was apparent where the mapping photography was exposed in 1951 and tremendous activity has since taken place. As a result, the aforesaid 15 map-sheets have been revised to date, checked as to accuracy of the topography, culture, and cadastral detail, and are now ready for the draughting office.

Copies of the multiplex large-scale mapping and the completed manuscripts as shown on the indexes following this report are available upon request.

List of Large-scale Mapping

No.	Name	Available	Scale	Contour Interval	No. of Sheets	Date
X 1	Goldfields	No	1″=800′, 900′, 1,000′, 1,320′	100′	----	--------
S.P. 1	Richmond	Yes	1″=200′, 600′	Mosaic	----	--------
S.P. 2	Lower Fraser Valley	Yes	1″=1,000′	5′–50′ then 50′	18	1957
S.P. 3	Lower Fraser Valley	Yes	1″=1,000′	5′–50′ then 50′	20	1958
1	Squamish	Yes	1″=20 ch.	20′	(1)	1952
2	Aleza Lake	No	1″= 550′	20′	----	1951/52
3	Tamihi Creek	No	1″=10 ch.	100′	----	1950
4	Earle Creek	No	1″=10 ch.	50′	----	1951/52
5	Lawless Creek	Yes	1″=10 ch.	50′	13	1951
6	Kemano	No	1″=1,300′	50′	----	1952/53
7	Mount Farrow	Yes	1″=13 ch.	500′	1	1951
8	Moran Dam-site	Yes	1″= 100′	5′	1	1951/52
9	Salmo	Yes	1″=1,000′	50′	38	1952
10	Moran Pondage	Yes	1″= 500′	20′–40′	8	1952
11	University Lands	No	1″= 100′	5′	----	1952
13	Trout Lake	No	1″=1,000′	50′	----	1953
14	Fraser Pondage	Yes	1″= 500′	10′–20′	6	1951
15	Fraser Pondage	Yes	1″= 500′	20′–40′	13	1953
16	Gulf Islands	No	1″=1,320′	50′	----	1953
17	Agassiz	Yes	1″= 200′	5′	28	1953
18	Delta Municipality	Yes	1″= 200′	Spot heights	73	1953/54
19	Doukhobor Lands—					
	Grand Forks	Yes	1″= 400′	5′–10′–25′	2	1953/54
	Krestova-Raspberry, Brilliant, etc.	Yes	1″= 400′	5′–10′–20′	7	1953/54
20	Brooks Peninsula	No	1″=1,320′	100′	----	1953/54
21	Agassiz (Extension)	Yes	1″= 400′	20′–100′	(2)	1954
24	Moran Pondage	Yes	1″= 500′	20′–40′	11	--------
28	Clearwater	Yes	1″= 500′	20′–40′	12	--------
M 2	Morice Lake	Yes	1″=1,000′	50′	8	1954/55
M 3	Naver Creek	Yes	1″=1,320′	50′	6	1955
M 4	Chilcotin River	Yes	1″= 500′	20′–40′	6	1955
M 5	Gaspard Creek	Yes	1″= 500′	20′–40′	1	1955
M 6	Churn Creek	Yes	1″= 500′	20′–40′	1	1955
M 7	Willow River	Yes	1″=1,000′	50′	26	1955/56
M 8	Upper McGregor River	Yes	1″=1,000′	20′	3	1956
M 9	Sinclair Mills	Yes	1″= 500′	20′	39	1956
M 11	Hobson Lake	Yes	1″=1,000′	50′	8	1955
M 12	Moran-Lytton	Yes	1″= 500′	20′–40′	23	1955
M 13	Penticton-Osoyoos	Yes	1″= 500′	10′	11	1954
M 14	Kelowna	Yes	1″= 500′	10′	5	1954
M 15	Westbank	Yes	1″= 500′	10′	2	1954
M 16	Lower McGregor River	Yes	1″=1,000′	20′	7	1956
M 17	Creston	Yes	1″= 500′	5′–10′–15′	7	1954
M 21	Clearwater	Yes	1″= 500′	20′–40′	20	1955
M 24	San Jose	Yes	1″= 500′	10′	8	1956
M 26	Taghum	No	1″= 300′	5′–10′–20′	----	--------
M 27	Peace River Pondage	Yes	1″=1,000′	20′	11	1958
M 29	Naramata	Yes	1″= 400′	10′	2	1956
M 30	Goat River	Yes	1″= 200′	Planimetric	4	1956
M 34	Fruitvale	Yes	1″= 500′	10′–20′	2	1957
M 36	Moose River	Yes	1″=1,000′	20′–40′	4	1957
M 37	Mount Robson	Yes	1″=1,000′	20′–40′	5	1956/57

1 One (Map 5E). 2 *See* No. 17.

LIST OF LARGE-SCALE MAPPING—*Continued*

No.	Name	Available	Scale	Contour Interval	No. of Sheets	Date
M 38	McLennan River	Yes	1″=1,000′	20′–40′	3	1956/57
M 39 (1957)	Dease River Dam-sites	Yes	1″= 500′	20′	9	1956/57
M 39 (1958)	Dease-Stikine Dam-sites	Yes	1″= 500′	10′	16	1959
M 39 (1960)	Dease-Stikine Dam-sites	Yes	1″= 500′	10′–20′	40	1960
M 40	Chilliwack River	Yes	1″= 600′	20′	7	1956
M 41	Summit Lake Diversion	Yes	1″=1,000′	20′	3	1958
M 42	Peace River Dam-site	Yes	1″= 600′	20′	10	1957
M 43	Alert Bay	No	1″=1,320′	50′	----	1956
M 44	Prince George East	Yes	1″= 200′	5′	2	1958
M 45	Prince George West	Yes	1″= 200′	5′	8	1958
M 52	Kaslo	Yes	1″= 500′	50′	17	1959
M 54	Big Bar	Yes	1″=2,640′	100′	1	1957
M 56	Lac la Hache	Yes	1″= 500′	20′	10	1958
M 59	Eaglet Lake	Yes	1″=1,320′	20′	2	1958
M 62	Alberni	Yes	1″= 500′	10′	2	1958
M 63	Parsnip River Pondage	Yes	1″=1,320′	20′–2,600′ then 50′	61[3]	1958
M 63	Parsnip River Pondage	Yes	1″=1,320′	20′	29[4]	1961/62
M 63A	Parsnip River Pondage Addition	Yes	1″=1,000′	20′	5	1962
M 66	Glen Lake	Yes	1″= 400′	10′	10	1958
M 67	Chemainus River	Yes	1″= 400′	10′	4	1958
M 68	Hansard Lake	Yes	1″=1,320′	20′	3	1958
M 70	Courtenay-Comox	Yes	1″=1,320′	25′	10	1958
M 73	North Okanagan	Yes	1″=1,000′	20′	48	1959
M 73	North Okanagan	Yes	1″= 500′	10′	5	1959
M 74	Glinz Lake	Yes	1″= 200′	10′	1	1959
M 75	Duncan	Yes	1″= 500′	10′–20′	25	1959
M 76	Nanaimo	Yes	1″= 500′	10′–20′	20	1960
M 77	Prince George	Yes	1″=1,000′	20′	17	1960
M 88	South Okanagan	----	1″=1,000′	20′	----	-------
M 89	North Thompson	Yes	1″= 300′	5′	5	1960
M 89	North Thompson	Yes	1″= 500′	20′	14	1960
M 90	Similkameen	Yes	1″= 500′	5′	15	1960
M 92	Skeena River	Yes	1″= 500′	20′	11	1962
M 98	Aberdeen-Haddo Lake	Yes	1″= 500′	10′	4	1960
M 105	Clearwater Lake-Azure Lake	Yes	1″=1,000′	50′	6	1962
M 107	Campbell River	Yes	1″=1,000′	20′	5	1961
M 108	Kootenay River	Yes	1″= 500′	Planimetry	12	1961
M 111	Clearwater River Dam-site	Yes	1″= 250′	5′	4	1961
M 113	Nanaimo	-------	1″= 500′	5′–10′	----	-------
M 117	Liard River	Yes	1″=1,000′	20′	68	1962
M 117	Liard River Dam-site	Yes	1″= 500′	10′	7	1962
M 118	Nitinat	Yes	1″= 500′	10′–20′	7	1962
M 121	Winfield	Yes	1″= 500′	10′–20′	4	1961
M 122	Stuart Lake Pondage	Yes	1″=1,320′	20′	9	1962
M 125	Port Hardy	Yes	1″= 100′	2′	3	1962
M 126	Thompson River	Yes	1″= 200′	10′–20′	3	1962
M 127	Parksville	--	1″= 500′	10′	----	-------
M 129	Aleza Lake	Yes	1″= 40′	2′	1	1962
M 130	McGregor River Pondage	Yes	1″=1,000′	20′	6	1962
M 131	Long Lake	Yes	1″=1,320′	50′–100′	4	1962
M 134	Kamloops Lake	Yes	1″=1,000′	20′	4	1962
M 136	Haney	Yes	1″= 500′	25′	2	1962
M 138	Hobson Lake Extension	Yes	1″=1,000′	50′	2	1962
M 139	Norbury Creek	Yes	1″= 400′	10′	1	1962
M 142	Kaleden	----	1″= 500′	10′	----	-------
-------	Government House Grounds	No	1″= 20′	2′	2	1959
-------	Victoria University Campus	No	1″= 20′	2′ and 5′	5	1960
M 84	Victoria University, Gordon Head	No	1″= 40′	2′	5	1960/61
M 83	Oakalla	No	1″= 40′	2′	4	1960
M 100	Essondale	No	1″= 50′	2′	4	1962
M 100	Essondale	No	1″= 100′	Spot heights	2	1962
M 114	Tranquille	No	1″= 50′	2′	2	1962
M 114	Tranquille	No	1″= 100′	2′	3	1962
M 141	Legislative Precinct, Victoria	-------	1″= 40′	2′	----	-------

[3] South area. [4] North area.

List of British Columbia Manuscripts Showing Date Surveyed

Sheet	Date
82 F/3	1951, 1960
82 F/4	1944, 1947
82 K/11, W.	1952
82 K/12	1958
82 L/7	1958
82 L/10	1958
82 M/13	1959
83 D/4	1959
83 D/5	1959
83 D/12	1959, 1960
83 D/13, W.	1960
92 B/5	1937, 1938, 1955
92 B/6, W.	1955
92 B/11, W.	1955
92 B/12	1938, 1955
92 B/13	1942, 1943, 1951
92 B/14	1951
92 C/8	1937, 1938
92 C/9	1937, 1938
92 C/10	1937, 1938
92 C/11	1938
92 C/13	1938
92 C/14	1938
92 C/15	1937, 1938
92 C/16	1937, 1938, 1942
92 E/1	1942
92 E/7	1946
92 E/8	1943, 1946
92 E/9	1938, 1946, 1947
92 E/10	1947
92 E/14	1948
92 E/16	1947
92 F/1	1942
92 F/2	1938, 1940, 1942
92 F/3	1938, 1940, 1941
92 F/4	1942
92 F/5	1937, 1938, 1943
92 F/6	1937, 1940, 1941, 1943
92 F/7	1942, 1943
92 F/8	1942, 1943, 1950
92 F/9	1950
92 F/10	1950, 1953
92 F/11	1934, 1935
92 F/12	1936, 1937, 1938
92 F/13	1935, 1936
92 F/14	1935
92 F/15, part	1950
92 F/16, part	1950
92 G/4	1942, 1943
92 G/5	1950, 1952
92 G/7, part	1940
92 G/10, part	1940
92 G/11	1952
92 G/12	1950, 1952
92 G/13	1950, 1952
92 G/14	1952
92 H/1	1920, 1923, 1949
92 H/2	1923, 1949
92 H/3	1924, 1931, 1948, 1949
92 H/4	1948, 1956
92 I/12	1958
92 I/13	1958
92 J/4, W.	1962
92 J/15	1948, 1949
92 J/16	1948, 1949
92 K/1, part	1950
92 K/2	1961, 1962
92 K/3	1949
92 K/4	1949
92 K/5	1949
92 K/6	1949
92 K/7	1961
92 K/8, W.	1962
92 K/10, W.	1962
92 K/11	1962
92 K/12	1962
92 K/13	1962
92 K/14	1962
92 K/15	1962
92 L/1	1932
92 L/2	1931, 1932
92 L/3	1948
92 L/4	1948
92 L/6	1931, 1934
92 L/7	1931
92 L/8	1931, 1932
92 L/10	1931, 1940, 1956
92 L/11	1940
92 L/12	1935, 1936
92 L/13	1936
92 M/2	1962
92 M/3	1959
92 M/4	1959
92 M/5	1959
92 M/6	1962
92 M/11, W.	1962
92 M/12	1962
92 M/13	1962
92 M/14, W.	1962
92 N/1	1958
92 N/7	1958
92 N/8	1958
92 N/9	1958
92 N/10	1958
92 N/15	1958
92 O/1	1950
92 O/2	1947
92 O/3	1958
92 O/4	1958
92 O/5	1958
92 O/6	1958
92 O/7	1950, 1958
92 O/8	1950
92 O/9	1951
92 O/10	1958
92 O/11	1958
92 O/12	1958
92 O/16	1951
92 P/2	1959
92 P/3	1959
92 P/4	1958
92 P/5	1958
92 P/6	1959
92 P/7	1959
92 P/10	1959
92 P/11	1959
92 P/12	1958
92 P/13	1958
92 P/14	1959
92 P/15	1959
92 P/16	1959
93 A/1	1959
93 A/2	1936, 1959, 1960
93 A/3	1959, 1960
93 A/4	1959
93 A/5	1935
93 A/6	1935
93 A/7	1936, 1959, 1960
93 A/8	1959
93 A/9	1959, 1960
93 A/10	1934, 1960
93 A/11	1933, 1934
93 A/12	1931, 1933, 1934
93 A/13	1934
93 A/14	1933, 1934
93 A/15	1934, 1960
93 A/16	1960
93 B/1	1951
93 B/8	1952
93 B/9	1950
93 B/16	1950
93 C/5	1959
93 D/2	1962
93 D/3	1962
93 D/4	1962
93 D/5	1962

LIST OF BRITISH COLUMBIA MANUSCRIPTS SHOWING DATE SURVEYED—*Continued*

Sheet	Date
93 D/6	1962
93 D/7	1958, 1962
93 D/8	1958, 1959
93 D/11, E.	1962
93 G/2	1933, 1960
93 G/3	1960
93 G/4	1960
93 G/5	1960
93 G/6	1960
93 G/7	1933, 1960
93 G/10	1960
93 G/11	1960
93 G/12	1960
93 G/14	1948
93 I/8	1956
93 I/9	1956
93 I/10	1956
93 I/11	1957
93 I/12	1957
93 I/13	1957
93 I/14	1957
93 I/15	1956
93 I/16	1956
93 J/2	1949
93 J/3	1949
93 J/5	1961
93 J/6	1961
93 J/11	1961
93 J/12	1961
93 J/13	1961
93 K/1	1946
93 K/2	1946
93 K/7	1960
93 K/8	1960
93 K/9	1960
93 K/10	1960
93 K/11	1961
93 K/12	1961
93 K/13	1961
93 K/14	1961
93 K/15	1961
93 K/16	1961
93 L/2	1951
93 L/7	1951
93 L/8	1951
93 L/9	1951
93 L/10	1950, 1951
93 L/11	1950
93 L/14	1950
93 L/15	1962
93 L/16	1962
93 M/1	1962
93 M/5	1949
93 M/12	1949
93 N/1	1962
93 N/2	1962
93 N/3	1962
93 N/4	1962
93 N/5	1962
93 N/6	1962
93 N/7	1962
93 N/8	1962
93 N/9	1962
93 N/10	1962
93 N/11	1962
93 N/12	1962
93 O/1	1957
93 O/4	1961
93 O/5	1961
93 O/6	1957
93 O/8	1957
93 O/11	1957
93 O/12	1957
93 O/13	1957
93 O/14	1957
93 P/1	1956
93 P/2	1956
93 P/3	1957
93 P/4	1957
93 P/5	1957
93 P/6	1957
93 P/7	1956
93 P/8	1956
94 B/4	1939, 1957
94 C, part	1939
94 E, part	1939
94 F, part	1939
94 L, part	1940, 1941
94 M, part	1941
102 I/8	1935, 1937
102 I/9	1935, 1936, 1937
102 I/15	1937
102 I/16	1936, 1937
102 P/8, E.	1961
102 P/9, E.	1961
102 P/16	1961
103 A/1	1961
103 A/2, E.	1961
103 A/8	1961
103 A/9	1961
103 A/13, E.	1961
103 G/1, E.	1961
103 G/7, E.	1961
103 G/8	1961
103 G/9	1961
103 G/10, E.	1961
103 G/16, E.	1961
103 G/16	1961
103 H/3	1961
103 H/4	1961
103 H/5	1961
103 H/6	1961
103 H/7	1962
103 H/8	1962
103 H/10	1962
103 H/15	1962
103 I/2	1949
103 I/7	1948
103 I/10	1947
103 P/9	1949
103 P/10, E.	1950
103 P/14, E.	1950
103 P/15	1950
104 A/2, W.	1950
104 A/3	1950
104 A/5, E.	1950
104 A/6	1950
104 A/11, W.	1951
104 A/12	1951
104 A/13, W.	1951
104 B/16	1951
104 G/1	1951
104 G/8	1951
104 G/9	1951
104 G/14	1951
104 G/15	1951
104 G/16	1951
104 H/12, W.	1951
104 H/13, W.	1951
104 J/2, W.	1952
104 J/3	1952
104 J/4	1952
104 J/5	1952
104 J/12	1952
104 J/13	1952
104 K/16, E.	1952, 1953
104 N/1	1952, 1953
104 N/2	1953
104 N/3, E.	1953
104 N/5	1952
104 N/6	1952, 1953
104 N/7, part	1953
104 N/11, W.	1952
104 N/12	1952
104 N/13	1952
104 P, part	1941
104 P/15	1941
104 P/16, part	1941

GEOGRAPHIC DIVISION

W. R. YOUNG, B.C.L.S., CHIEF, AND PROVINCIAL REPRESENTATIVE ON CANADIAN PERMANENT COMMITTEE ON GEOGRAPHICAL NAMES

A very satisfactory year was experienced by the Geographic Division in 1962, with advances being recorded along several avenues of endeavour. Particularly gratifying was the number of map-sheets produced, there being 18 during 1962, compared with 12 the previous year. Eight of these maps were entirely new editions, four were completely revised reprints, and one received minor revision. The remaining five were status maps reprinted without revision in order to replenish stocks depleted by heavy demand.

Of special importance was the publication of Map 1B (North-western British Columbia) at 1-inch-to-10-miles scale. This map is the sixth in a regional series at that scale, and with its publication the series is now complete. Besides being printed in grey to match the others in the series, the landforms edition of Map 1B was also printed in light sand colour, which tends to give greater emphasis to relief than does grey. The reprinted landforms edition of Map 1E (South-eastern British Columbia) was also done in light sand, and it is expected that, as others of the series become due for reprinting, they will be converted to this colour.

Another highlight of the year's activities was the production of National Topographic status maps at 1:250,000 scale for Victoria (92B-C), Alberni (92F), and Vancouver (92G). Besides providing an up-to-date status of Crown land alienation for the most densely populated portion of the Province, these new seven-colour maps illustrate the great complexity of cadastral detail which exists in this part of British Columbia. They also show, in their latest form, cultural features, such as highways, power-lines, tunnels, and dams. It is gratifying to note that the general public has reacted very favourably to these maps.

Work performed by the Trigonometric Control Section is tabulated in Tables A and B. Though the number of new calculations decreased, a considerable proportion of the Section's efforts was directed toward the rewriting of approximately 30,000 file cards showing changes from the Dominion Manual System of Rectangular Co-ordinates to the Polyconic Rectangular Co-ordinate System. This conversion programme should be finished in 1963. Checking of petroleum and natural-gas well-site surveys made under the *Petroleum and Natural Gas Act* completed its first full year of operation. Well-site plans numbering 366 were examined in 1962, compared with 67 the previous year.

Four Land Series bulletins were reprinted during 1962, all of which required revision in order to maintain their reputation for being up to date. The following bulletin areas were involved: Kootenay (No. 1), Lower Coast (No. 3), and Fort Fraser-Fort George (No. 7). A revised edition of the Land Series bulletin titled "Acquisition of Crown Lands in British Columbia" was also issued. A full revision of the Peace River Bulletin Area (No. 10) was published in the spring of 1962.

A total of 26 Provincial topographic manuscripts was sent to Ottawa, where they await reproduction at 1:50,000 scale. The number of such maps now in production by the Army Survey Establishment totals 92, compared with 66 at the end of 1961 (*see* Table J). The Army Survey Establishment reproduced and printed seven Provincial Government National Topographic sheets at 1:50,000 scale (*see* Table H), compared with 14 the previous years. All were reprints of existing coverage.

The 35 map-sheets and manuscripts checked for cultural features and place-names resulted in 215 new names being added to the Gazetteer files maintained by the Geographic Division.

In contrast to 1961, when only nine two-coloured provisional maps were issued by the Federal Government, output rose sharply to 60 during 1962. An additional 63 sheets at 1:50,000 scale were printed in colour. Bulk stocks of 19 of the aforementioned full-colour maps were received from the Army Survey Establishment. The Department of Mines and Technical Surveys also issued National Topographic maps at 1:250,000 scale covering the Nelson, Kananaskis, Ashcroft, and Graham Island areas.

Provincial map production has already been partially reviewed in the opening paragraphs of this Report. The 1-inch-to-10-miles scale regional maps South-eastern British Columbia (1E) and North-western British Columbia (1B) were issued in planimetric, landforms, and special brown landforms editions (*see* Table G). New status editions at 1:250,000 scale included Victoria (92B-C), Vancouver (92G), and Alberni (92F), whereas a completely revised Smithers sheet (93L) was also released. The publication of Maps 92B-C and 92F has completed the replacement of the former (Map 2A (Southerly Vancouver Island). The Provincial 1-inch-to-2-miles scale mapping programme resulted in two new sheets being released—namely, Creston (82 F/SE) and Slocan (82 F/NW). This completes the replacement of the old Degree Series Maps 4A and 4B. As indicated in Table I, work in hand at the end of 1962 included five new 1-inch-to-2-miles status sheets covering parts of the Kootenays not previously mapped with status.

Sale and distribution of map-sheets rose by 14 per cent over 1961 to reach a new high of 99,324. More than one-half of this total (52,958) were Provincial maps showing land status. Revenue derived from the sale and distribution of all maps totalled $35,391. In addition, the Division received another 130,420 new editions, revisions, and reprints into stock, thus depleting still further the storage space available.

In November a modest increase was applied to the price of all Provincially distributed maps. However, the probability is that further price adjustments will be made in 1963 in order to conform with proposed price changes in maps published by Canadian Government agencies.

The Geographic Division continued to handle the editing, publication, and distribution of the Lands Service Annual Report, as well as special cartographic jobs on behalf of other Government departments and the general public. The latter totalled 18 in 1962, with a value of $1,708 (*see* Table E).

Summary tables of statistical computations, correspondence, and cartographic achievements of the Geographic Division are contained in Tables A to J on the following pages. For convenience, Indexes to Published Maps (Nos. 8 to 14) may be found in the envelope attached to the back cover of this Annual Report. The indexes provide full details concerning prices, date of publication, and how to order maps.

STATISTICAL COMPUTATIONS

Table A.—Least-square Triangulation Adjustments Completed

Net	Locality	Type of Bearings	Number of Triangles Involved
Canadian Hydrographic Service	Hiekish Narrows	Grid	22
Canadian Hydrographic Service	Mathieson Channel and Sheep Passage	Grid	64
Canadian Hydrographic Service	Hunter Channel and Lama Passage	Grid	59
Canadian Hydrographic Service	Raymond Passage and vicinity	Grid	26

The following tables give comparison with the previous five-year period:—

Table B.—Computations.

	1957	1958	1959	1960	1961	1962
Triangles adjusted by least squares	567	562	542	543	182	171
Stations calculated from rectangular co-ordinates	669	918	806	891	168	14
Stations fixed by tellurometer measurements	.....	.....	.....	73	201	89
Ties to cadastral surveys	70	22	24	174	113	10
Elevation of stations determined	325	378	133	251	128	42
Index cards—						
New	1,637	1,173	1,563	1,419	1,930	917
Old (rewritten)	613	1,297	945	551	149	9
Total on file	26,289	27,462	29,025	30,444	32,374	33,291
Requests for control attended to	403	397	383	349	333	417

Table C.—Canadian Permanent Committee on Geographical Names

	1957	1958	1959	1960	1961	1962
Number of map-sheets or charts checked	54	49	51	41	74	35
Number of names checked	8,884	4,698	6,321	4,949	7,837	7,168
Number of new names recorded	306	278	372	322	360	215

Table D.—Map Stock and Distribution

	1957	1958	1959	1960	1961	1962
Maps issued to departments and public	55,167	62,544	78,074	68,518	87,198	99,324
Maps received into stock	181,412	117,729	92,374	175,495	126,502	130,420
Total value of maps issued	$20,441	$21,911	$27,117	$24,378	$32,936	$35,391

Table E.—Geographical Work for Other Departments and Public

	1957	1958	1959	1960	1961	1962
Total number of items	86	55	20	18	22	18
Total value of work	$2,654	$1,447	$2,754	$1,370	$1,452	$1,708

Table F.—Letters

	1957	1958	1959	1960	1961	1962
Letters received and attended to	5,516	6,545	6,865	6,929	8,670	8,790

Table G.—Maps Reproduced and Printed by the Geographic Division, Victoria, during 1962

Map. No.	Name	Scale	Remarks
1B	North-western British Columbia, planimetric	1 in. to 10 mi.	New edition.
1BL	North-western British Columbia, landforms	1 in. to 10 mi.	New edition.
1BLS	North-western British Columbia, landforms in brown	1 in. to 10 mi.	New edition.
1E	South-eastern British Columbia, planimetric	1 in. to 10 mi.	Complete revision.
1EL	South-eastern British Columbia, landforms	1 in. to 10 mi.	Complete revision.
1ELS	South-eastern British Columbia, landforms in brown	1 in. to 10 mi.	Complete revision.
3F	Chilcotin	1 in. to 3 mi.	Reprint, minor revisions.
3J	North Thompson	1 in. to 3 mi.	Reprint, no revision.
92B-C	Victoria (first status edition)	1:250,000	New, seven colours, contoured.
92F	Alberni (second status edition)	1:250,000	New, seven colours, contoured.
92G	Vancouver (second status edition)	1:250,000	New, seven colours, contoured.
92J	Pemberton (first status edition)	1:250,000	Reprint, no revision.
93L	Smithers (second status edition)	1:250,000	Reprint, complete revision.
103I	Terrace (first status edition)	1:250,000	Reprint, no revision.
82 F/SE	Creston (first status edition)	1 in. to 2 mi.	New, seven colours, contoured.
82 F/NW	Slocan (first status edition)	1 in. to 2 mi.	New, seven colours, contoured.
82 L/SW	Vernon (first status edition)	1 in. to 2 mi.	Reprint, no revision.
92 G/SE	Langley (first status edition)	1 in. to 2 mi.	Reprint, no revision.

Table H.—Provincial Government Topographic Manuscripts Reproduced and Printed at 1:50,000 Scale by the Canadian Government, Ottawa, during 1962

Map No.	Name	Map No.	Name
92 C/9, E. & W.	San Juan (second edition reprint).	92 F/7, E. & W.	Horne Lake (second edition reprint).
92 F/1, E. & W.	Nanaimo Lakes (second edition reprint).	92 G/4, W.	Nanaimo (first edition reprint).

Table I.—Maps Being Reproduced by the Geographic Division, Victoria, during 1962

Map No.	Name	Scale	Remarks
1K	South-western British Columbia	1 in. to 10 mi.	In draughting.
92J	Pemberton (second status edition)	1:250,000	In draughting.
93D	Bella Coola (second status edition)	1:250,000	Draughting complete.
93F	Nechako River (first status edition)	1:250,000	In draughting.
93K	Fort Fraser (second status edition)	1:250,000	In draughting.
103F-G-K	Graham Island (first status edition)	1:250,000	In compilation.
103I-J	Terrace (second status edition)	1:250,000	In compilation.
103P	Nass River (second status edition)	1:250,000	In compilation.
82 G/SE	Flathead (first status edition)	1 in. to 2 mi.	In draughting.
82 G/NW-NE	Cranbrook (first status edition)	1 in. to 2 mi.	In compilation.
82 G/SW	Elko (first status edition)	1 in. to 2 mi.	Draughting complete.
82 J/SE-SW	Canal Flats (first status edition)	1 in. to 2 mi.	In compilation.
82 K/SE	Lardeau (first status edition)	1 in. to 2 mi.	In draughting.

Table J.—Provincial Government Topographic Manuscripts Being Reproduced at 1:50,000 Scale by the Canadian Government, Ottawa, during 1962

Map No.	Name	Map No.	Name
82 F/3, E. & W.	Salmo (second edition).	93 O/6, E. & W.	Morfee Lakes (first edition).
82 K/11, W.	Trout Lake (first edition).	93 O/11, E. & W.	Cut Thumb Creek (first edition).
82 K/12, E. & W.	Beaton (first edition).	93 O/12, E. & W.	Blackwater Creek (first edition).
82 L/7, E. & W.	Lumby (first edition).	93 O/13, E. & W.	Finlay Forks (first edition).
82 L/10, E. & W.	Mabel Lake (first edition).	93 O/14, E. & W.	Point Creek (first edition).
82 M/13, E. & W.	Raft River (first edition).	93 P/1, E. & W.	Kiskatinaw River (first edition).
92 J/15, E. & W.	Bralorne (first edition).	93 P/2, E. & W.	Flatbed Creek (first edition).
92 J/16, E. & W.	Bridge River (first edition).	93 P/3, E. & W.	Bullmoose Creek (first edition).
92 L/10, E. & W.	Alert Bay (first edition).	93 P/4, E. & W.	Sukunka Creek (first edition).
92 M/3, E. & W.	Belize Inlet (first edition).	93 P/5, E. & W.	Burnt River (first edition).
92 M/4, E. & W.	Cape Caution (first edition).	93 P/6, E. & W.	Gwillim Lake (first edition).
92 M/5, E. & W.	Goose Bay (first edition).	93 P/7, E. & W.	Sundown Creek (first edition).
92 O/9, E. & W.	Dog Creek (first edition).	93 P/8, E. & W.	Tupper Creek (first edition).
93 C/5, E. & W.	Atnarko (first edition).	94 B/4, E. & W.	Wicked River (first edition).
93 D/7, E.	Bella Coola (first edition).	104 A/2, W.	Kwinageese River (first edition).
93 D/8, E. & W.	Stuie (first edition).	104 A/5, W.	Bowser Lake (first edition).
93 I/8, E. & W.	Narraway River (first edition).	104 A/6, E. & W.	Bell-Irving River (first edition).
93 I/9, E. & W.	Belcourt Creek (first edition).	104 A/11, W.	Taft Creek (first edition).
93 I/10, E. & W.	Wapiti Lake (first edition).	104 A/12, E. & W.	Delta Peak (first edition).
93 I/11, E. & W.	Monkman Pass (first edition).	104 A/13, W.	Mount Alger (first edition).
93 I/12, E. & W.	Missinka River (first edition).	104 B/16, E. & W.	Bob Quinn Lake (first edition).
93 I/13, E. & W.	Sentinel Peak (first edition).	104 K/16, E.	Nahlin River (first edition).
93 I/14, E. & W.	Kinuseo Falls (first edition).	104 N/1, E. & W.	Nakina Lake (first edition).
93 I/15, E. & W.	Kinuseo Creek (first edition).	104 N/2, E. & W.	Nakina (first edition).
93 I/16, E. & W.	Redwillow River (first edition).	104 N/3, E.	Sloko River (first edition).

AIR DIVISION

A. C. KINNEAR, B.C.R.F., CHIEF

The function and accomplishment of the Air Division during 1962 continued in much the same pattern as has been established during the past several years.

The two photographic aircraft of the Division, Anson CF-EZI and Beechcraft CF-BCE, flew a combined total of 504 hours during the year and exposed nearly 20,000 air photos for all projects. Of this total, the largest single demand was for the Forest Service inventory programme, in which some 15,000 air photos were exposed for the flying-time of nearly 260 hours. This is slightly less than the average for recent years, but considering the extremely poor weather pattern of the summer it is a creditable figure. Again many other Government departments requested new photography in various parts of the Province. It is regretted that many such projects could not be completed owing to the lack of sufficient photographic weather during the flying season, in relation to authorized potential in personnel and equipment.

The Mapping and Compilation Sections were primarily engaged in the production of 1-inch-to-20-chains interim map-sheets of the public working circles throughout the Province for the Forest Survey and Inventory Division. A total of some 15,000 square miles of slotted template lay-downs, representing nearly 380 map sheets, was produced. An additional 14,000 square miles of cadastral surveys were plotted for permanent record, of which 60 final tracings, covering 2,875 square miles, were completed and are ready for public distribution.

Since 1961, when the 9- by 9-inch negatives replaced the 5- by 5-inch negatives for the forest inventory programme, a steady increase in the production of 9- by 9-inch contact prints is reported by the Process Laboratory. A corresponding decrease is noted in the output of 9- by 9-inch enlargements made from the older 5- by 5-inch negatives. The combined total of these two types of prints has decreased, however, in the last two years because of greater time required to make the contact prints and, to a lesser extent, by lost time collecting and returning air-film rolls from a new storage vault located some distance from the laboratory.

The Air Photo Library reports a decrease in the total number of reprints and loans issued to the public. The total number, 38,186, compares with the traffic in 1958, when there was a general decrease in exploration work throughout the Province. Another factor which may help account for this decrease is the fee charged for the loan service, imposed for the first time this year.

An increase in the number of people visiting the library in person is reported this year, and it is interesting to note that nearly $4,000 in cash was collected over the counter. In previous years this amount was so insignificant that details were not reported. The bulk of the revenue, however, is still received by mail in Departmental accounts.

The two Williamson ordinance survey cameras (O.S.C.), obtained on loan from the Royal Canadian Air Force, as reported last year, were purchased from the Crown Assets Disposal Corporation, and have produced excellent negatives for all projects other than precision mapping. The Wild RC8 camera is still the camera used for the latter. A third O.S.C. camera is being purchased from a commercial survey company and will be available as a serviceable spare unit.

The former R.C.A.F. cameras served well during the first year's operation, but they have many worn parts, connections, etc., which can cause unserviceability during the flying season. Extensive reconditioning is therefore being done in the

instrument-shop. No further progress can be reported on the Logetronic equipment at this time, but it is anticipated that development work will be resumed early in 1963. The automatic determination of exposure for contact prints, ensuring uniformity between all prints in a particular area, is a system well established in other comparable organizations and should be incorporated here in the future.

The writer assumed responsibility for the Division in March, 1962, following the resignation of the former Chief, Mr. W. Hall, P.Eng., B.C.R.F.

Mr. Eric S. W. Andrews, B.C.L.S., formerly of the Topographic Division, was promoted to Assistant Chief in May, 1962, following a competition, and brings to the Division considerable experience in the field of photogrammetric mapping.

Details of the Air Division's activities and accomplishments during the year are given in the following sections and tables, and Index Maps Nos. 15 to 18 which are contained in envelope attached to back cover of this Annual Report.

FLYING OPERATIONS

The year 1962 saw the Division's first full season's use of the recently modified Beechcraft D18S (Expeditor), CF-BCE. While this aircraft operated for a few hours in 1961, it could not be properly assessed until a full season's work had been completed. Much credit must be given to the aircraft maintenance staff of the Department of Highways and our own mechanics for modifying this R.C.A.F. surplus unit into an aircraft suitable for our type of operation. While a close replacement for the worthy Anson, the Beechcraft, nevertheless, has limits in range, altitude, speed, and pay load. As requirements for air photos are reaching into areas farther from airfields and over higher ground elevations, and as demands for photography are ever-increasing, some thought must be given to higher-performance aircraft for the future.

In spite of one of the poorest seasons on record, weatherwise, both detachments took advantage of every opportunity and completed about 70 per cent of first-priority demands.

Detachment EZI flew a total of 21 days and Detachment BCE flew 23 days. The normal average over the years is 30 days. The detachments operated on a more mobile basis this year and returned to the home base at Patricia Bay during prolonged spells of poor weather. A total of 542 lineal miles of tricamera photography was attempted, but for various reasons it is not of acceptable quality and will only be used as a last resort. Four experienced personnel left this Section during the off-season—one pilot, two photographers, and one mechanic—representing 50 per cent of the active strength of the field crews. Replacements were engaged prior to the field season, and by a "crash" training programme the senior members of the air crews were able to fit the new members into an efficient and harmonious team. The accomplishment, in spite of the weather, for this summer speaks well for all personnel engaged on flying operations.

MAPPING AND COMPILATION

In addition to the main forest inventory programme, as stated earlier, a special project was undertaken for the Surveyor of Taxes, Department of Finance. The entire E. & N. land grant area is to be mapped at a scale of 40 chains to 1 inch, and interim maps produced showing all cadastral surveys and cultural features brought up to date. The first section of this programme was photographed this summer using the Wild RC8 camera, and a slotted template lay-down was made. A total

of 2,400 square miles, covering 19 map-sheets, has been plotted with all ground survey information. This programme is expected to be completed in three years' time.

A function of this Section, started several years ago, is the recording and tabulation on air photographs of all known accurately identified control points. These are obtained through the co-operation of the Topographic and Legal Surveys Divisions, Hydrographic Services of Canada, etc. There are now 3,998 of these points accurately identified and located on air photos and are available to all users. The template lay-down sheets, produced during the compilation of the 1-inch-to-20-chains sheets on the forest inventory programme, are proving invaluable to industrial users for preparing their own maps before the final interim map is available, some months later.

INSTRUMENT-SHOP

Extensive work on the R.C.A.F. surplus O.S.C. cameras was handled in the instrument-shop, as well as the rebuilding of ancillary equipment for these cameras. Co-operation with the Department of Highways, Department of Finance, Forest Service, and Water Resources Service in many small development and maintenance problems has been continued during the year.

One of the Division's instrument-makers was engaged in the production of the new model "Andrews Plotter," but now that this instrument is in the trial operating stage, it is expected that the development of the Logetron printer will be resumed.

Through the ingenuity and ability of personnel in the instrument-shop, a whirler for the rapid drying of paper prints was developed and put into operation in the Process Laboratory. This piece of equipment, originally a second-hand washing-machine purchased for $15, considerably reduces the time required to dry photographic prints.

PROCESS LABORATORY

A new contact printer was added to the equipment in the laboratory this year to replace the out-of-date equipment previously in use. Although contact printing is slower than projection printing, the total of 132,027 9- by 9-inch prints made still represents a production of over 500 prints per day. The other work of enlargements, up to 40 by 40 inches, autopositives, Kelsh, and A7 plates, continues to be required for other departments and commercial users.

A new stable-base air film was tried for the first time this year on an experimental basis. Various manufacturers are producing this film, but it awaits final proof of stability before being adopted for use on precision mapping projects.

The problem of eliminating dirt from the water in the laboratory is still of major concern. A small filtering system has been in use for some years, but has never proved satisfactory. It is hoped that a better system can be installed in the near future.

AIR PHOTO LIBRARY

One of the largest single orders for reprints was received from the Geological Survey of Canada during the year. A total of 10,031 prints was ordered and delivered.

While a decrease in the public loans was recorded, an increase of 5,000 prints was issued to Provincial Government offices. New 1-inch-to-20-chains photographs, which were previously held for mapping copies, were released for loan purposes and probably account for this increase. As more of these larger-scale photographs become available for loans, the traffic is expected to further increase.

1962 Air Operations Cost Summary by Projects

	Aircraft-hours		Number of Photographs	Accomplishment			Flying Costs	Photographic Costs	Total Costs
				Square Miles	Lineal Miles	Stations			
A. Basic vertical cover—Queen Charlotte Islands	Hr. 7	Min. 55					$916.79		$916.79
B. Basic tricamera cover	14	05	1,075		542		1,630.93	$3,065.80	4,696.73
Average cost					$8.74				
C. Triangulation control identification									
D. Forest inventory cover (approximately 20 chains to 1 inch)—									
1. New cover—									
Burns Lake	7	55	170	210			$916.79	$484.83	$1,401.62
Canoe	12	40	585	565			1,466.88	1,668.38	3,135.26
Cranbrook-Fernie	63	20	4,635	3,900			7,334.34	13,218.62	20,552.96
Harrison-Soo	53	55	3,105	3,725			6,243.85	8,855.19	15,099.04
Kettle	28	15	1,660	1,600			3,271.50	4,734.18	8,005.68
Shuswap-Salmon Arm	28	25	1,405	1,445			3,290.80	4,006.94	7,297.74
Stum	46	40	2,565	2,870			5,404.25	7,315.16	12,719.41
Terrace	18	45	815	1,050			2,171.35	2,324.32	4,495.67
Sub-totals	259	55	14,940	15,365			$30,099.76	$42,607.62	$72,707.38
2. Improvement flying, all districts	3	05	60				357.07	171.11	528.18
Totals	263	00	15,000	15,365			$30,456.83	$42,778.73	$73,235.56
Average cost			$4.88	$4.77					
E. Forest engineering—									
Ashnola bridge sites	1	55	16		2		$221.97	$45.63	$267.60
Ashnola Forest-development Road	3	25	41		30		395.68	116.93	512.61
Cayoosh Creek		40	14		8		77.20	39.93	117.13
Crawford Creek		45					86.85		86.85
Galbraith, Wildhorse, Lussier	1	00	21		13		115.80	59.89	175.69
Greely Creek	1	30	16		12		173.71	45.63	219.34
Horsefly-Hendrix bridge sites	1	00	14		2		115.80	39.93	155.73
Lodgepole	1	45	56		25		202.67	159.71	362.38
Morice-Owen	1	15	26		18		144.76	74.15	218.91
Morice River	1	30	39		24		173.71	111.22	284.93
Ranger stations	1	00	10			2	115.80	28.52	144.32
Rock Creek		50	38		23		96.50	108.37	204.87
Sanca Creek	2	20	80		50		270.21	228.15	498.36
Slok Creek	1	00	40		25		115.80	114.08	229.88
Texas Creek	1	00	39		27		115.80	111.22	227.02
Tochcha	1	30	20		13		173.71	57.04	230.75
White River	1	30	54		36		173.71	154.00	327.71
Totals	23	55	524		308	2	$2,769.68	$1,494.40	$4,264.08
Average cost			$8.14		$13.38	$72.16			
F. Precision mapping projects—									
Ashcroft area irrigation	8	30	190		110		$984.35	$541.86	$1,526.21
Camp Lister irrigation	4	00	10		15		463.22	28.52	491.74
Cross flights	18	00	505		880		2,084.50	1,440.22	3,524.72
Haney forest	3	30	7		10		405.32	19.96	425.28
Kaleden water supply	2	00	30		36		231.61	85.56	317.17
Mission Creek	2	35	18		28		299.16	51.33	350.49
Norbury Creek	3	00	2		1		347.42	5.70	353.12
Penticton water supply	3	00	45		50		347.42	128.34	475.76
Sechelt water supply	2	35	48		64		299.16	136.89	436.05
Wells Gray Park	26	10	779		1,215		3,030.24	2,221.64	5,251.88
Legislative Precinct	1	05	3		1		125.45	8.56	134.01
Totals	74	25	1,637		2,410		$8,617.85	$4,668.58	$13,286.43
Average cost			$8.12		$5.51				
G. Special projects—									
Water Resources—									
Columbia River low water	3	35	96		70		$414.98	$273.78	$688.76
Fraser River low water	3	25	71		115		395.67	202.49	598.16
Lillooet River	1	55	38		18		221.96	108.37	330.33
Lillooet River extension	1	30	28		15		173.71	79.85	253.56
Port Edwards cannery		15	3		2		28.95	8.56	37.51
Department of Highways—Port Renfrew Road	1	00	49		35		115.80	139.74	255.54
Department of Mines—Strathcona Park	3	30	81		126		405.32	231.00	636.32

1962 Air Operations Cost Summary by Projects—*Continued*

	Aircraft-hours		Number of Photographs	Accomplishment			Flying Costs	Photographic Costs	Total Costs
				Square Miles	Lineal Miles	Stations			
G. Special Projects—*Continued*	Hr.	Min.							
Forest Surveys—20-chain comparative test		50	5		5		$96.50	$14.26	$110.76
Geographic Division—Bridge River pondage	2	00					231.61		231.61
Land Inspector—									
Christina Lake shoreline	1	30	18		12		173.71	51.33	225.04
Villages on Queen Charlotte Islands		30	35		9		57.90	99.82	157.72
Legal Surveys—									
Burns Lake–Endako Highway	1	15	40		37		144.76	114.08	258.84
Curzon Junction–Goatfell Highway	1	00	5		4		115.80	14.26	130.06
Golden–Donald Highway	3	15	24		18		376.37	68.45	444.82
Grand Forks–Christina Lake Highway	2	05	35		20		241.26	99.82	341.08
Surveyor of Taxes—									
E. & N. Block and Gulf Islands	18	20	600		1,000		2,123.11	1,711.15	3,834.26
Gold River	4	25	63		88		511.47	179.67	691.14
Peace River Block	8	05	70		105		936.09	199.63	1,135.72
Totals	58	25	1,261		1,679		$6,764.97	$3,596.26	$10,361.23
Average cost			$8.22		$6.17				
H. Miscellaneous flying—									
Forest Management — Farwell Creek beetle kill obliques	3	35	80				$414.97	$228.14	$643.11
Federal Fisheries Department—Sea lion experimental photo	2	50	34		2		328.11	96.96	425.07
Surveyor of Taxes — Nanaimo Lakes obliques	2	15	10				260.56	28.52	289.08
Internal—									
Colony Park Farm		25	3		1		48.25	8.56	56.81
O.S.C. mapping test	4	55	20		15		569.38	57.04	626.42
Peace River area obliques	1	30	15				173.71	42.78	216.49
P.N.E. Grounds		50	3		1		96.50	8.56	105.06
Training[1]	10	45	36		20				
Camera maintenance[1]	6	15	28						
Aircraft maintenance[1]	10	50							
Administration flying	18	35					2,152.06		2,152.06
Totals	62	45	229		39		$4,043.54	$470.56	$4,514.10
Average cost			$1.97		$11.57				
Grand totals	504	30	19,726	15,365	4,978	2	$55,200.59	[2]$56,074.33	$111,274.92

[1] Cost of maintenance and training charged to all projects.
[2] Includes purchasing two O.S.C. 12-inch cameras.

Production Record, 1962, Air Photo Processing Laboratory

Processing completed—

Air camera films—

RC 8	18 rolls
O.S.C.	85 rolls
Eagle 5	17 rolls
F24, H.M.C. Dockyard	2 rolls
K20, Federal Hydrographic	3 rolls
F24, colour	1 roll
70 mm.	1,000 ft.
Topographic—118	71 rolls

Printing completed—

Standard prints, 10 by 10 inches	75,345
Enlargements, up to 40 by 84 inches	952

Printing completed—*Continued*	
Contact prints—	
10 by 10 inches	56,682
20 by 24 inches	122
Kelsh and A7-A8 plates, 9½ by 9½ inches	597
Film transparencies, up to 30 by 30 inches	204
Autopositive films, up to 30 by 42 inches	320
Ground photos, 4 by 5 inches	4
Requisitions completed	1,923

Orders for Standard Prints (9 by 9 Inches) from British Columbia Negatives, 1962

	Reprints		Loans	
	Requisitions	Number	Requisitions	Number
Public—				
Individuals	678	3,861	145	1,476
Companies and organizations	109	1,109	42	1,156
Mining	116	5,640	54	1,541
Oil and natural gas	33	4,337	7	534
Schools and universities	122	1,170	15	697
Towns and cities	7	174	4	16
Commercial air survey	82	5,652	47	1,310
Forest industries	238	6,063	101	3,120
Real estate	36	220	24	110
Totals	1,421	28,226	439	9,960
Federal Government—				
Department of Mines and Technical Surveys	29	14,311	7	45
Department of National Defence	----------	----------	----------	----------
Department of Agriculture	28	143	1	36
Department of Fisheries	8	109	4	59
Miscellaneous	12	261	7	83
Totals	77	14,824	19	223
Provincial Government—				
Surveys and Mapping	152	20,457	532	9,811
Land Inspectors	37	2,167	15	148
Water Resources Service	29	1,529	56	609
Lands Branch (miscellaneous)	3	69	20	251
Department of Highways	73	952	226	3,695
Forest Surveys	134	56,970	329	7,674
Department of Finance	48	3,605	28	333
Department of Agriculture	16	866	13	151
Department of Mines	22	375	43	857
British Columbia Hydro and Power Authority	25	633	22	617
Regional Planning	9	831	16	142
Department of Recreation and Conservation	20	479	131	1,715
Pacfiic Great Eastern Railway	1	44	----------	----------
Totals	569	88,977	1,431	26,003
Grand totals	2,067	132,027	1,889	36,186

Public Loans and Reprints

	1958	1959	1960	1961	1962
Loans	8,646	13,981	11,840	13,399	9,960
Reprints	32,131	45,644	49,627	34,659	28,226
Totals	40,777	59,625	61,467	48,058	38,186

UNIVERSITY ENDOWMENT LANDS

UNIVERSITY ENDOWMENT LANDS

M. E. FERGUSON, PROJECT MANAGER

Owing to the dormant state of development operations, this Project's activities for 1962 were naturally related mainly to general administration items.

In addition to the usual administrative problems of a small town operating without the benefit of the usual legal controls, there were, however, several additional problems which required attention.

One of the problems was in connection with the control of traffic and parking within the residential area. This was the result of the increased enrolment at the University, coupled with the fact that a new policy of creating a walking campus was initiated, and a plan was inaugurated whereby all students and staff were charged a fee for the privilege of parking on the campus. The parking problem has been fairly well controlled by the posting of parking restrictions. The traffic problem will continue to become an even greater problem until a new access road is constructed between the City of Vancouver and the U.B.C. campus. Serious consideration is presently being given to the possible location of such an access road, and when the opinions and recommendations of the traffic consultants for the University are received, further consideration will be given this matter.

During the year the report of Swan-Wooster Engineering Company was received, and meetings held by the Chairman of the Erosion Committee, Mr. E. W. Bassett, to consider same. As a result of these meetings, additional exploratory work is presently being carried out by sub-committees for submission to the full committee in due course.

The continued growth of the University campus continues to increase demands on our present water supply, but the steps presently being proceeded with by the Greater Vancouver Water Board should keep this problem under control. The Board is now increasing supply-lines to the Endowment Lands and is about to obtain a reservoir-site in the area.

The Fire Department continued its operation under the special assistance arrangements with the City of Vancouver. Present arrangements expire March 31, 1963, at which time it is hoped more permanent planning will become effective. An added difficulty arose in fire protection on the campus through creation of one-way streets plus the installation of barricades on the main mall, where the main water supply and fire-hydrants are located. It is hoped at least the most pressing items relating to these barricades will be solved shortly by the initiating of a modified form of traffic control.

Like most other residential districts, the Endowment Lands encountered a considerable amount of damage from the storm "Frieda," which occurred on October 12th and 13th. Many boulevard trees were toppled, and crews worked around the clock trying to keep streets open. The number of power and telephone lines brought down added to the situation because of the danger from high-voltage wires. This experience, which resulted in most of the area being without power or heat for over two days, made many people aware of the advantages of having power distribution underground. The damage was beyond the scope of the current year's budget to do more than a minimum amount of tree removal with no hope of considering replacement at present.

Probably the most outstanding item to record for the year was the fact that the general-tax mill rate was actually reduced slightly while most other adjoining

areas recorded substantial increases. This is unique for the added reason that a further decrease appears likely for 1963.

With the last remaining fraternity lot being built on this year, it became evident something would have to be done to provide additional lots for other fraternities that are presently trying to locate near the campus. It would now appear that a solution to this will be reached shortly and provision made to accommodate these fraternities early next year.

NUMBER AND VALUE OF BUILDING PERMITS ISSUED DURING THE YEARS ENDED DECEMBER 31, 1960, 1961, AND 1962

	1960		1961		1962	
	Number	Value	Number	Value	Number	Value
Church addition	---	----------	---	----------	1	$11,000.00
Churches	---	----------	1	$150,000.00	---	----------
Swimming-pools	4	$19,800.00	1	13,000.00	---	----------
New houses	---	----------	1	20,000.00	---	----------
New fraternities	2	100,530.00	1	50,000.00	---	----------
Alterations	12	55,831.00	10	44,450.00	11	48,400.00
Garages, etc.	4	4,200.00	9	8,400.00	1	1,000.00
Totals	22	$180,361.00	23	$285,850.00	13	$60,400.00

SUMMARY OF REVENUE RECEIVED DURING THE PAST TEN YEARS TO DECEMBER 31, 1962

Year	Sale of Repossessed Property		Local Improvement Taxes		Loans		Land Sales		99-year Lease Rentals	Water Account	Sundry Rents and Leases	Miscellaneous and Permits	Total
	Principal	Interest	Principal	Interest	Principal	Interest	Principal	Interest					
1953	$898.82	$64.72	$10,762.31	$100.54	$10,353.55	$3,426.02	$37,652.77	$868.48	$914.57	$32,260.34	$10,261.49	$11,835.99	$119,399.60
1954	430.70	107.41	9,532.13	92.99	21,254.60	2,806.22	11,612.02	106.36	976.26	22,151.77	10,981.01	7,693.94	87,745.41
1955	531.64	6.60	11,250.35	126.28	5,505.39	2,070.89	15,544.43	411.79	561.53	43,078.28	7,311.23	6,632.94	93,031.35
1956	.....	.....	7,487.45	29.94	8,719.99	2,713.73	1,575.00	.....	818.10	62,401.20	7,379.23	8,404.33	99,528.97
1957	.....	.....	7,819.29	36.77	5,908.69	1,022.42	1,000.00	135.00	.....	62,205.11	11,564.73	10,302.65	99,994.66
1958	.....	.....	8,832.53	17.97	11,067.28	544.28	2,000.00	92.50	146.10	67,388.26	13,768.93	2,223.97	106,081.82
1959	.....	.....	6,758.89	6.24	5,051.43	245.03	.....	.....	146.10	70,867.86	6,536.23	1,894.11	91,505.89
1960	.....	.....	7,352.79	20.91	3,123.88	166.07	.....	.....	146.10	82,346.14	16,022.63	3,337.84	112,516.36
1961	.....	.....	12,427.09	31.35	537.87	12.56	.....	.....	146.10	84,435.63	11,622.23	10,333.27	119,546.10
1962	.....	.....	10,320.99	16.49	.....	.....	.....	.....	146.10	86,400.08	15,131.63	11,213.19	123,228.48
Totals	$1,861.16	$178.73	$92,543.82	$479.48	$71,522.68	$13,007.22	$69,384.22	$1,614.13	$4,000.96	$613,534.67	$110,579.34	$73,872.23	$1,052,578.64

WATER RESOURCES SERVICE

VICTORIA, B.C., January 31, 1963.

The Honourable R. G. Williston,
Minister of Lands, Forests, and Water Resources,
Victoria, B.C.

SIR,—I have the honour to submit the Annual Report of the British Columbia Water Resources Service of the Department of Lands, Forests, and Water Resources for the nine months ended December 31, 1962. Included in this Annual Report are the activities of the Water Rights Branch for the first three months of 1962, during which period the Water Rights Branch was still under the Lands Service of the Department of Lands and Forests.

A. F. PAGET,
Deputy Minister of Water Resources.

WATER RESOURCES SERVICE

THE WATER RIGHTS BRANCH

The Water Rights Branch is the agency of the Provincial Government which administers the control and use of surface water under the authority of the *Water Act*.

The main principles of the *Water Act* regarding the use of water are:—

(1) The property in and the right to the use and flow of all the water at any time in any stream in the Province are for all purposes vested in the Crown in right of the Province. The common-law principle of riparian water right has been abolished.

(2) Licence-holders have a right to the use of water under the terms and conditions of the water licence issued by the Comptroller of Water Rights. Earlier licences have priority over licences issued later.

(3) Retention of a water licence is dependent upon the beneficial use of the water, payment of the water-licence rentals, and observance of the regulations of the *Water Act*.

(4) A water licence is generally made appurtenant to a parcel of land, mine, or undertaking, and it will pass with any conveyance or other disposition thereof.

(5) If it is necessary that a water licensee construct works on another person's land, he can expropriate the land reasonably required if an amenable agreement cannot be reached. If the works will be on Crown land, the water licensee may acquire a permit to occupy Crown land for such purpose.

The second major function of the Water Rights Branch is to generally supervise and assist the administration of the improvement districts which have been incorporated under the *Water Act* for irrigation, waterworks, drainage, dyking, street-lighting, providing financial aid to hospitals, fire protection, and several other purposes. An improvement district is a self-governing public corporate body administered by elected Trustees. The undertakings of an improvement district can be financed by Provincially guaranteed debenture issues.

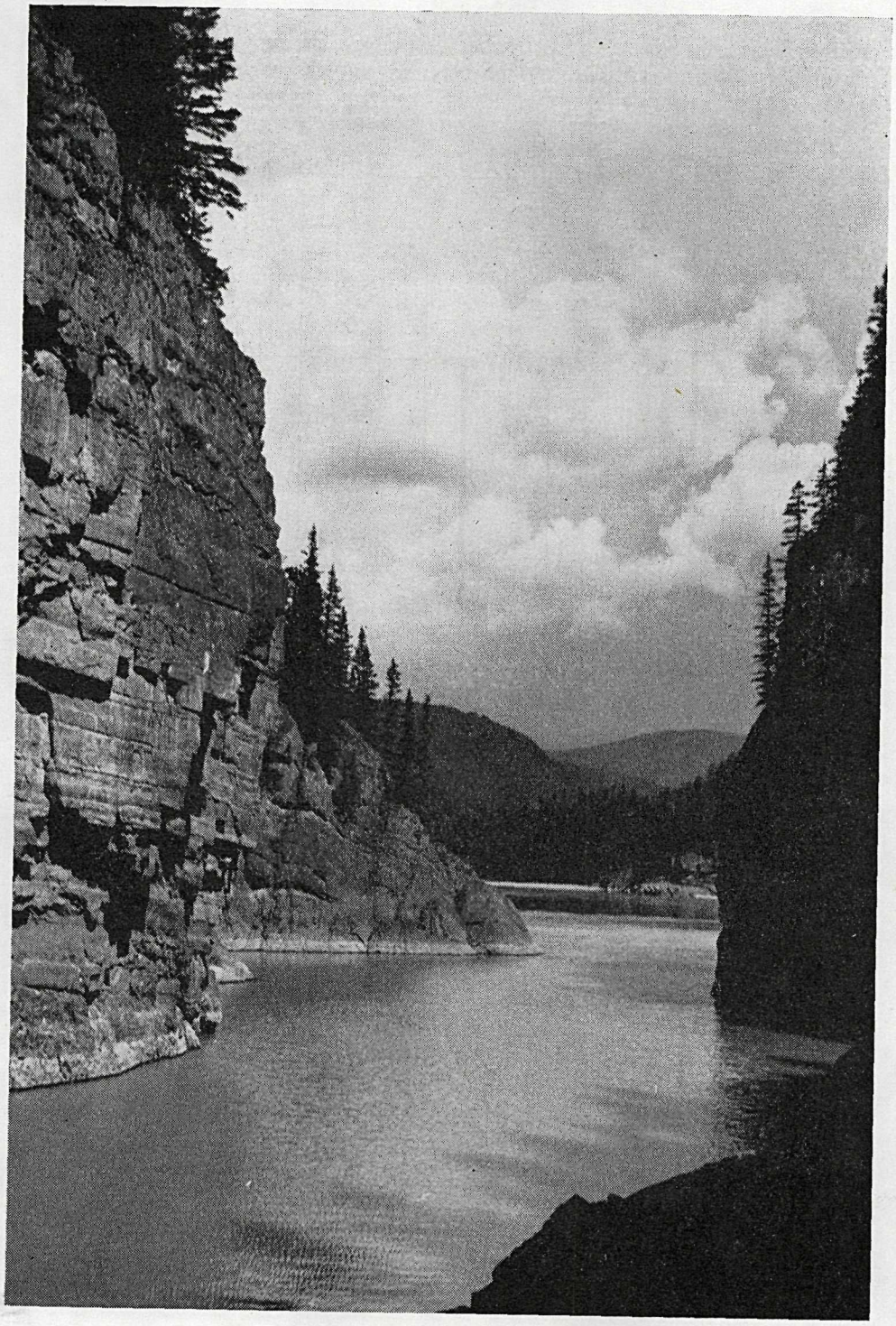
The administration of the *Water Act* is carried out by the Comptroller of Water Rights, and his staff are located at a headquarters office in Victoria and district offices at Victoria, Kamloops, Kelowna, Nelson, Prince George, and Mission City.

Water is a natural resource which often has a controlling influence on economic development of other resources and, therefore, is in competitive demand by the utilizers of other resources. Much of the vast industrial expansion presently occurring in this Province is associated with the use of British Columbia water. A large number of communities have been incorporated into improvement districts to operate community projects and provide essential amenities.

THE WATER INVESTIGATIONS BRANCH

With the creation of an independent Water Resources Service, effective April 1, 1962, the technical matters pertaining to the water resources of the Province which are not directly connected with the administration of the *Water Act* are being transferred from the Water Rights Branch to the newly formed Water Investigations Branch. The Hydraulic Investigations Division of the Water Rights Branch will thus form the nucleus of the new Water Investigations Branch, which is headed by the Chief Engineer.

The dominant function of the Water Investigations Branch is to carry out water resources surveys. Basic hydrometeorological data are gathered and analysed to encourage and guide the future use and conservation of our water resources. Engineering investigations are carried out pertaining to irrigation and domestic water supply, water power, stream erosion, flooding, and other water problems.



North channel, Hades Gate, Liard River.

ORGANIZATION

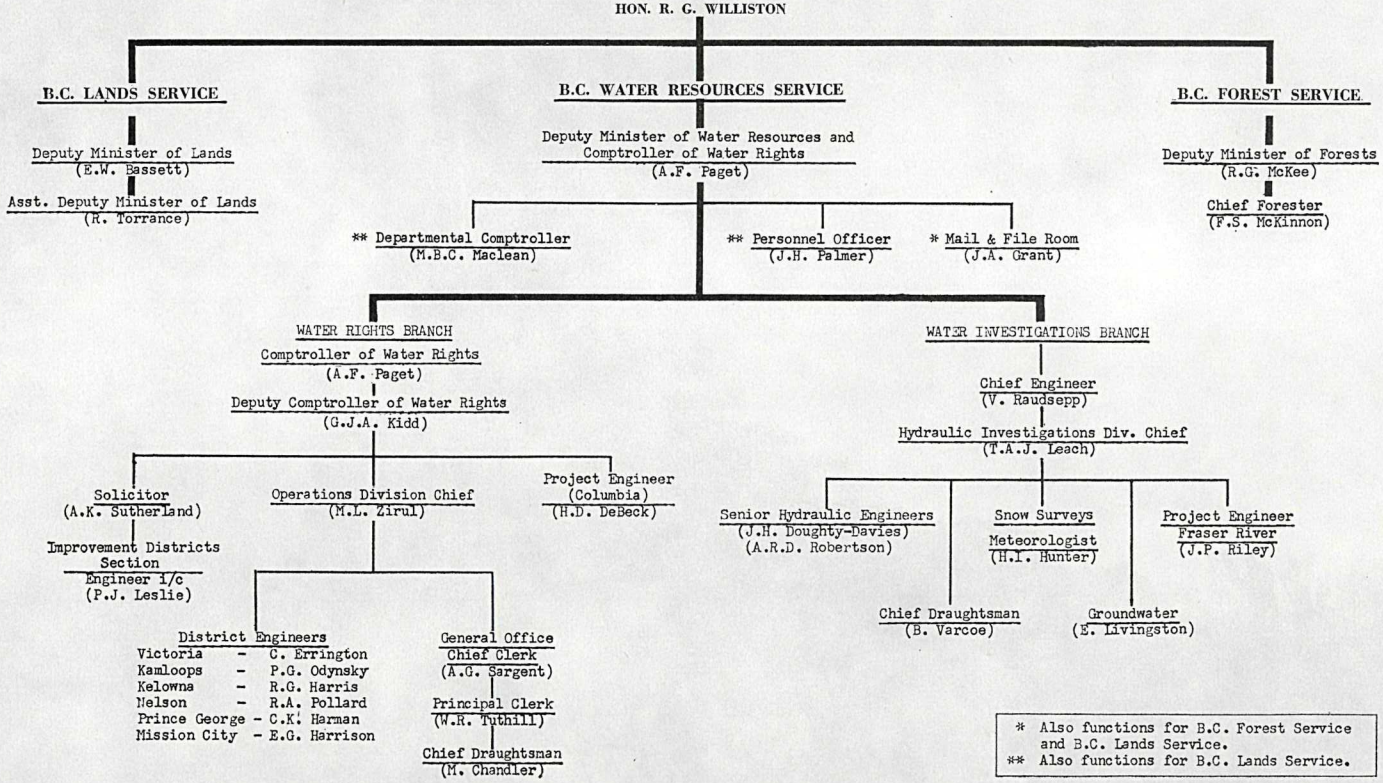
BRITISH COLUMBIA WATER RESOURCES SERVICE

DEPARTMENT OF LANDS, FORESTS, AND WATER RESOURCES

Victoria, B.C.

Year ending December 31, 1962

MINISTER OF LANDS, FORESTS, AND WATER RESOURCES
HON. R. G. WILLISTON



* Also functions for B.C. Forest Service and B.C. Lands Service.
** Also functions for B.C. Lands Service.

Report of Water Resources Service

A. F. Paget, Deputy Minister of Water Resources and
Comptroller of Water Rights

The *Department of Lands and Forests Amendment Act, 1962,* transferred the administration of the *Water Act* and all matters pertaining to the water resources of the Province to the newly created post of Deputy Minister of Water Resources. Accordingly, the Water Rights Branch was transferred from the Lands Service to the Water Resources Service on April 1, 1962, and a Deputy Minister of Water Resources appointed.

The Water Rights Branch, headed by the Comptroller of Water Rights, has been administering the *Water Act* since 1909 and passed its 50-year anniversary date a few years ago. In the future the Water Resources Service will deal mainly with the administration of the control and use of water under the authority of the *Water Act.* The technical matters pertaining to the water resources of our Province are being transferred to the newly created Water Investigations Branch, headed by the Chief Engineer.

At the beginning of 1962 the Water Rights Branch was still a part of the Lands Service. For this reason, the 1962 Annual Report is prepared jointly with the Deputy Minister of Lands. As the transfer of technical water matters from the Water Rights Branch to the newly created Water Investigations Branch commenced only in December, 1962, it appeared to be convenient to report on all activities as having been under the Water Rights Branch. The Hydraulic Investigations Division of the latter forms now the Water Investigations Branch, and it is anticipated that the new Branch will be given its full responsibilities next year.

The personnel matters, the accounting, and the mailing and filing of the Water Resources Service are handled on a co-operative basis by the respective officers of the Lands Service. Similarly, the Mechanical Superintendent of the Forest Service carries out inspection of the motor-vehicles.

The Deputy Minister of Water Resources received his appointment effective April 1, 1962. For the time being he still retains his second position as the Comptroller of Water Rights. Mr. V. Raudsepp, Deputy Comptroller of Water Rights since 1956, was appointed to the position of Chief Engineer, to be in charge of the Water Investigations Branch. Mr. G. J. A. Kidd returned from the British Columbia Hydro and Power Authority to the Water Resources Service as Deputy Comptroller, effective December 10, 1962.

The permanent establishment of the Water Resources Service experienced several other changes. Mr. J. P. Riley, Water Rights District Engineer at Nelson, was transferred to Victoria to occupy the position of Project Engineer in connection with the Fraser River Board studies. Mr. R. A. Pollard, of the Hydraulic Investigations Division, is now the Nelson District Engineer. Six additional positions to the establishment were allowed in the 1962/63 appropriations. Among these were one engineering position for each of the district offices of Kelowna and Kamloops, now occupied by Mr. W. K. A. Dobson and Mr. J. Wester respectively.

Activities in connection with water licensing continued to increase. A record number of new water-licence applications was received. In August this figure was up to 142. Among the major water licences issued in 1962 were the Columbia Basin development; storage licences at Mica Creek, Arrow Lakes, and at Duncan Lake, issued in April; and a power and a storage licence on Peace River for Portage Mountain site issued in December, all to the British Columbia Hydro and Power Author-

ity. Messrs. H. D. DeBeck and D. B. Tanner carried out extensive studies in connection with these proposed major power projects.

Work load continued to be heavy in the section dealing with community water-supply projects, under the direction of Mr. P. J. Leslie, assisted by Mr. J. W. Webber. Most of these projects were associated with either proposed or existing improvement districts, the administration of which is guided by Mr. A. K. Sutherland, solicitor of the Water Resources Service. It is noteworthy that the total number of improvement districts has grown to 278.

A good start was made by Mr. E. Livingston in compilation of available data on ground-water resources. In the field of surface-water investigations, our co-operative activities with the Fraser River Board took up a large portion of the available manpower and time. In addition, a variety of assignments involving flooding and erosion, irrigation, and other water-supply proposals received extensive studies. The snow surveys and run-off forecasting under Mr. H. I. Hunter, meteorologist, were successfully continued and expanded.

Finally, there were, as in the past, a number of boards and committees or organizations dealing with water problems and related matters, and on which the senior members of the Water Resources Service participate. A list of these includes the following: British Columbia Energy Board, Fraser River Board, International Kootenay Lake Board of Control, Pollution-control Board, Interdepartmental Committee on Public Access, British Columbia Natural Resources Conference, Hydrology Sub-committee of the National Research Council, Western Snow Conference, Western Reclamation Association, British Columbia Public Works Association, Cowichan River Erosion and Flooding Committee, etc.

IMPROVEMENT DISTRICTS

There are 278 improvement districts under the supervision of the Water Resources Service. The districts are incorporated for various purposes, among which are to extend financial aid to hospitals; to provide hospitals, irrigation, waterworks, fire protection, street-lighting, sewage disposal, garbage collection and disposal, land protection, dyking, drainage, community halls, ambulance services; the operation and maintenance of cemeteries; the provision and maintenance of parks and playgrounds; and the provision of mosquito control. Nine improvement districts were incorporated this year, as follows: Coldwater Improvement District, Dellcliff Waterworks District, Genelle Improvement District, Ladysmith and District Hospital Improvement District No. 33, Fort Fraser Waterworks District, Hudson Hope Improvement District, Mill Bay Waterworks District, Minto Improvement District, and Sheltered Cove Improvement District. One district was dissolved—namely, Somerset Waterworks District.

Pursuant to section 62 of the *Water Act,* $572,672 was advanced to improvement districts by the Province of British Columbia for 1962 requirements to provide fire protection, financial aid to hospitals, ambulance services, and street-lighting, and will be collected by the Province by way of taxes over a period of time from 1 to 20 years, depending upon the capability of the area to repay. The tax levy for 1962 to take care of the aforementioned advances and those of previous years was $1,050,969.

Pursuant to the *Improvement Districts Assistance Loan Act,* chapter 38 of the Statutes of British Columbia, 1945, and amendments thereto, the Province of British Columbia guaranteed debentures with respect to both principal and interest in the amount of $862,000. In addition, temporary borrowings with respect to both principal and interest in the amount of $2,143,000 were guaranteed by the Province of

British Columbia. Of this amount of temporary borrowings, $118,500 was liquidated from funds received from the sale of debentures as aforesaid. This Branch recommends the feasibility of the projects before the Province guarantees temporary borrowings and debentures with respect thereto, and, further, that the areas can liquidate the debentures as they become due. Of the total net amount guaranteed as aforesaid, $669,500 was used for rehabilitating and constructing waterworks systems and sewers, $21,000 was used for rehabilitating irrigation systems, $2,160,000 was used for constructing new hospitals, and $36,000 was used for constructing a new fire-hall.

WATER-USERS' COMMUNITIES

There are 66 water-users' communities in the Province at the present time. They are incorporated under the *Water Act* by certificate of incorporation issued by the Comptroller of Water Rights and are usually small corporate bodies of six or more persons holding water licences. A community can install and operate a water-supply system for its members. Their powers are more restricted than those of an improvement district, and the administration is carried out by a manager under the supervision of the Comptroller of Water Rights. Four water-users' communities were incorporated during 1962.

INTERNATIONAL WATERS—COLUMBIA BASIN

Ratification of the Columbia Treaty between the United States and Canada is still pending a decision by the Parliament of Canada. In British Columbia, however, much work has been done and water licences for the three storage projects —Mica, Arrow Lakes, and Duncan—were issued to the British Columbia Hydro and Power Authority on April 16, 1962. As a result of evidence submitted at public hearings in September, October, and November of 1961, a number of special provisions were inserted in these licences in order to protect the interests of the public.

Studies at present being undertaken by or in participation with the Water Resources Service in connection with the aforementioned special provisions include the establishment of a hydro-meterological network, a road relocation programme, a flood-routing programme, and a study to determine the best method of transporting wood products around or over the Arrow Lakes dam. In addition to these, the Department of Recreation and Conservation is conducting studies to determine the effects on fisheries and wildlife, and will be making a report of its findings to the Comptroller. The Forest Service is studying the effects on timber that will be flooded by the reservoirs, and will also be advising the Comptroller on the necessary measures to be taken.

The British Columbia Hydro and Power Authority and its consultants are continuing work on the design of the dams. This work is complete for Duncan, but some details have still to be decided for Arrow Lakes. Mica is the subject of an intensive two-year study which should be ready next year. The matter of relocation of persons affected by flooding, mainly by Arrow, is receiving very much attention, and an outline of proposed measures for resettlement was made at recent public meetings in the area. However, due to the delay in ratification of the treaty, funds are not available as yet for carrying out the actual development of the projects.

FRASER RIVER BASIN

The Fraser River Board, of which the Comptroller is a member, is engaged in an analysis of flood regulation and hydro-electric development in the headwater streams of the Fraser system. During the year the Water Resources Service continued active participation in studies and field investigations for the Fraser River Board.

A study was undertaken to establish flood-protection benefits now provided by the existing dyking and drainage works in the Lower Fraser Valley. In addition, a determination was made of those benefits which could be provided by a proposed system of up-stream reservoirs. The areas included in the reservoir benefit study were the Lower Fraser Valley, Kamloops, Prince George, and Quesnel. The benefits were those derived from protection against spring floods of all frequencies up to the limit set by a calculated maximum flood.

Studies were continued of the dyking systems in the Lower Fraser Valley in an effort to establish their effectiveness as flood-protection structures. A drilling programme was initiated through which some 200 miles of dyke are being investigated. The drill samples are being subjected to standard soil mechanics tests and analyses. From the results of this study and from information already obtained, recommendations will be formulated concerning the ability of the present dykes to provide flood protection.

Studies have indicated that the proposed system of dams in the basin of the Clearwater River is capable of sufficient regulation to eliminate flood damage at Kamloops. It was also established that flood damage could be reduced at Kamloops by an improvement in outflow conditions at Kamloops Lake.

An investigation was carried out of the possible effects of Fraser River flow regulation on drainage conditions in the Lower Fraser Valley. Flow regulation will modify not only the stages of the spring floods, but also will effect changes in the river levels during the winter months. These changes in river levels will have some effects on both seepage inflow and gravity drainage for certain dyking districts. For these districts, the study indicated possible changes in both pumping costs and flooding conditions.

DEVELOPED AND UNDEVELOPED WATER POWER

Records of hydro-power generation for 1961 and preceding years are shown graphically in Plates 2 and 3. Plate 2 shows the Provincial totals of peak loads, average loads, and installed capacities, and Plate 3 shows the breakdown between the major producers. The attention of the reader is brought to the note on Plate 2 referring to peak loads.

The total amount of electrical energy generated at hydro-electric plants during 1961 was 12,371,000,000 kilowatt-hours, a decrease of 2.1 per cent on the corresponding figure for 1960. This drop in production is entirely due to the two months' shut-down of the Aluminum Company of Canada's power plant at Kemano. If Alcan had maintained its output of the previous year, the over-all total for the Province would have shown an increase of around 5 per cent.

Over the last 10 years the total amount of power generated by hydro plants in the Province has risen at a rate of 10.1 per cent compound. The total generation, both hydro and thermal for the same period, has risen at a rate of 9.8 per cent compound, from 5,143,000,000 kwh. in 1951 to 13,158,000,000 kwh. in 1961. It is interesting to note that the average rate for the last 41 years, the longest period for which records are available, is 8.2 per cent compound.

ADDITIONAL INSTALLATION DURING 1962

There has been only one significant addition to the list of operating hydro plants during 1962. This is on the Raging River near Port Alice, Vancouver Island, where Consolidated Mining and Smelting Company of Canada, Limited, has recently reopened its Benson Lake copper mine. It should be noted that the curve on Plate 3 for " Installed Capacity—C.M. & S." shows a slight drop. This is due to the aban-

donment, during 1961, of the plant at Anyox, which had been inoperative for some years. The Raging River addition will be reflected in next year's report. Consolidated Mining and Smelting Company of Canada, Limited, is also installing a third 72-megawatt unit at its Waneta plant. Installation was originally scheduled for mid-1962 but has been delayed. An application in connection with this plant was recently made to the National Energy Board of Canada for an equi-change of electrical energy with the Bonneville Power Administration in the United States, which application was approved in December, 1962.

In the thermal-power field the first 150,000-kilowatt unit of the British Columbia Hydro and Power Authority's Burrard plant at Ioco is now in operation.

UNDEVELOPED WATER POWER

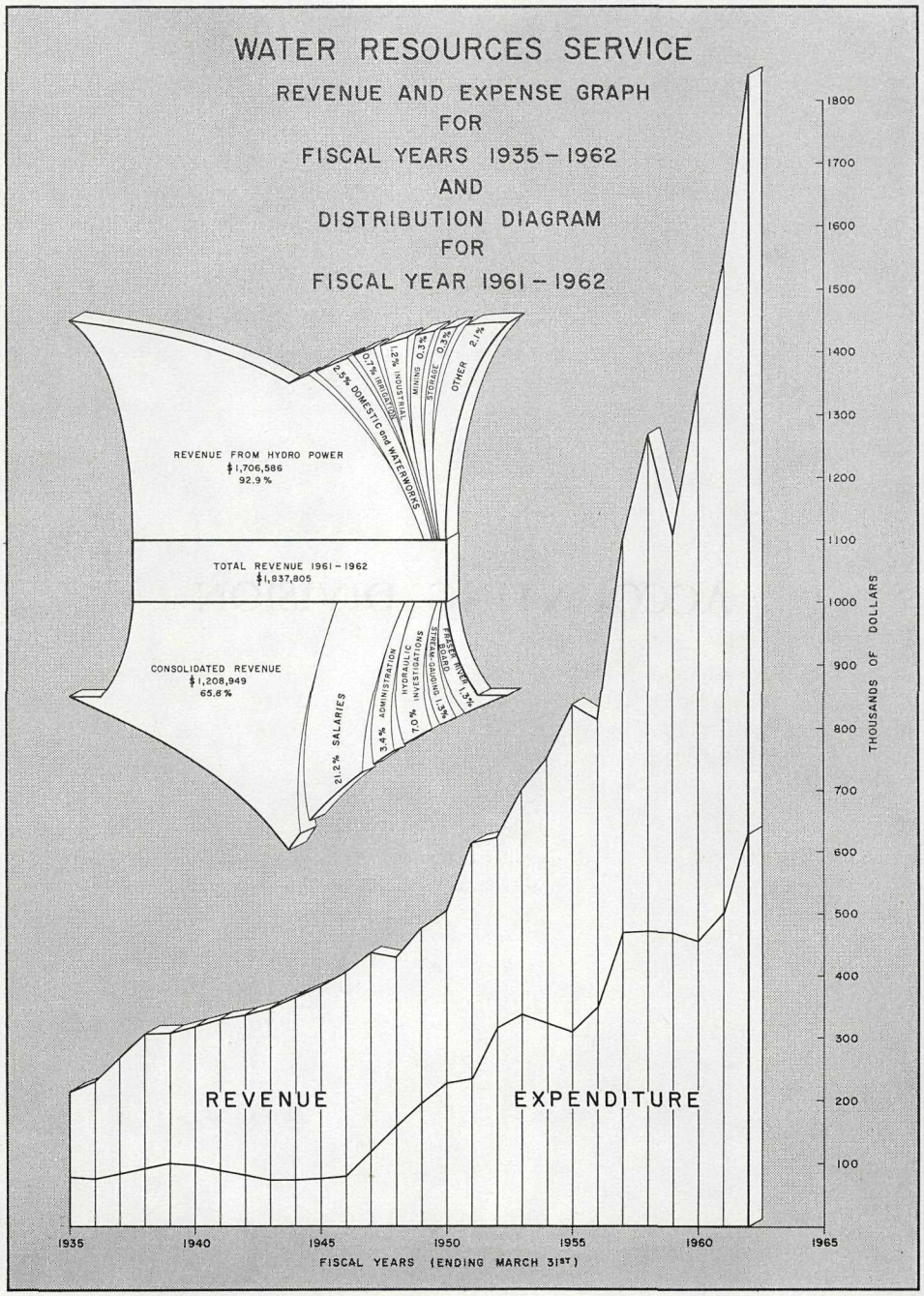
There have been no recent additions of any significance to the known undeveloped hydro-electric power resources of the Province. The present estimated total therefore still stands at 22,100,000 kilowatts of prime power, or some 34,000,000 kilowatts of installed capacity. Studies which may well reveal additional resources are continuing.

PEACE RIVER POWER DEVELOPMENT

In February, 1962, the B. C. Electric Company, now part of the British Columbia Hydro and Power Authority, made applications for power and storage licences of 58,300 c.f.s. and 32,000,000 acre-feet respectively on the Peace River at Portage Mountain. As required under the *Water Act,* all the affected persons received notification of these water applications, and the Comptroller of Water Rights received some 70 letters objecting to or expressing concern about these applications.

These representations were considered at a public hearing at Chetwynd in early August and at a further meeting in Victoria. Water licences for the Portage Mountain power development on the Peace River were issued by the Comptroller of Water Rights to the British Columbia Power and Hydro Authority on December 21, 1962.

ACCOUNTING DIVISION


WATER RESOURCES SERVICE
REVENUE AND EXPENSE GRAPH
FOR
FISCAL YEARS 1935 – 1962
AND
DISTRIBUTION DIAGRAM
FOR
FISCAL YEAR 1961 – 1962
REVENUE FROM HYDRO POWER
$1,706,586
92.9 %
TOTAL REVENUE 1961 – 1962
$1,837,805
CONSOLIDATED REVENUE
$1,208,949
65.8 %
2.5% DOMESTIC and WATERWORKS
0.7% IRRIGATION
1.2% INDUSTRIAL
MINING 0.3%
STORAGE 0.5%
OTHER 2.1%
21.2% SALARIES
3.4% ADMINISTRATION
7.0% HYDRAULIC INVESTIGATIONS
STREAM-GAUGING 1.5%
BOARDS 1.3%
FRASER RIVER 1.3%
REVENUE
EXPENDITURE
1800
1700
1600
1500
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
200
100
THOUSANDS OF DOLLARS
1935
1940
1945
1950
1955
1960
1965
FISCAL YEARS (ENDING MARCH 31ST)

ACCOUNTING DIVISION

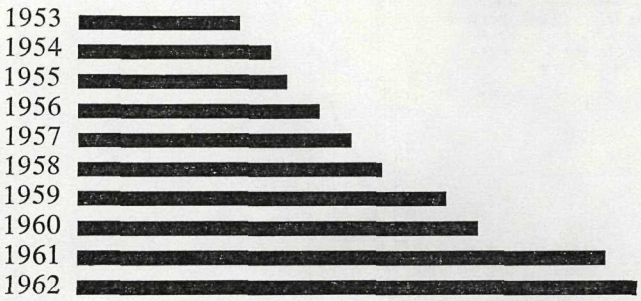
M. B. MACLEAN, B.COM., DEPARTMENTAL COMPTROLLER

Revenue from water rentals and recording fees amounted to $2,115,738 for the calendar year 1962, and was derived from the following sources of use:—

Domestic, incidental use, and fees	$ 68,323.29
Waterworks	11,874.54
Irrigation	3,106.35
Power	1,731,914.41
Funds held on application	300,519.41
Total	$ 2,115,738.00

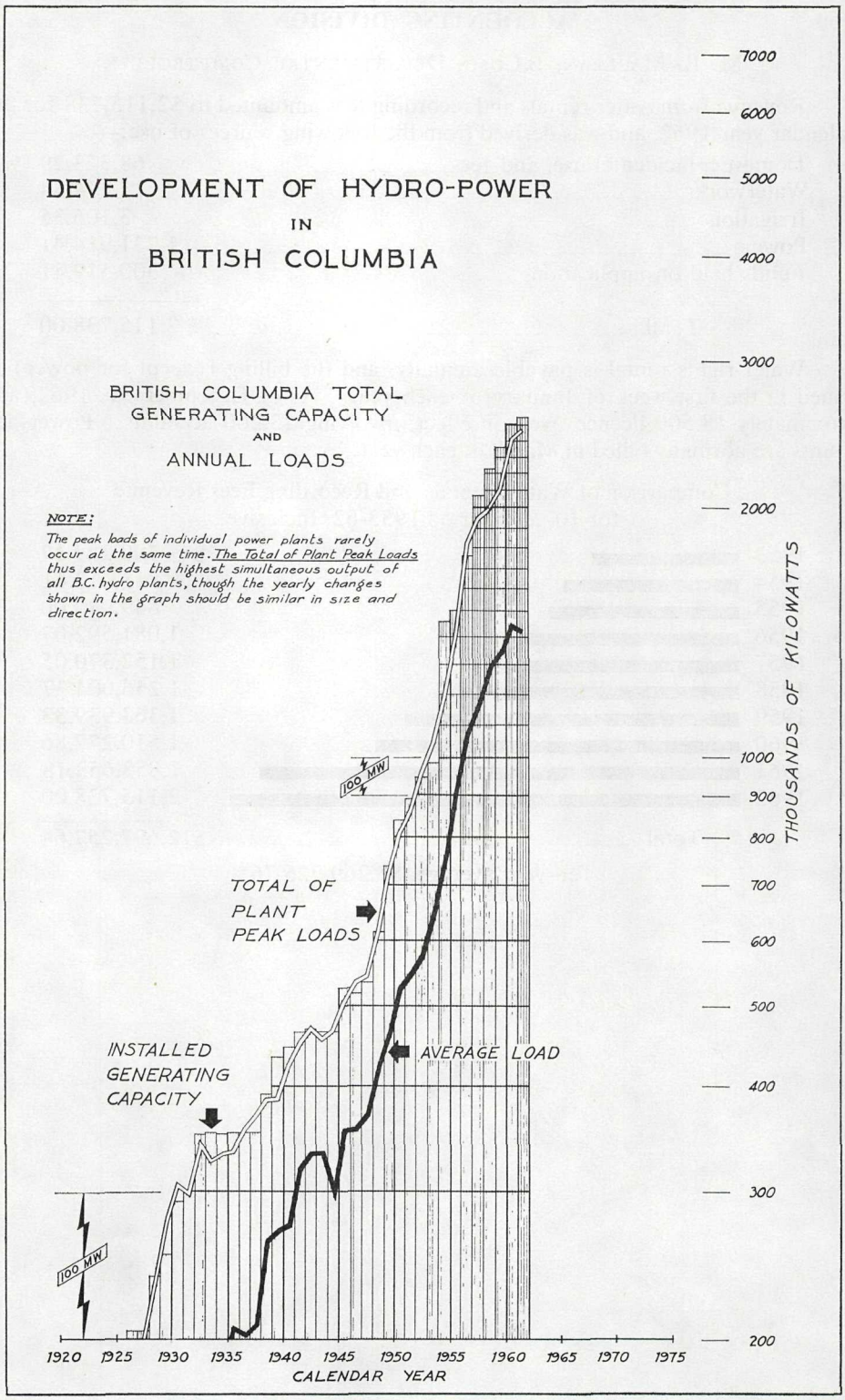
Water-rights rental is payable annually, and the billing (except for power) is issued in the first week of January of each year. As of December 31, 1962, approximately 18,500 licences were in effect, involving 13,200 accounts. Power accounts are normally billed in March of each year.

Comparison of Water Rentals and Recording Fees Revenue
for 10-year Period 1953-62, Inclusive



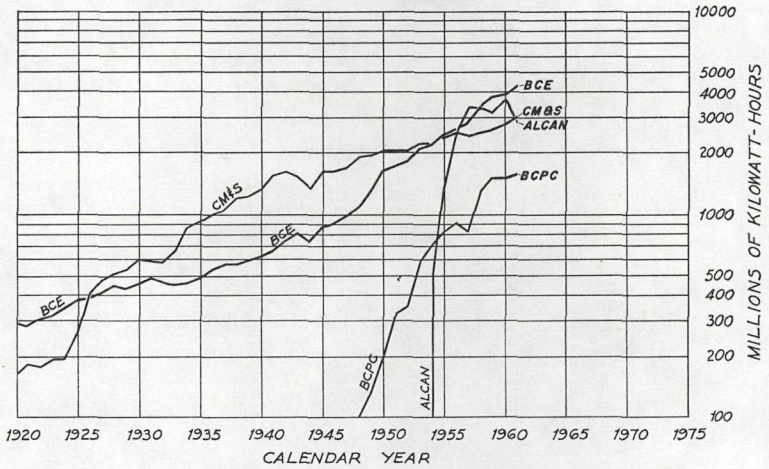
1953	$ 700,289.17
1954	813,413.61
1955	849,980.00
1956	1,081,592.07
1957	1,152,370.05
1958	1,256,004.37
1959	1,363,939.33
1960	1,510,277.86
1961	1,853,653.18
1962	2,115,738.00
Total	$12,697,257.64

Ten-year average, $1,269,725.76


DEVELOPMENT OF HYDRO-POWER
IN
BRITISH COLUMBIA
BRITISH COLUMBIA TOTAL
GENERATING CAPACITY
AND
ANNUAL LOADS
NOTE:
The peak loads of individual power plants rarely occur at the same time. The Total of Plant Peak Loads thus exceeds the highest simultaneous output of all B.C. hydro plants, though the yearly changes shown in the graph should be similar in size and direction.
TOTAL OF
PLANT
PEAK LOADS
INSTALLED
GENERATING
CAPACITY
AVERAGE LOAD
100 MW
100 MW
7000
6000
5000
4000
3000
2000
1000
900
800
700
600
500
400
300
200
THOUSANDS OF KILOWATTS
1920
1925
1930
1935
1940
1945
1950
1955
1960
1965
1970
1975
CALENDAR YEAR

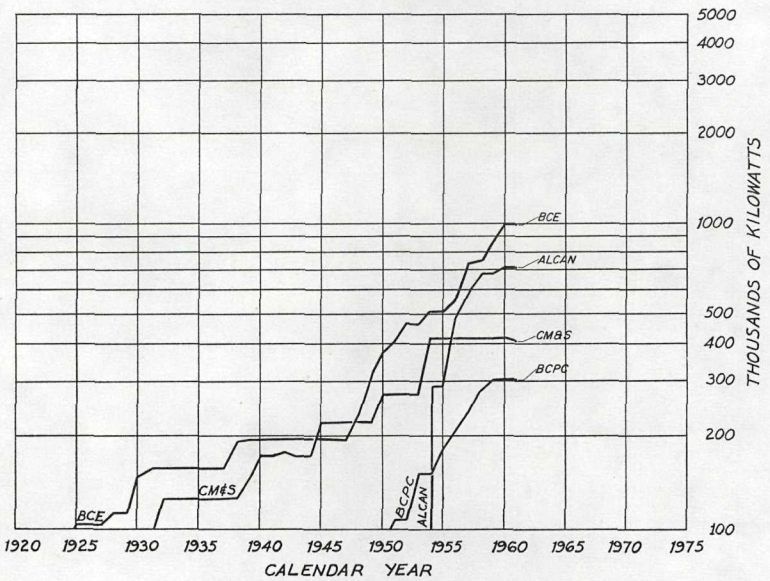
DEVELOPMENT OF HYDRO-POWER IN BRITISH COLUMBIA

ANNUAL PRODUCTION OF HYDRO-ELECTRIC ENERGY BY MAJOR PRODUCERS



ALCAN	Aluminum Company of Canada.
BCE	British Columbia Electric Company } Now B.C. Power & Hydro Authority
BCPC	British Columbia Power Commission. } Now B.C. Power & Hydro Authority
CM&S	Consolidated Mining & Smelting Company & West Kootenay Power & Light Company.

INSTALLED GENERATING CAPACITIES OF MAJOR PRODUCERS



OPERATIONS DIVISION

OPERATIONS DIVISION

M. L. ZIRUL, P.ENG., CHIEF, OPERATIONS DIVISION

The Operations Division is charged with the duties arising out of processing and investigating applications for water licences and with supervising and regulating the diversion and use of water under water licences and approvals issued pursuant to the provisions of the *Water Act*.

The Operations Division is under the general supervision of the Chief Operations Division, who is responsible to the Comptroller and Deputy Comptroller for the operation of his division. The Division's administrative composition is as follows:

(1) General office, under the supervision of Chief Clerk.
(2) Administrative draughting office, under the supervision of Chief Draughtsman.
(3) Six district offices, located at Victoria, Mission City, Kamloops, Kelowna, Nelson, and Prince George, each in the charge of a District Engineer.

The statutory requirements for making an application for a water licence are set out in the *Water Act* and the regulations thereto. All applications received are "cleared" by the administrative draughting office with reference to existing water licences, reserves, and lands affected. The application is reviewed in the general office to ascertain that the statutory requirements have been fulfilled, including posting and filing of the application and notification of all parties required. The application is then referred for investigation and recommendation to the Engineer for the Water District within which the application falls, after which the application is granted and a water licence issued or it is refused.

The most easily developed sources within economic reach of lands and communities requiring water are rapidly becoming fully licensed, and applications for additional water licences on these sources therefore require careful study. The increasing pressure for water in these areas also requires that water use under licence requires increasingly more administrative attention. The district offices have continued their studies of possibilities for alleviating deficiencies in the existing water-short areas.

Although initial prospects for an adequate supply of water for the year under review did not appear too favourable in some areas, a wetter-than-usual growing season throughout the Province caused very little, if any, shortages to be experienced in any area.

Once again the statistics included in the reports of the Chief Clerk and the Chief Draughtsman show substantial increases in all phases of the work handled by the Operations Division. In particular, 1,186 applications for new water licences were received during the year, which is the highest number ever received in any one year.

The separate reports of the general office, administrative draughting office, and the district offices follow.

GENERAL OFFICE

(Period November 1, 1961, to October 31, 1962)

	1958	1959	1960	1961	1962
Applications for licences	977	1,038	939	1,102	1,186
Applications for apportionments	16	42	36	25	55
Applications for change of appurtenancy	25	23	31	31	59
Applications for change of works	54	75	115	175	106
Applications for extension of time	298	69	84	67	69
Applications for right-of-way over Crown lands	131	109	160	184	166
			5	17	10
Change of ownership, address, etc.	2,299	2,364	2,293	2,669	2,652
Cancellations of abandonments	257	190	222	384	341
Totals	4,057	3,910	3,885	4,654	4,644
Conditional licences issued	562	850	718	810	880
Final licences issued	275	274	228	220	200
Total licences issued	837	1,124	946	1,030	1,080
Right-of-way permits over Crown lands issued	132	112	183	185	203
Approvals issued			5	17	10
Totals	969	1,236	1,134	1,232	1,293

DRAUGHTING OFFICE

	1961	1962
New water applications cleared and plotted on maps	1,013	1,097
Final- and conditional-licence plats compiled and traced	932	1,195
New water-rights maps compiled and traced	30	49
Water-rights maps revised	42	19
New improvement districts described and plans prepared	19	10
Improvement districts' descriptions and plans amended	37	42
Reference maps renewed	16	36
Water clearances (change of ownership, apportionments, cancellations, etc.)	3,109	3,213
Land clearances (purchases, Crown grants, leases, etc.)	6,232	6,700
Land clearances (cancellations)	1,517	1,660
Rights-of-way over Crown land	185	203
Totals	13,132	14,224

During the year many inquiries by the public and other departments were taken care of. The usual requests for maps and other information by our District Engineers were also attended to during the year.

Considerable time was spent during the year checking petitions and drawing up legal descriptions for improvement districts.

IMPROVEMENT DISTRICTS ENGINEERING SECTION

The work of the Improvement Districts Engineering Section is concerned principally with the preparation of feasibility reports for proposed waterworks and irrigation schemes, and with the review of engineering reports and plans submitted by improvement districts. Advising improvement districts on engineering problems also forms an important facet of the Section's activities.

A summary of the major investigations which were reported on during the year follows.

Covert Irrigation District

This improvement district is located immediately west of Grand Forks.

Due to the deterioration of certain parts of the district's irrigation system, replacements became necessary. As the original system layout was inefficient, it was recommended that the renewals be made in conformity with a master plan for a revised and improved layout.

Water Supplies for the John Hart Highway Area

During the past decade considerable development has taken place in the area along the John Hart Highway immediately north of Prince George. The existing private well supplies are in many cases unsatisfactory, and a study was therefore made to determine the economic feasibility of installing domestic water-supply systems to serve the communities in the area. The costs of operating the systems were, however, found to be relatively high, and it was recommended that consideration of the schemes be deferred until more consumers become available.

Athalmer Improvement District

Tests have shown that a large number of the private well supplies in Athalmer are subject to pollution, and the residents are therefore anxious to install a community water system. Following a study of the various possibilities, it was recommended that a well located outside the district and remote from possible sources of contamination be used as the source of supply for the proposed waterworks.

Hudson Hope Improvement District

A large influx of personnel into Hudson Hope is expected concomitant with developments on the Peace River, and adequate water supply and sewerage facilities were therefore deemed necessary. A field trip was made to Hudson Hope, and a source of water supply recommended. Subsequently the plans of the proposed systems, prepared by the district's consulting engineer, were reviewed and checked.

Boundary Line Irrigation District

The district, which is located near Osoyoos, has for some time been experiencing operational difficulties with its system, and, in addition, replacement of part of the pumping main will shortly become necessary. A study of the district's problem is at present being made, and a report will be issued in the near future.

Proposed Water Supply, Tulameen

A report was prepared to establish the feasibility of providing a water-supply system for the existing community at Tulameen. The report considered that a suitable system could be installed for approximately $38,000, and that resultant water charges would be in the region of $4 per household per month.

Proposed Water Supply, Port Hardy

Following requests from Port Hardy and District Chamber of Commerce, a report was prepared on the economic feasibility of installing a water-supply system to serve the community. The report found that the estimated capital cost was beyond the financial ability of the existing and potential consumers to support.

Proposed Water Supply, South Pandozy Area

In a report on a proposed water-supply system for the South Pandozy area, near Kelowna, it was demonstrated that the project was marginally feasible. The report recommended the property-owners give serious consideration to inclusion in the City of Kelowna before committing themselves to a programme of independent development of essential services.

Rutland Waterworks District

An appraisal was made of the existing works serving the Rutland Waterworks District with a view to advising the Trustees on future district policy. The investigation indicated that the consumers were using excessive quantities of water to the point where the existing pumping facilities were becoming overloaded. The consequent heavy system operating costs were threatening the district's financial position.

Subsequently the Trustees have decided to install water meters on domestic services. This policy, together with the vigorous development currently taking place in the area, should restore a satisfactory over-all condition.

Tsawwassen Waterworks District

In response to a request from the Trustees of the Tsawwassen Waterworks District, technical guidance was rendered to facilitate the reconstruction of the intake and pumping storage sump serving the existing system.

The suggested modifications have since been completed.

Winfield and Okanagan Centre Irrigation District

Contoured mapping of the Winfield and Okanagan Centre Irrigation District has been completed, and work is currently proceeding on a report designed to guide the Trustees on future system rehabilitation policy.

Miscellany

Numerous miscellaneous investigations, reports, and meetings were undertaken during the year, which included studies of the proposed extension of Lakeview Irrigation District, the preparation of agreements and attendance at organizational meetings regarding North Saanich domestic water supply, the preparation and presentation of a technical paper at the Irrigation Workshop held at the University of British Columbia, and the appraisal of a large number of plans submitted by consulting engineers in connection with waterworks for improvement districts.

VICTORIA DISTRICT OFFICE

C. Errington, P.Eng., District Engineer

The area under the administration of the Victoria District Office is comprised of the Alberni, Nanaimo, and Victoria Water Districts and covers Vancouver Island and the adjacent Gulf Islands. This office operates out of the Victoria head office. There is no Assistant Engineer in this district.

Rainfall for the period from June 1st to September 30th was normal for Victoria and Nanaimo, but almost twice the average for Alberni, and an increase of 44 per cent over average for Campbell River. In all areas studied the precipitation in August was more than twice the long-term average.

For this reason, shortages of water for irrigation and domestic purpose and the relevant problems which usually appear in August and September did not occur in 1962.

During the period November 1, 1961, to October 31, 1962, some 17 special investigations, studies, or reports were made.

Summary of Year's Work

Total applications received	186
Conditional licences issued	167
Final licences issued	53
Conditional licences reported on	183
Licences abandoned or cancelled	42

KELOWNA DISTRICT OFFICE

R. G. Harris, P.Eng., District Engineer

The Kelowna District Office, administering an area of approximately 15,000 square miles, comprises the Kettle, Similkameen, and Okanagan drainage basins, the Shuswap River drainage basin from Sicamous to its source, and that part of the Columbia River drainage basin from Boat Encampment, the northerly limit of the Columbia River, to a point about 15 miles south of Arrowhead on the Upper Arrow Lake.

The water supply during 1962 was generally adequate. Although a number of storage reservoirs failed to fill in one area, sufficient water was available for irrigation requirements as a result of favourable weather conditions.

Several irrigation and domestic water-supply investigations were carried out, and this has now become an important part of the district office work. Studies are continuing concerning areas with short water supply. This work has been completed for the Grand Forks Water District, and the results compiled in the form of a report. In addition, surveys of existing storage-works are being carried out for the purpose of estimating existing storage capacity and preparing plans of existing works.

During the year a record number of 174 water applications was processed, of which 134 were recommended. In addition, a total of 75 meetings was held, of which 57 were in connection with improvement districts.

There was one staff change in the Kelowna Office staff during the past year, Mr. K. Dobson succeeding Mr. R. Sorokoski as Assistant District Engineer. Mr. Sorokoski was transferred to the Hydraulic Investigations Division.

Summary of Year's Work

Applications on hand and received	248
Applications investigated and reported on	153
Applications abandoned or cancelled	21
Final-licence survey reports	59
Dam inspections	41
Site inspections for proposed dams	8
Miscellaneous field investigations and surveys	9
Engineering investigations for irrigation and domestic water supply	17
Investigations of flooding, drainage, and erosion	18
Meetings with improvement districts and others	75

Engineering Investigations and Studies

Engineering investigations requiring preparation of reports including design, cost estimates, financial study, and recommendations were as follows:—

(1) Bridesville Waterworks District—report on replacement of the existing expended system was completed and presented to the district. The new system has now been installed.

(2) Village of Oliver—a full review of the existing domestic water-supply system was made, including a plan of the layout and an appraisal of its condition, operation, and economics. In addition, a master plan for improvement and extension of the distribution system was included.

Further investigations involving engineering study and the giving of engineering advice were as follows: Bankhead Irrigation District (feasibility of supplying irrigation to additional lands), Covert Irrigating District (obtaining field data and water requirements for reconstruction design), Glenmore and Ellison Irrigation Districts (recommendations for installation of new measuring-weirs), Grandview Waterworks District (investigation of additional water-supply possibilities), Guisachan Water Users' Community (design for replacement of part of the main ditch by pipe), Keremeos Irrigation District (design of measuring-weir at headworks), Rutland Waterworks District (study of silting conditions at intake).

In addition to the above, an active programme of surveying all existing dams has been followed in order to prepare plans and assess the condition of the storage structures and to obtain information on storage exercised and further storage possibilities of the reservoirs.

KAMLOOPS DISTRICT OFFICE

P. G. Odynsky, P.Eng., District Engineer

The Kamloops District Office administers the *Water Act* over the central section of the Fraser River drainage basin, extending from Spuzzum to a point 20 miles north of Quesnel. Containing approximately 57,000 square miles, this section is divided into seven water districts — Ashcroft, Barkerville, Cariboo, Kamloops, Lillooet, Nicola, and Quesnel. During 1962, administration was extended into the Chilcotin area as far west as Anahim Lake.

In the Kamloops, Ashcroft, Nicola Districts, below average winter snowfall resulted in a dry spring, with many lakes showing below normal storages of water. However, after the middle of May frequent rains filled these storages to overflowing and persisted through the summer to reduce water-shortage problems to a minimum. Many areas which experienced a pronounced shortage in 1961 had ample water in 1962, the northern districts having excess water in the early summer months.

Although 1962 was a good water year, the diminishing availability of unrecorded water in the more settled areas is demanding more time and study for the investigation and disposition of new water applications. The recent addition of Mr. Jacob Wester to the Kamloops Office engineering staff should help considerably in processing these applications and in coping with work which has accumulated during the past years.

During the year of review 182 conditional licences and 33 final licences were added to our files, bringing the number of active water licences up to a total of 4,705.

Summary of Year's Work

Applications received	300
Applications inspected and reported on	163
Final-licence survey reports	67

Dam inspections	63
Applications for apportionments and changes of works investigated and reported on	31
Miscellaneous field investigations and surveys	113
Meetings with improvement districts and others	14
Orders issued	2

Engineering Investigations and Studies

1. Study and report on erosion caused by Quesnel River near Quesnel.

2. Special study required in connection with granting of a water licence for land-improvement purposes on the Chilanko River near Chilanko Forks.

3. Field investigation of flooding caused by Dragon Creek near Quesnel. Report is under preparation.

4. Concluded studies of watersheds of Duffy, Cherry, Blaker, and Campbell Creeks near Kamloops and Borland and Valley Creeks near 150 Mile House in connection with the report on water-short areas under preparation.

NELSON DISTRICT OFFICE

R. A. Pollard, P.Eng., District Engineer

The Nelson Office administers the *Water Act* over some 25,000 square miles of the Kootenay Land District of South-eastern British Columbia. There are seven water districts in this area, each with problems peculiar to its own location.

Water supplies generally were adequate in most sections of the Nelson District. Isolated instances of disputes arose among water-users experiencing shortages, but all were settled amicably.

The diminishing supply of unrecorded water in the more settled areas continues. The trend to ground-water development continues, and in many areas of both the East and West Kootenays ground-water has become an important source of community water supply.

As in previous years, there was a noticeable increase in the routine administrative work, not only in the number of water applications requiring attention, but also in the number of licences requiring amendment. With the present limited staff of the Nelson Office, it has not been possible to satisfy the demands for service which the public has made and which they are entitled to.

In July of this year Mr. R. A. Pollard, P.Eng., replaced Mr. J. P. Riley, P.Eng., as District Engineer, on Mr. Riley's transfer to Victoria.

During the year 156 new conditional licences and 72 new final licences were added to the files.

Summary of Year's Work

New applications received	185
New applications investigated and reported	161
New applications abandoned and cancelled	43
Final-licence and amendment surveys	77
Pollution investigations	4
Flooding investigations	14
Water-use investigations	7
Meetings with improvement districts and water-users' communities	29
Miscellaneous meetings and investigations of non-routine nature	76
Routine calls and problems	1,649
Sampling snow courses	15
Dam inspections	5

Engineering Investigations and Studies

1. Domestic water supplies for Elko, Kitchener, Trout Lake City, Invermere, Wilmer, and Canal Flats investigated.
2. Flooding by small streams in Creston area.
3. Erosion problem on Salmo River.
4. Rogun Lake dam on Salter Creek.
5. Pollution problem on Michel Creek.
6. Office study of surface-water supplies for water-short areas.
7. Flooding of Lardeau River at Lardeau.
8. Erosion study of Cottonwood Creek at Nelson.
9. Flooding problem on Kemball Creek at Kaslo.
10. Pollution problems on various streams investigated and dealt with.

PRINCE GEORGE DISTRICT OFFICE

C. K. Harman, P.Eng., District Engineer

The area administered from the Prince George District Office includes the Skeena River drainage, the Peace River drainage within British Columbia, and the Fraser River drainage up-stream from a point 20 miles north of Quesnel.

There were no reports of water shortages in any of the water districts. Minor flooding occurred in the Burns Lake area in late June as a result of heavy rainfall.

Fifty-one new applications were received, and 59 new conditional water licences were added to the files during the year.

The residents in the unorganized areas surrounding Prince George continued to show keen interest in the formation of improvement districts for the purpose of establishing water supplies. This office assisted the Victoria Office in obtaining field information and in the preparation of a feasibility report for a domestic water system for the John Hart Highway area just north of Prince George. It also assisted the Groundwater Section in a water-well survey in the Prince George area in order to determine the feasibility of ground-water as a source for domestic water supply.

This office also assisted in the organization of the Fort Fraser Waterworks District and the Hudson Hope Improvement District, which were incorporated this year.

MISSION CITY DISTRICT OFFICE

E. G. Harrison, P.Eng., District Engineer

The Mission City District Office administers water-rights matters in the Vancouver and New Westminster Water Districts, an area of approximately 40,000 square miles.

The past year was wetter than average, but there were still disputes among water-users in some water-short areas. This office also investigated several complaints of pollution, flooding, and unauthorized works and obstructions in streams. Two hundred and fifty applications for water licences were received, and 206 were investigated and reported on.

There are 2,900 active water licences in the Mission District, of which 172 were added to the files this past report year.

HYDRAULIC INVESTIGATIONS DIVISION

HYDRAULIC INVESTIGATIONS DIVISION

T. A. J. LEACH, P.ENG., CHIEF, HYDRAULIC INVESTIGATIONS DIVISION

GENERAL

The problems investigated and reported upon by the Hydraulic Investigations Division and the ground-water investigations of the Operations Division have been grouped under the following sections:—

(1) Flooding, Erosion, and Drainage.
(2) Irrigation and Water Supply.
(3) Hydro-electric power.
(4) Hydrology.
(5) Ground-water.

Probably the two main investigations were the completion of a report on winter flooding within the Coquitlam River watershed and the flood studies carried out for the Fraser River Board on areas in the Lower Mainland as well as up-stream points such as Kamloops, Prince George, and Quesnel.

In the Ashcroft area the feasibility of irrigating some 11,000 acres was looked into, and in the case of the Kaleden Improvement District various alternatives were reported upon in connection with the rehabilitation of this old system which supplies both irrigation and domestic water.

Hydro-electric power investigations have been limited to the completion of mapping of some of the northern rivers. Such preliminary work will assist in studies of the power potential of the northern portion of our Province.

The field of hydrology is, of course, basic to all these investigations. In the case of snow-surveying, which is one of our main endeavours in this field, a programme of volume run-off forecasts for the spring and summer months of April to July or April to August was continued. In the Columbia and Peace watersheds this activity has been intensified through a co-operative programme with the British Columbia Hydro and Power Authority. Office analysis of snow-survey data has been accelerated through the use of the Department of Finance's I.B.M. 650 electronic computer. This service, which was started last year, has allowed the exploration of a wide range of variables which previously could not be included because of time limitations.

Most of the hydraulic investigations which are described below are covered in reports, of which there are now over 1,000 in the Water Rights Branch library. This total is being added to at the rate of 70 per year, and these are available to the public at a nominal charge for assembling only.

Some 200 reports were distributed to the public, and, in addition, over 100 inquiries were answered in connection with the hydro-power potential within the various parts of the Province.

FLOODING, EROSION, AND DRAINAGE

Flooding and erosion during the winter within the Coastal areas, due predominantly to rain, augmented in some instances by snow melt, continue to be a problem in built-up areas. In contrast to these local coastal conditions are the spring floods which occur in the major rivers and which are caused mainly by a prolonged period of snow melt.

Coquitlam River Flooding

Early in the year the Coquitlam River flooding report was completed and supplied to the City of Port Coquitlam and the District of Coquitlam. This report explores various methods of flood control and indicates that up-stream storage, coupled with an improved lower channel, would, under proper maintenance, regulate most floods to safe levels within the lower reaches. It is understood that, at present, work is under way to improve the channel immediately above the Lougheed Highway bridge which should have a remedial effect on river-bank erosion.

Columbia River Flooding at Athalmer

Flooding of the Columbia River between Athalmer and Golden can be attributed to the flat valley gradient, which averages only 0.8 feet per mile over some 60 miles. The natural channel is inadequate to contain the spring freshet flows, and annually the natural levees are overtopped. The cost of protecting the low lands at Athalmer, at the outlet of Windermere Lake, was investigated. The various alternatives were all found to be expensive when compared with the benefits of such flood control. Because of this, a limited " first aid " programme was suggested which would provide a more adequate channel immediately down-stream of Athalmer through the removal of old navigational and bridge structures.

Cowichan River Flooding

Studies on Cowichan River flood-control possibilities, which commenced after the January, 1961, flood, were continued. Precipitation in the Cowichan River valley during the winter of 1961/62 ranged from 17 inches at Cowichan Bay to 35 inches at Nitinat and were less than 75 per cent of the long-term average and only about 50 per cent of the maximum which was recorded during the winter of 1960/61. The maximum level of Cowichan Lake for 1962 occurred on November 27th, when a gauge elevation of 9.92 feet was recorded. This is some 4 feet lower than the January 15, 1961, maximum.

The local committee, consisting of representatives from the municipalities and the Indian Affairs Branch, continued to consider flood-control possibilities for the lower reaches of Cowichan and Koksilah Rivers. The Water Rights Branch, in turn, completed an investigation into the feasibility of diverting a portion of Cowichan Lake flood inflow into the Nitinat River watershed. A limited drilling programme along the possible diversion route was carried out. It is estimated that such a diversion proposal would be an expensive one and would not provide adequate flood control in the lower reaches of the Cowichan River.

Squamish River Erosion

In response to a request from the Department of Highways, a brief field investigation of erosion along the east bank of the Squamish River some 15 miles from Squamish was carried out during August, 1962. The road in this area has been washed out on a number of occasions and was again threatened this year. Three types of bank protection were considered, consisting of riprap revetment, a system of groins to direct the main current away from the eroding east bank, or a cut-off channel to by-pass the threatened area. While revetment would appear to be the most feasible, its high cost suggests that road relocation would probably be the most economical solution.

Salmon River Sedimentation Into Shuswap Lake

Sediment accumulation at the Salmon Arm wharf channel is a problem of long standing, as indicated by past records of dredging dating back to the turn of the century. In response to a request from local organizations, investigations were carried out in the summer of 1961 and April, 1962. The main cause of navigation difficulties in recent years would appear to be the diversion of the mouth of the Salmon River to the east and closer to the wharf channel. The Salmon River silt load, which was previously deposited farther to the north-west, is now being caught up by the navigation channel.

A rediversion of the Salmon River mouth could improve this local condition, but it would not eliminate the sedimentation problem, and the permanency of such a solution is open to question. Any type of works which would intercept the silt load before it reached the boat channel would be expensive and would require periodic clean-out by dredging.

Liard River Watershed Suspended Sediment

As reported in the previous year, sporadic sampling of suspended sediment was undertaken in the Liard River watershed at or near the Alaska Highway crossings in 1961. In most cases the samples were taken after peak stages of the streams. The results are summarized as follows:—

Stream	Date of Sampling, 1961	Drainage Area (Sq. Mi.)	Water Discharge (C.F.S.)	Average Sediment Concentration (Parts per Million by Weight)	Suspended Sediment (1,000 Tons per Day)
Sikanni Chief	June 29	860	6,820	1,080	20.00
Muskwa	June 30	7,770	110,000	3,800	620.00
Racing	July 2	710	3,860	258	2.70
Toad	July 3	940	3,990	81	0.87
Liard (lower)	July 5	40,020	112,000	81	24.00
Smith	July 5	1,450	1,530	30	0.13
Coal	July 6	3,850	5,970	20	0.32
Hyland	July 7	3,370	10,230	28	0.76
Liard (upper)	July 8	12,290	33,890	27	2.40

Vancouver North Shore Flooding

The North Shore area, which includes the City of North Vancouver and the Districts of North and West Vancouver, is subject to intense winter rain-storms which cause flash floods and erosion. This condition is becoming more and more critical as residential land development extends into the various mountain watersheds and upon lands threatened by floods and stream erosion.

In the summer of 1962 the Water Rights Branch undertook a preliminary survey of the main streams which have flooded in the past—namely, the Capilano River and Mosquito, Lynn, and Seymour Creeks. Air photography of the whole area was obtained, from which enlarged air photos were prepared. Discussions have been carried out with local municipal officials, and a report is being prepared dealing with some of the main flooding and erosion problems in each area.

Fraser River Basin

Active participation in the studies and field investigations of the Fraser River Board were continued. A benefit-cost study was undertaken with respect to the

existing dyking and drainage works in the Lower Fraser Valley, and also with respect to the effect of the proposed flood-control storage reservoirs. The latter studies were made also for the Prince George, Quesnel, and Kamloops areas. Further, the effect that Fraser River flow regulation might have on drainage conditions in the Lower Fraser Valley was investigated.

The above-mentioned studies in the Lower Fraser Valley were based on enlarged air photographs giving elevations which were derived by Wild A7 stereoplotter from ground control surveys. Direct flood damage to agriculture and to industries and other improvements were appraised. In addition, losses of income and other direct and indirect losses and costs that would be associated with flooding were assessed. All information was so compiled that the total and the average annual value of flood protection could be determined for various flood frequencies.

The regulation of the Fraser River discharges by operation of up-stream storage reservoirs in the future will modify not only the spring flood-levels, but will also modify the winter water-levels of the Fraser River. Such changes would have some effect on certain lower Fraser dyking districts, where, during heavy winter storms, gravity drainage ceases due to rising river-water levels. Under these conditions all water behind the dykes must be pumped. In order to assess the effect of such future changes on the drainage conditions of the Lower Fraser Valley dyked areas, it was necessary to carry out a detailed survey of the existing dyking and drainage works. This was followed by an investigation with respect to seepage flow from the Fraser River into the adjoining dyked areas. This study required estimates for the various hydrologic factors, such as evaporation, soil moisture, ground-water storage, precipitation, and run-off. Two dyked areas—the Pitt Polder and the Matsqui Dyking District—were studied in detail, and the effect of seepage inflow on drainage conditions was estimated.

A study of flooding at Kamloops was undertaken, in which the following details were determined:—

(*a*) Flood-levels through the area under natural conditions and alternately with up-stream regulation through future storage dams on the Clearwater River.

(*b*) Actual flood profiles which have occurred in the Kamloops region and the effect of improvements to the lake outflow conditions on these flood profiles.

This study involved a comprehensive field survey during 1961 and 1962 to obtain lake soundings and large-scale maps of the area and the river. During 1962, water-level gauges were established throughout the area and water profiles obtained for the high run-off period. Discharge measurements of the Thompson River about 1,000 feet below the old highway bridge to North Kamloops were undertaken during the high-water period through the assistance of the Federal Water Resources Division.

Investigations for Other Provincial Agencies

The Department of Highways requested advice on erosion problems at the Elk River bridge on Highway No. 93, and in connection with the proposed new road crossing at the Copper River near Terrace.

The Department of Public Works received advice in connection with flooding and erosion potential at a proposed building-site on North Thompson River, and a land-drainage proposal was prepared for a technical-school site near Kelowna.

Beach Grove at Boundary Bay

The Department of Lands, Forests, and Water Resources was requested to investigate the Beach Grove area at Boundary Bay, where decaying seaweeds here produced objectionable odours. A brief inspection was carried out jointly with the Lands Service, and certain remedial measures were suggested.

IRRIGATION AND WATER SUPPLY

Norbury Creek Hatchery

Water-supply possibilities for Norbury Creek fish hatchery in East Kootenay, proposed by the Department of Recreation and Conservation, were investigated by the Department of Public Works and the Water Rights Branch. Additional topographic mapping was arranged in order to investigate alternative sources of supply. The Department of Public Works undertook well-drilling, which would enable the use of ground-water to control the water temperature in summer and to augment surface supplies.

Ashcroft Area Irrigation

In response to a request from the Ashcroft and District Board of Trade, a reconnaissance of an irrigation proposal was carried out in that area during the latter part of 1961. This was followed by further investigations in 1962 covering the feasibility of providing irrigation water to the Upper Thompson Valley east and south of Ashcroft and Cache Creek. The total area that might be served amounts to 11,000 acres, 2,000 of which are presently irrigated. It is contained within a 30-mile-long strip of rolling bench and fan topography averaging less than 1 mile in width. The elevations range from 1,000 feet in low benches near the river-level to over 1,700 feet in the Semlin Valley and though the main acreage is located north of the Thompson River there are scattered areas south of the river which are included in the investigation.

Following the completion of a co-ordinated programme consisting of an engineering and soil survey carried out by the Water Rights Branch and the Department of Agriculture respectively, a Reclamation Committee meeting was held, at which soil types and irrigation-water requirements were estimated. While field mapping has been kept to a minimum, new air photography was obtained of the region and survey control was established at a sufficient density to obtain large-scale mapping should it be required in the future. The present study will indicate the approximate cost of providing irrigation water to the various areas.

Kaleden Irrigation District

In response to a request from the Kaleden Irrigation District, the Branch carried out an investigation into alternative water-supply possibilities for the rehabilitation of the district's existing system. This irrigation district comprises some 100 dwellings and 535 acres of orchards adjoining the west side of Skaha Lake south of Penticton. Incorporated in 1922, the district took over the original water system laid out in 1910. The system has been expanded and presently receives water through long diversion-works from Shingle and Shatford Creeks and the Marron River. The operation of these diversion-works and the supporting storage reservoirs has been very expensive in view of the limited acreage assessed by the district. In addition, water quality for domestic use has been unsatisfactory.

Previous Water Rights Branch reports on this district were attempted to set up a renewal plan which would provide for an orderly replacement of the existing struc-

tures. Investigations in 1962 have brought these proposals up to date and have also included other alternatives which would eliminate a part or all of the existing gravity system in favour of pumping from Skaha Lake.

Doukhobor Lands Water Supply

The subdivision and sale of the Doukhobor lands in the Grand Forks and Kootenay areas has brought with it a request from the Orthodox group, who are the main purchasers, for investigations of water-supply and sewerage systems. This request, made to the Attorney-General, was directed to the Water Rights Branch, which had participated in water-supply investigation during the Judge Lord study of 1956.

A brief reconnaissance was made of the area, and meetings were held with the Orthodox group committee at Grand Forks and at Brilliant. It would appear that the first area that might be developed would be the Grand Forks region, where a number of ground-water wells may be the most economic solution. However, to date no exploratory work has been undertaken.

West Osoyoos Bench Irrigation

In co-operation with the Department of Agriculture and the Surveys and Mapping Branch, an investigation of the feasibility of irrigating some 300 acres of Osoyoos west bench area, located within the Southern Okanagan Lands Project, was carried out. The cost of irrigating some 10 lots appears to be rather high, and a further appraisal is now under way to determine whether additional acreage might be included.

Hydro-electric Power

No field investigations of hydro-electric power were carried out this year. However, a mapping programme of our northern rivers was continued, and the following basic data, together with stream-flow information, are now becoming available.

Dease-Stikine Hydro Power

The Stikine is the largest of our northerly Coastal rivers, with a length of 335 miles. An office study using the existing maps and some of the large-scale dam-site plans, scale 1 inch to 1,000 feet, indicates a total hydro-power potential at 1,160,000 horsepower. This includes four power-sites, varying in head from 500 to 600 feet, and does not include any water diversion from the Dease Lake drainage.

Skeena River Hydro Power

Similar office studies on the Skeena River where large-scale mapping is limited to dam-site areas reveals a power potential of 1,240,000 horsepower through the development of three sites with a total head of 475 feet.

Liard River Hydro Power

Mapping has been completed on the Liard River and its several tributaries as the result of the field surveys carried out in 1960. This consists of pondage maps and site maps at scales of 500 feet to 1 inch.

Some additional mapping has been done in the Yukon by the Federal Water Resources Branch, and it is planned to use this information as well in computing the potential hydro power of this watershed.

HYDROLOGY

Snow Surveys

The snow-survey programme continued to expand in 1962. As requested by agencies interested in water supply, 23 new snow courses were installed this past summer. These included 12 in the Peace River drainage, 3 in the Upper Columbia, 1 on the Kettle River, and 7 scattered throughout the large Fraser River basin. All were located for the specific purpose of ultimately providing estimates of potential snow-melt water supply. A total of 133 snow courses will be in active operation during the coming sampling season, and of this total, 78 will be sampled free of charge by personnel of co-operating agencies.

At British Columbia Hydro and Power Authority's request, the Peace River courses were established to provide a backlog of snow data so that reservoir inflows can be forecasted in succeeding years. The 12 sampling-sites ring the Peace catchment, and all are located near the headwaters of major tributaries. A float-plane was used to make the installations, and, because of this, all 12 were sited in alpine meadows close to mountain lakes. Depending on lake ice conditions, either a ski-equipped aeroplane or a helicopter will be used to transport the snow surveyors for their winter samplings.

Also at the request of British Columbia Hydro and Power Authority, three new high-level courses were established on Upper Columbia drainage. These include the Goldstream watershed in the Big Bend region, the avalanche research station on Fidelity Mountain in Glacier National Park, and the Beaverfoot range just south-east of Golden. British Columbia Hydro and Power Authority will use an over-snow vehicle to complete the Goldstream and Beaverfoot winter measurements, while personnel at the avalanche station will carry out those for Fidelity Mountain. Still on Columbia drainage but farther south and west, a Kettle River snow course was established near the Carmi radio range station.

On the Fraser Basin, seven new courses were installed and one was abandoned. These include two low-level courses at Hope and Lytton for the Federal Meteorological Service, one middle-elevation course near Longworth on the Upper Fraser, two on the Bridge watershed with locations near Bralorne and atop Mission Mountain, one near the Federal Department of Transport's radio beacon site near Enderby, and finally a middle-elevation course near Blue River on the North Thompson drainage. The abandoned course was Penrose Mountain on the Bridge watershed near Bralorne.

In addition to the new installations, 25 existing courses were visited and the necessary repair work completed at each. During the winter of 1962, 17 snow courses were visited, and at-site instruction in the proper procedures of snow-sampling was given to the responsible surveyors. Office work included the collection, checking, and filing of meteorological, hydrological, and hydrometric data; written instructions to some 80 part-time snow surveyors; collaboration with United States Government agencies regarding Columbia River snow-survey schedules and in the development of common forecast procedures for international gauging-sites ; and continued use of the electronic computer to develop new stream-flow forecast procedure, as well as refining those already developed. As a public service, six snow bulletins were edited and published in the period February 1st through June 1st. These bulletins provided quantitative forecasts of river-water supply and showed build-up and depletion of the 1962 mountain snow cover.

Long Lake Hydrology

Long Lake is located some 4 miles north of Nanaimo. In order to assess the feasibility of further diversions from the lake a brief hydrological study on the average inflow was made, based on meteorological records available in nearby areas. Arrangements have been made for the installation of a gauge on Long Lake, which will, in time, confirm or modify our present analysis.

Millstone River Control

The flow of Millstone River, near Nanaimo, varies from a few cubic feet per second to some 800 cubic feet per second. Preliminary investigations to regulate the maximum discharges and improve the minimum flows for irrigation water supply was investigated. It was found that storage on Brannen Lake would be too limited to prevent flooding, but that minimum flows could be augmented appreciably to assist in irrigation.

Enos Lake Hydrology

A study on available water supply from Enos Lake, north of Nanaimo, was made, based on available meteorological records. Run-off, evaporation, and other losses were estimated in order to arrive at the usable yield of this watershed. In order to check the tentative results, a gauging-station was installed at Enos Lake.

Hydrometric Network Planning

Stream-gauging network planning for new stations was carried out, with particular emphasis on northern rivers and the Columbia River watershed. In the case of the latter, some consideration is being given not only to the extension of stream-gauging stations, but also to the need for additional meteorological stations.

Some preliminary work has also been done in a study of maximum discharges of the Lower Fraser Valley streams. Most of the records are of very short duration. Where longer records are available, the approach has been to establish flood frequencies and a relationship between maximum discharges and the physical characteristics of the watershed.

GROUND-WATER

Compilation of the available information on ground-water potential and its existing use was continued by the Ground-water Section of the Operations Division. A number of observation wells have been established, and a few reconnaissance surveys in connection with water-supply problems were carried out.

Well records for about 10,000 water wells were obtained from the Geological Survey of Canada, co-operating well-drillers, and others. These are being filed, using a punched-card system, the well locations being plotted on maps. Well maps for the Fraser Valley from Chilliwack to Ladner have been completed. Similar maps for the eastern portion of Vancouver Island from Campbell River to Victoria are being compiled. A ground-water reconnaissance survey of the Saanich Peninsula, involving geologic mapping and compilation of well records, is approaching completion. Similar investigations were carried out at Comox and in the Prince George area. Short investigations of local ground-water problems were carried out at Grand Forks, Beaver Falls, Marysville, Point Grey, and Yarrow. Drilling of an irrigation well for the Forest Service nursery in Surrey was supervised. A test well near Prince George was started in late 1962.

A network of 19 observation wells was established in the Lower Fraser Valley between Vancouver and Abbotsford; nine of these were drilled by the Department of Highways, the remainder being privately owned wells already in existence. Water-table elevation is measured once a month, and the information is exchanged with the Geological Survey of Canada, which also operates several observation wells in this area. Observation wells were also established near Comox, Nanaimo, and Sidney on Vancouver Island, and near Vernon, Kelowna, and Kamloops.

PERSONNEL OFFICE

PERSONNEL OFFICE

J. H. PALMER, B.A., B.COM., PERSONNEL OFFICER

ESTABLISHMENT AND ORGANIZATION

The separation of the Lands Service into the two departments known as the Lands Service and the Water Resources Service was the principal organizational change affecting the Department this year. This report, however, covers both Services.

A start was made toward the establishment of two Branches in the Water Resources Service with the appointment of Mr. V. Raudsepp, P.Eng., to head the Water Investigations Branch as Chief Engineer and with Mr. G. J. A. Kidd, B.Sc., P.Eng., heading the Water Rights Branch as Deputy Comptroller of Water Rights. Mr. Kidd returned to the Department following service with the British Columbia Hydro and Power Authority. The Chief Engineer filled one of four new engineering positions established this year, and Mr. J. P. Riley, B.A.Sc., I.E., P.Eng., filled another as Project Engineer, Fraser River. Appointments were made of an additional engineer in Kamloops and one in Kelowna. A Clerk 2 was added to the general office.

Two positions—a Senior Clerk and a Clerk 3—were added to the Leases Section, and a Clerk-Typist in Victoria and a Land Inspector at Pouce Coupe were added to the staff of the Land Inspection Division of the Lands Branch. A Mapping Assistant 4 was added to the staff of the Legal Surveys Division to prepare Land Registry Office plans for checking by electronic computer.

STAFF CHANGES

The following table indicates the volume of staff changes, such as separations, promotions, etc.:—

	Lands Service	Water Resources Service	Total
Separations	28	9	37
In-service promotions	17	5	22
Reclassifications	24	3	27
Transfers to other departments	7	1	8

Senior changes in the Lands Service were as follows: Mr. D. Borthwick, B.S.A., B.Ed., A.A.C.I., and Mr. W. R. Redel, B.A.Sc., P.Ag., A.A.C.I, were promoted to Superintendent and Assistant Superintendent of Lands respectively, and Mr. A. C. Kinnear, B.C.R.F., and Mr. E. S. W. Andrews, B.C.L.S., to Chief and Assistant Chief of the Air Surveys Division respectively. Mr. James Edward, Technical Draughtsman, retired from the Legal Surveys Division after more than 38 years with the Department. He was the first Civil Servant awarded the Premier's long-service plaque for loyal and efficient service. Mr. William Hall, M.C., B.Sc.F., P.Eng., B.C.R.F., resigned from the position of Chief, Air Surveys Division, after more than 25 years' service to accept the position of registrar of the Association of Professional Engineers of British Columbia. Mr. C. T. W. Hyslop, B.S.A., P.Ag., Superintendent of Lands, resigned to accept a senior resource planning position with the Federal Government.

TRAINING

Two employees entered the third year of the Executive Development Training Plan course, four commenced the second year, and three began the first year of this in-service training scheme. Ten employees completed short courses in English fundamentals under the sponsorship of the Civil Service Commission.

SAFETY PROGRAMME

In keeping with the Government's concern over the cost of injuries at work, a Lands Service Safety Committee chaired by Mr. A. H. Ralfs, Assistant Director of Surveys and Mapping, and with Mr. D. Pearmain, Chief, Legal Surveys Division, Mr. L. D. Fraser, Chief Land Inspector, and Mr. J. H. Palmer, Personnel Officer, as members, was established by the Deputy Minister and commenced studies of accident patterns within the Lands Service with a view to fostering safety wherever possible. The scope of this Committee was later expanded to include the Water Resources Service by the appointment of Mr. J. H. Doughty-Davies, Engineer i/c Water Resources Compilation Section, as a member.

UNIVERSITY ENDOWMENT LANDS

Negotiations leading to a salary increase and the granting of additional time off in lieu of statutory holidays for University Endowment Lands Fire Department personnel were concluded by the Minister's Salary Advisory Committee for the University Endowment Lands.

MAIL AND FILE ROOM

MAIL AND FILE ROOM

JOHN A. GRANT

Letters received in the Department during 1962 amounted to 228,015, compared to 237,317 in 1961, a decrease of 9,302. This was probably due in part to a light fire season, which is reflected in the Forest Service mail.

A total of 11,374 files was created during the year, which will necessitate the expansion of facilities at Topaz Avenue vaults for the storage of inactive files in order to make room for the new files in the Department's main vaults.

LETTERS INWARD

Branch	1961	1962	10-year Average, 1953–62
Lands	44,552	45,514	38,374
Forests	148,863	137,979	117,469
Water Resources	24,169	24,150	22,147
Surveys and Mapping	19,733	20,372	17,399
Totals	237,317	228,015	195,389

LETTERS OUTWARD (RECORDED)

Branch	1961	1962	10-year Average, 1953–62
Lands	16,674	17,374	11,897
Forests	2,296	2,045	3,421
Water Resources	2,381	2,275	1,833
Totals	21,351	21,694	17,151

MISCELLANEOUS REPORTS

Designation	1961	1962	10-year Average, 1953–62
Forest-fire reports	9,184	5,551	5,131
Slash-disposal reports	532	524	458
Logging-inspection reports	14,792	13,724	15,046
Land-classification reports	4,075	4,134[1]	3,009
Stumpage-adjustment notices	4,372	2,473	.....
Totals	32,955	26,406	23,644

[1] Estimated.

NEW FILES CREATED

Designation	1961	1962	10-year Average, 1953–62
"0" files	5,767	7,404	5,031
Timber-mark files	1,208	1,450	1,368
Timber-sale files	2,660	2,520	3,345
Totals	9,635	11,374	9,744

Printed by A. SUTTON, Printer to the Queen's Most Excellent Majesty
in right of the Province of British Columbia.
1963

1,060-363-6100

1963

INDEXES 1 TO 7

PROVINCE OF BRITISH COLUMBIA
DEPARTMENT OF LANDS, FORESTS, AND WATER RESOURCES

DECEMBER 31st, 1962

LANDS SERVICE

HON. R. G. WILLISTON - - MINISTER
E. W. BASSETT, DEPUTY MINISTER OF LANDS

INDEX TO DEPARTMENTAL REFERENCE MAPS AND MANUSCRIPTS

EXPLANATION OF THE VARIOUS MAP SERIES

Most of the maps listed in this index were prepared originally for Departmental use, and, having proved of value to the public, copies of same are for sale. As the originals of these maps are on tracing-linen or paper-backed manuscript, the copies are available only in white print or ozalid print form, which shows the map detail with dark-blue or black lines on a white-background paper.

The topographic manuscripts shown on Index 4 are being published on a scale of 1:50,000. Index 14, showing the progress of this programme is available on request.

Address all orders and inquiries to:—

Director, Surveys and Mapping Branch,
Attention: Legal Surveys Division,
Department of Lands, Forests, and Water Resources, Victoria, B.C.

Applicants are requested to enclose the correct payment with their orders as Government Publications must be paid for in advance. Orders to points within Canada may be sent C.O.D. upon request. For orders to be delivered within the Province 5-per-cent social services tax must be added. Cheques or money orders should be made payable to the Minister of Finance for British Columbia.

To avoid misunderstanding, applicants are requested to state the map number and index map of sheets required. Maps supplied from these indexes are not kept in stock but have to be printed especially to fulfil each individual request. As we have no way of making use of same once they have been printed, they have no returnable value.

LAND BULLETINS

The LAND BULLETINS listed below give information both on the agriculture potentialities and general economy of the various districts to incoming settlers.

LAND BULLETINS		Date of Issue
No. 1	Kootenay Bulletin Area	1962
2	Okanagan Bulletin Area	1961
3	Lower Coast Bulletin Area	1962
4	Vancouver Island Bulletin Area	1959
5	Quesnel-Lillooet Bulletin Area	1961
6	Kamloops Bulletin Area	1960
7	Fort Fraser—Fort George Bulletin area	1962
8	Prince Rupert-Smithers Bulletin Area	1961
9	Atlin Bulletin Area	1961
10	Peace River District	1962
11	Acquisition of Crown Lands in British Columbia	1963

FOREST SERVICE

"How to Obtain a Timber Sale." F.S. 223 1960
Grazing Regulations 1959

ADDITIONAL INFORMATION AND SERVICES AVAILABLE

FIELD-NOTES.—Prints or photostat copies of original survey notes of District Lot Divisions are obtainable, cost depending on the size of the original. Prices on request.

TOWNSHIP PLANS.—Prints are obtainable of most of the townships within the old Dominion Railway Belt and Peace River Block within British Columbia. Price, 30¢ per print.

LAND REGISTRY PLANS.—Inquiries regarding Land Registry plans of subdivisions of district lots should be addressed to the Land Registry Office in the district concerned. The districts and offices are as follows:—

Kamloops.	Nelson.	New Westminster.
Prince Rupert.	Vancouver.	Victoria.

(*See also* Index 3 for composite maps of L.R.O. plans.)

PHOTOSTAT REPRODUCTIONS.—Photostat copies of survey plans, maps, documents, etc., recorded in the Department, can be supplied to any size or scale—enlargement or reduction. Price:—

One sheet 18″×24″, $ 1.15 per photostat.
One half-sheet 12″×18″, 60¢ per photostat.

PUBLISHED MAPS—A separate Index to Published Maps will be supplied upon request, showing the various types of maps covering the Province. Series are as follows:—

General Maps ..... Index 8
Regional Maps ..... Index 9

National Topographic Maps on the scale of:

1 inch to 2 miles ..... Index 10
1:250,000 and 1 inch to 4 miles ..... Index 11
1 inch to 8 miles ..... Index 12
1:1,000,000 ..... Index 13
1:50,000 and 1 inch to 1 mile ..... Index 14

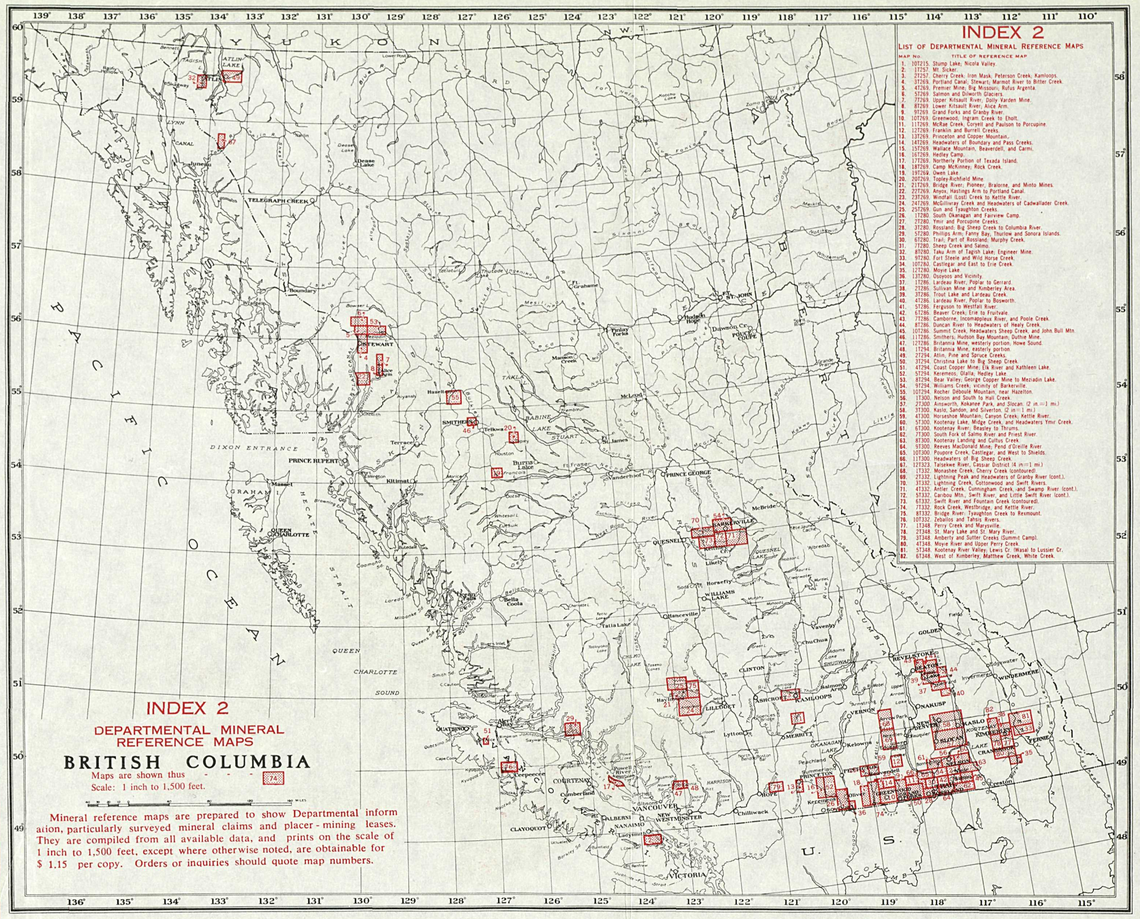
AIR PHOTOGRAPHS—Prints of British Columbia Government air photographs are available to the public. Indexes 15, 16, 17, and 18 show photographs taken at various altitudes. **Prices will be supplied on request.**

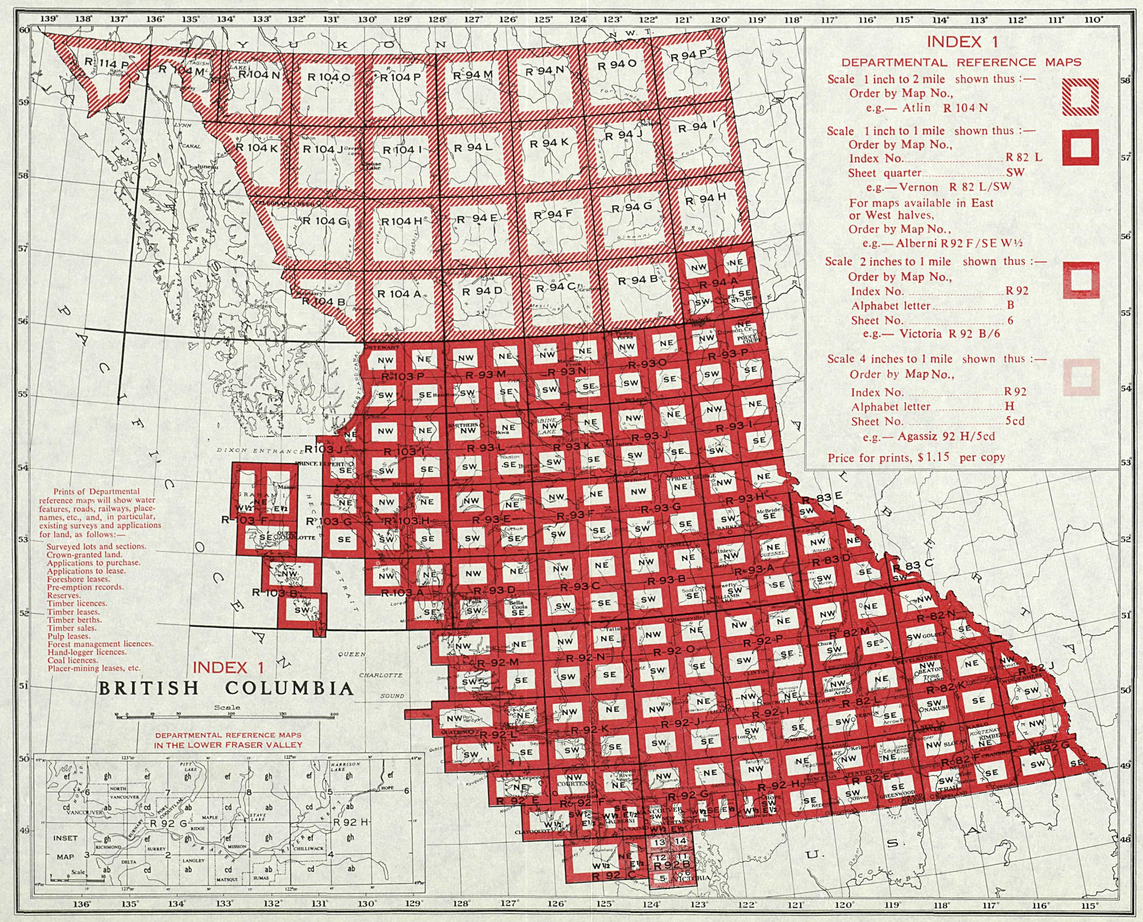
DEPARTMENT OF MINES

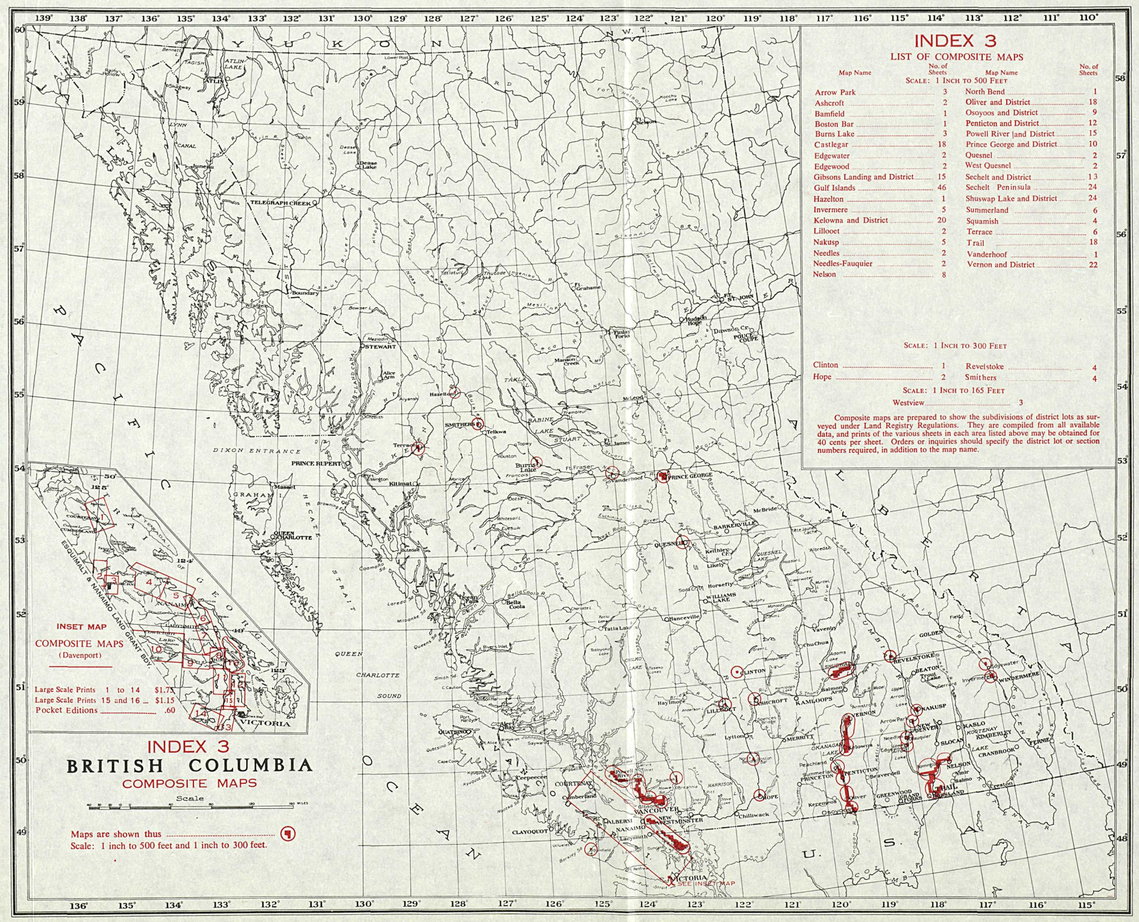
PETROLEUM AND NATURAL GAS LOCATION MAPS.—Prints of these maps showing permits and licences are available to the public. Price, $3.45 per print. An index to areas covered by location maps will be supplied on request.

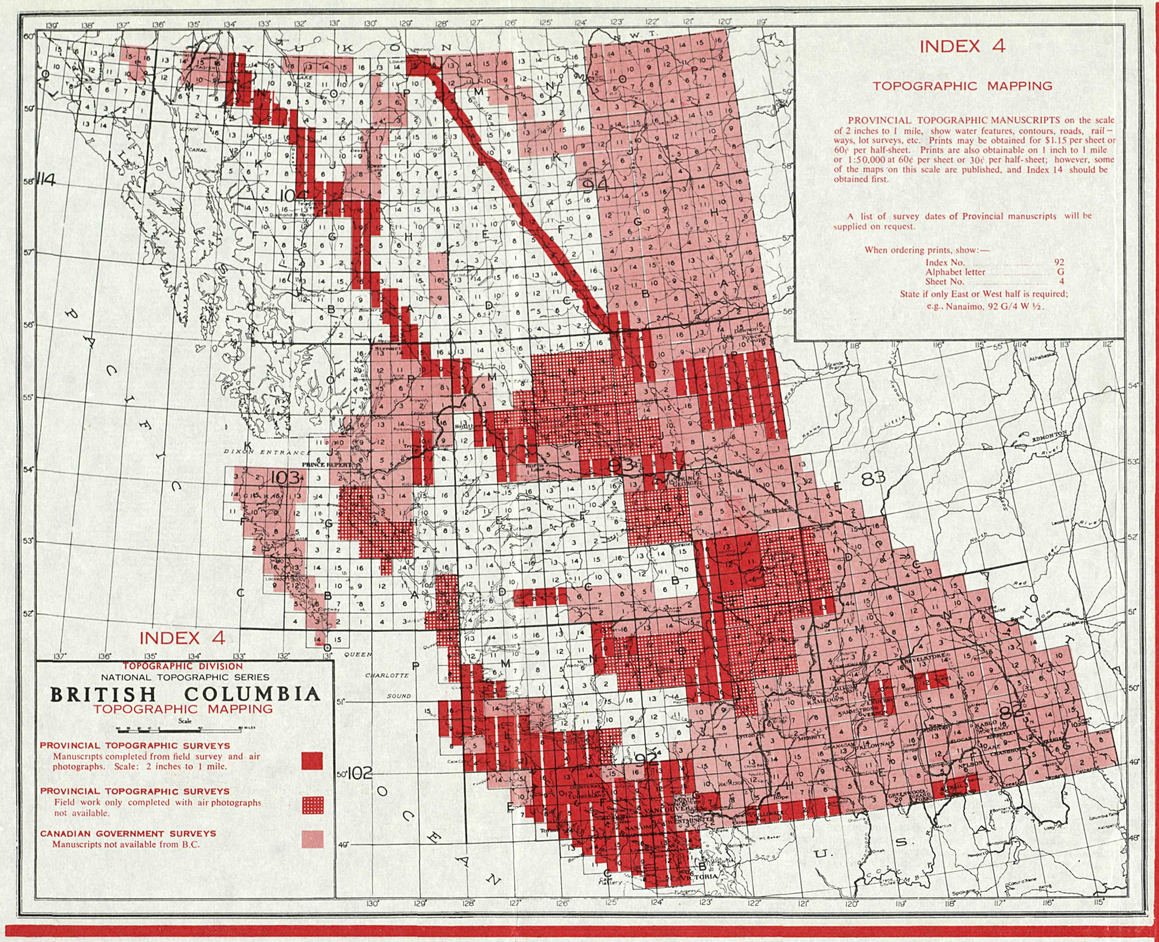
MINERAL CLAIMS AND PLACER LEASES,—Prints showing the approximate locations of staked mineral claims and placer-mining leases are available to the public. These maps conform in geographical detail, size, and number to the reference maps shown on Index 1 and mineral reference maps shown on Index 2. Price, $1.15 per print.

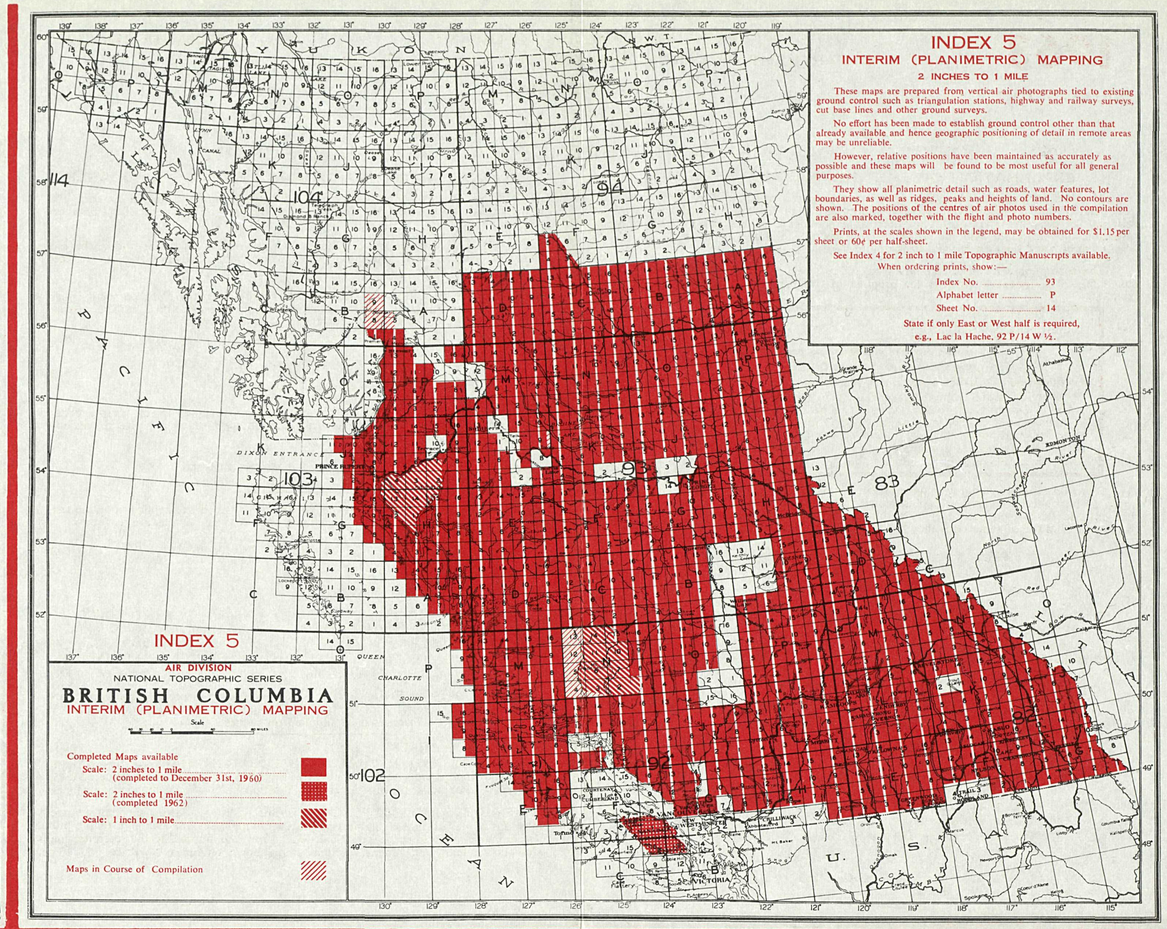
Address all inquiries to:— Chief Gold Commissioner, Victoria, B.C.








INDEX 4
TOPOGRAPHIC MAPPING
PROVINCIAL TOPOGRAPHIC MANUSCRIPTS on the scale of 2 inches to 1 mile, show water features, contours, roads, railways, lot surveys, etc. Prints may be obtained for $1.15 per sheet or 60¢ per half-sheet. Prints are also obtainable on 1 inch to 1 mile or 1:50,000 at 60¢ per sheet or 30¢ per half-sheet; however, some of the maps on this scale are published, and Index 14 should be obtained first.
A list of survey dates of Provincial manuscripts will be supplied on request.
When ordering prints, show:—
Index No. 92
Alphabet letter ..... G
Sheet No. 4
State if only East or West half is required;
e.g., Nanaimo, 92 G/4 W ½.
INDEX 4
TOPOGRAPHIC DIVISION
NATIONAL TOPOGRAPHIC SERIES
BRITISH COLUMBIA
TOPOGRAPHIC MAPPING
Scale
PROVINCIAL TOPOGRAPHIC SURVEYS
Manuscripts completed from field survey and air photographs. Scale: 2 inches to 1 mile.
PROVINCIAL TOPOGRAPHIC SURVEYS
Field work only completed with air photographs not available.
CANADIAN GOVERNMENT SURVEYS
Manuscripts not available from B.C.


INDEX 5
INTERIM (PLANIMETRIC) MAPPING
2 INCHES TO 1 MILE
These maps are prepared from vertical air photographs tied to existing ground control such as triangulation stations, highway and railway surveys, cut base lines and other ground surveys.
No effort has been made to establish ground control other than that already available and hence geographic positioning of detail in remote areas may be unreliable.
However, relative positions have been maintained as accurately as possible and these maps will be found to be most useful for all general purposes.
They show all planimetric detail such as roads, water features, lot boundaries, as well as ridges, peaks and heights of land. No contours are shown. The positions of the centres of air photos used in the compilation are also marked, together with the flight and photo numbers.
Prints, at the scales shown in the legend, may be obtained for $1.15 per sheet or 60¢ per half-sheet.
See Index 4 for 2 inch to 1 mile Topographic Manuscripts available.
When ordering prints, show:—
Index No. 93
Alphabet letter ..... P
Sheet No. 14
State if only East or West half is required,
e.g., Lac la Hache, 92 P/14 W ½.
INDEX 5
AIR DIVISION
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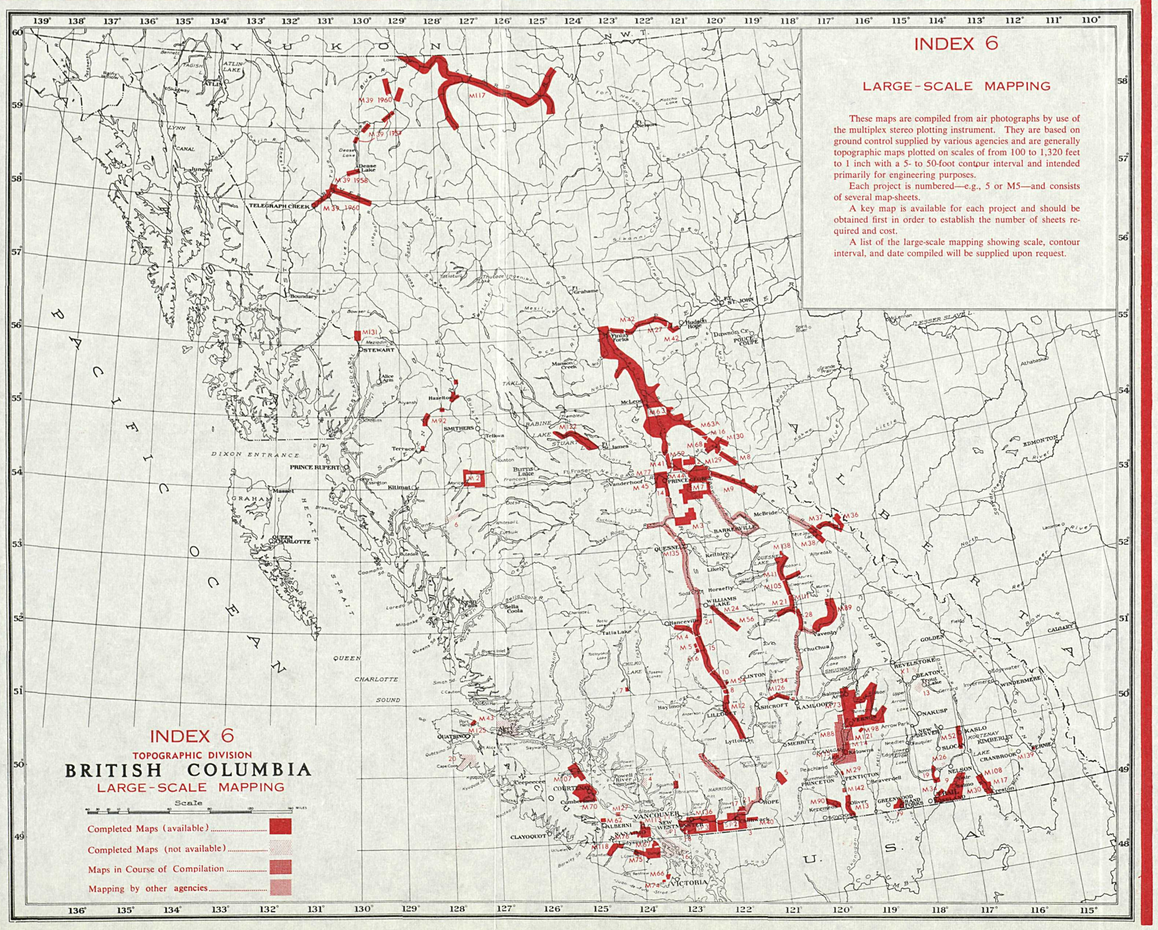
Completed Maps available
Scale: 2 inches to 1 mile (completed to December 31st, 1960)
Scale: 2 inches to 1 mile (completed 1962)
Scale: 1 inch to 1 mile
Maps in Course of Compilation


INDEX 6
LARGE-SCALE MAPPING
These maps are compiled from air photographs by use of the multiplex stereo plotting instrument. They are based on ground control supplied by various agencies and are generally topographic maps plotted on scales of from 100 to 1,320 feet to 1 inch with a 5- to 50-foot contour interval and intended primarily for engineering purposes.
Each project is numbered—e.g., 5 or M5—and consists of several map-sheets.
A key map is available for each project and should be obtained first in order to establish the number of sheets required and cost.
A list of the large-scale mapping showing scale, contour interval, and date compiled will be supplied upon request.
INDEX 6
TOPOGRAPHIC DIVISION
BRITISH COLUMBIA
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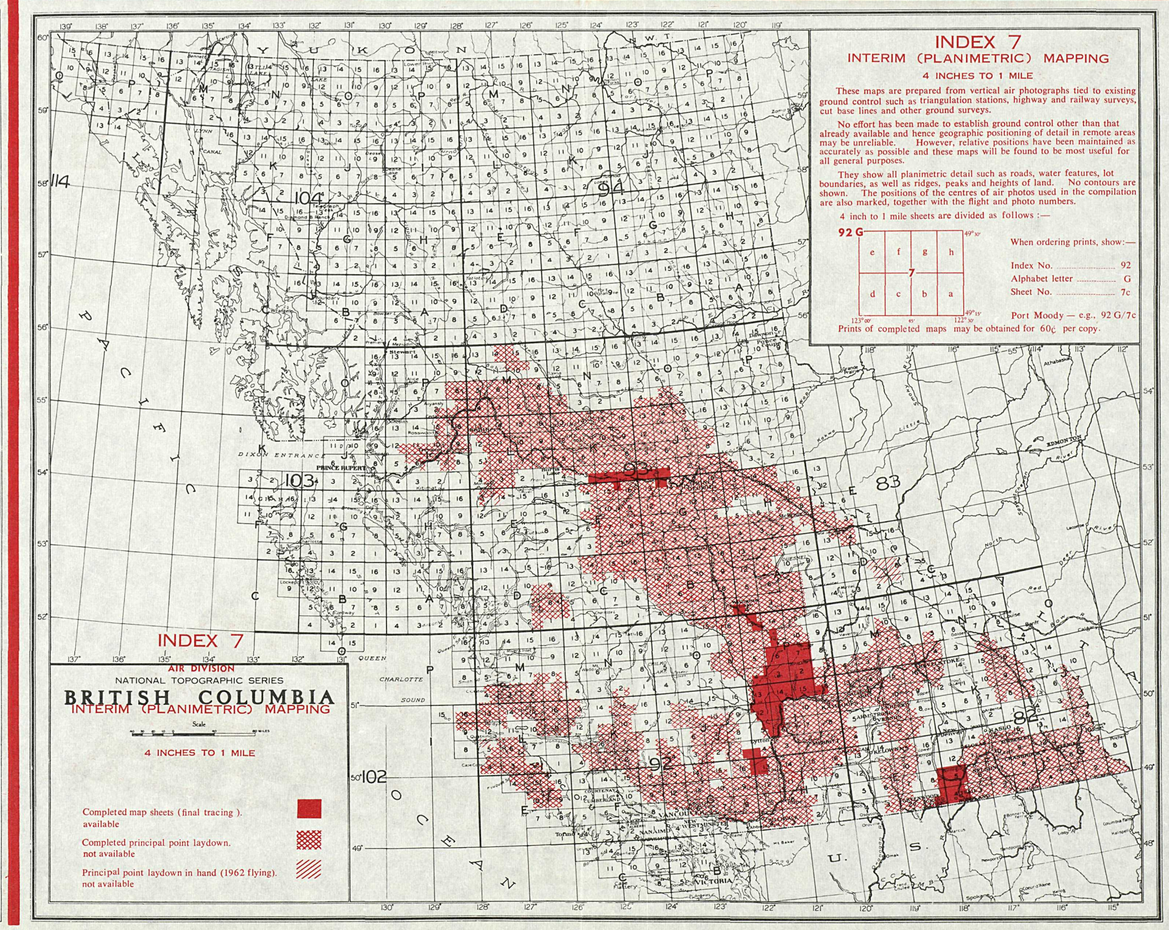
Completed Maps (available)
Completed Maps (not available)
Maps in Course of Compilation
Mapping by other agencies


INDEX 7
INTERIM (PLANIMETRIC) MAPPING
4 INCHES TO 1 MILE
These maps are prepared from vertical air photographs tied to existing ground control such as triangulation stations, highway and railway surveys, cut base lines and other ground surveys.
No effort has been made to establish ground control other than that already available and hence geographic positioning of detail in remote areas may be unreliable. However, relative positions have been maintained as accurately as possible and these maps will be found to be most useful for all general purposes.
They show all planimetric detail such as roads, water features, lot boundaries, as well as ridges, peaks and heights of land. No contours are shown. The positions of the centres of air photos used in the compilation are also marked, together with the flight and photo numbers.
4 inch to 1 mile sheets are divided as follows :—
92 G
e f g h
7
d c b a
When ordering prints, show:—
Index No. 92
Alphabet letter ..... G
Sheet No. 7c
Port Moody — e.g., 92 G/7c
Prints of completed maps may be obtained for 60¢ per copy.
INDEX 7
AIR DIVISION
NATIONAL TOPOGRAPHIC SERIES
BRITISH COLUMBIA
INTERIM (PLANIMETRIC) MAPPING
Scale
4 INCHES TO 1 MILE
Completed map sheets (final tracing) available
Completed principal point laydown, not available
Principal point laydown in hand (1962 flying), not available

1963

INDEXES 8 TO 14

PROVINCE OF BRITISH COLUMBIA
DEPARTMENT OF LANDS, FORESTS, AND WATER RESOURCES
LANDS SERVICE
HON. R. G. WILLISTON - - MINISTER
E. W. BASSETT DEPUTY MINISTER OF LANDS

INDEX TO PUBLISHED MAPS

EXPLANATION OF THE VARIOUS MAP SERIES

The Pre-emptor and Degree Series of regional maps (Index 9) are gradually being replaced by the National Topographic System maps on the 1-inch-to-2-mile and 1:250,000 (approx. 1 in. to 4 mi.) scales.

The latter system is a series of map sheets on the following scales designed to cover Canada in a regular manner using lines of latitude and longitude for the borders.

1 inch to 2 miles	See Index 10
1:250,000 (approx. 1 in. to 4 mi.)	,, ,, 11
1 inch to 8 miles	,, ,, 12
1:1,000,000 (approx. 1 in. to 16 mi.)	,, ,, 13
1:50,000 and 1 inch to 1 mile	See Index 14 (on reverse)

Address all orders and inquiries to:—

Director, Surveys and Mapping Branch,
Attention: Geographic Division,
Department of Lands, Forests, and Water Resources, Victoria, B.C.

Applicants are requested to enclose the correct payment with their orders as Government Publications must be paid for in advance. Orders to points within Canada may be sent C.O.D. upon request. For orders to be delivered within the Province 5-per-cent social services tax must be added. Cheques or money orders should be made payable to the Minister of Finance for British Columbia.

To avoid misunderstanding, applicants are requested to state the map number and index map of sheets required.

Government Agents throughout the Province stock copies of maps available within their districts for over-the-counter sale.

Unless otherwise requested, maps will be sent folded.

LAND BULLETINS

The LAND BULLETINS listed below give information both on the agriculture potentialities and general economy of the various districts to incoming settlers.

LAND BULLETINS	Date of Issue
No. 1. Kootenay Bulletin Area	1962
2. Okanagan Bulletin Area	1961
3. Lower Coast Bulletin Area	1962
4. Vancouver Island Bulletin Area	1959
5. Quesnel-Lillooet Bulletin Area	1961
6. Kamloops Bulletin Area	1960
7. Fort Fraser—Fort George Bulletin area	1962
8. Prince Rupert-Smithers Bulletin Area	1961
9. Atlin Bulletin Area	1961
10. Peace River District	1962
11. Acquisition of Crown Lands in British Columbia	1963

(Status maps showing vacant Crown land will be found on Indexes 9, 10, and 11.)

FOREST SERVICE

"How to Obtain a Timber Sale." F.S. 223	1960
Grazing Regulations	1959

Detailed topographic maps are also available of the B.C.-Alberta Boundary, B.C.-U.S.A. Boundaries, of the 1:25,000 series, Victoria-Vancouver area, and the valleys of the Columbia River Basin. Indexes will be supplied on request.

GENERAL MAPS — INDEX 8

Map No.	Year of Issue	Title of Map	Size of Sheet (in Inches)	Scale, Miles, etc.	Per Copy
1A	1958	Wall Map of British Columbia. In two sheets. Roads, trails, railways, etc. When joined—	57×71	1:1,000,000 or 1 in. to 15.78 m.	$ 3.45
1CR	1951	British Columbia—Tentative Range Map	17×22	1 in. to 55 m.	Free
‡ MD	1957	Ditto —Mining Divisions	17×22	1 in. to 52 m.	Free
1J	1957	British Columbia. In one sheet. Showing post offices, railways, main roads, trails, parks, distance charts, etc.	30×38	1 in. to 30 m.	$0.90
‡ 1JB	1957	B.C. Land Districts	30×39	1 in. to 30 m.	.90
‡ 1JC	1957	B.C. Land Recording Districts (revised, 1960)	30×38	1 in. to 30 m.	.90
‡ 1JD	1957	B.C. Mining Divisions (revised, 1958)	30×38	1 in. to 30 m.	.90
‡ 1JE	1957	B.C. Assessment and Collection Districts (revised, 1960)	30×38	1 in. to 30 m.	.90
‡ 1JF	1957	B.C. Electoral Districts (redistribution, 1938) (revised, 1955)	30×38	1 in. to 30 m.	.90
‡ 1JG	1957	B.C. Counties (Revised Statutes, 1948) and Sheriffs' Districts	30×38	1 in. to 30 m.	.90
‡ 1JH	1957	B.C. School Districts (revised, 1962)	30×38	1 in. to 30 m.	.90
‡ 1JJ	1957	B.C. Forest and Grazing Districts (revised, 1963)	30×38	1 in. to 30 m.	.90
‡ 1JK	1957	B.C. Registration Districts, Bills of Sale (revised, 1950)	30×38	1 in. to 30 m.	.90
‡ 1JL	1957	B.C. Land Registration Districts (Revised Statutes, 1948)	30×38	1 in. to 30 m.	.90
‡ 1JNT	1957	B.C. Showing N.T. System	30×38	1 in. to 30 m.	.90
1JR	1960	B.C. Relief Map —Layer Colours (precipitation inset)	30×38	1 in. to 30 m.	1.15
1JS	1945	B.C. Census Divisions	32×41	1 in. to 27 m.	.90

Year of Issue	Reports	Per Copy
1953	Geographical Gazetteer of British Columbia—Contains recorded geographical names of cities, villages, post offices, railway stations, rivers, creeks, lakes, islands, mountains, etc.	$ 1.15

‡ Prints only available. *In course of compilation

Certain departmental reference plans and manuscripts are available to the public in ozalid or photostat form. Indexes of the following, showing scales and prices, will be supplied on request:—

Index 1—DEPARTMENTAL REFERENCE MAPS showing all land surveys, leases, applications, etc., to date of order (1 in. to 1 mi. except where noted on index)

Index 2—DEPARTMENTAL MINERAL REFERENCE MAPS showing surveyed mineral claims, placer mining leases, etc. (1 in. to 1,500 ft.).

Index 3—COMPOSITE MAPS showing subdivisions (1 in. to 500 ft.) (1 inch to 300 ft).

Index 4—TOPOGRAPHIC SURVEY MAPPING showing lots and contours (2 in. or 1 in. to 1 mi.).

Index 5—INTERIM MAPPING (2 in. to 1 mi.) showing planimetry compiled from air photos.

Index 6—LARGE SCALE MAPPING (1 in. to 100 ft.) to (1 in. to 1,320 ft.).

Index 7—INTERIM MAPPING (4 in. to 1 mi.) showing planimetry from air photos.

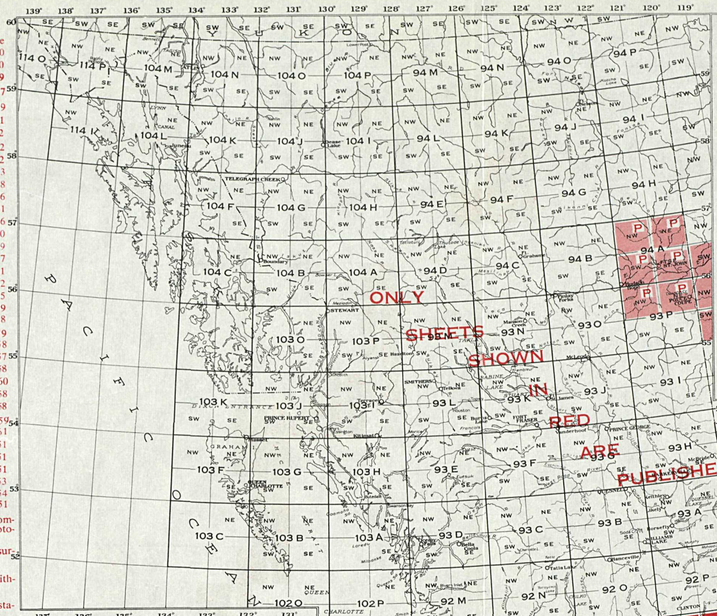
Indexes 15, 16, 17, and 18 show British Columbia Government air photographs taken at various altitudes.

For forest cover maps, write to Surveys and Inventory Division, British Columbia Forest Service, Victoria.
For marine charts, write to the Canadian Hydrographic Service, Department of Mines and Technical Surveys, Victoria, B.C., or Ottawa, Ont.
For aeronautical charts, write to Map Distribution Office, Department of Mines and Technical Surveys, Ottawa, Ont.
For published soil maps, write to Department of Agriculture, Victoria, B.C.
For staked mineral claim, placer lease maps, also petroleum and natural-gas location maps, write to Chief Gold Commissioner, Victoria, B.C.

INDEX 10

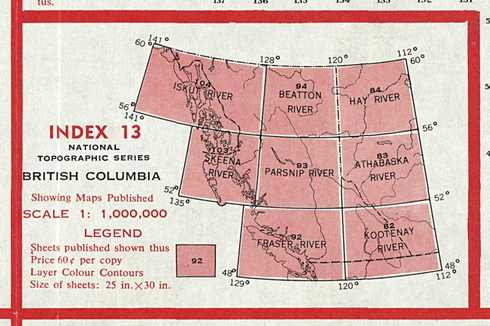
Map No.	Date
*82 E/SW	SL 1960
*82 E/NW	SL 1960
*82 E/SE	SL 1959
*82 E/NE	SL 1957
*82 F/SW	SL 1959
*82F/NE	SL 1961
*82F/NW	SL 1962
*82F/SE	SL 1962
*82G/SW	SL 1962
82 J/NE, NW—Parts of	1923
82 K/NE, SE—Parts of	1918
82 K/NW	L 1956
*82 K/SW	SL 1961
*82 L/SE	SL 1956
82 L/NE	L 1950
*82 L/NW	SL 1959
*82 L/SW	SL 1957
82 N/NE	1931
82 N/SE	L 1932
82 N/SW	L 1955
*92 B/NW, SW Parts of	SL 1959
*92 G/SE	SL 1958
*92 G/SW	SL 1959
*92 H/NE	SL 1958
*92 H/NW	SL 1957
*92 H/SE	SL 1958
*92 H/SW	SL 1960
*92 I/SW	SL 1958
*92 I/NW	SL 1958
*92 I/NE	SL 1959
*92 I/SE	SL 1961
*93 P/NE	P L 1951
*93 P/NW	P L 1951
*94 A/NW	P L 1951
*94 A/SE	P L 1953
*94 A/SW	P L 1954
*94 A/NE	P L 1951

* denotes sheets which were compiled with the use of air photographs.
L denotes sheets on which lot surveys are shown.
P denotes preliminary maps without contours.
S denotes maps showing land status.



INDEX 10
NATIONAL TOPOGRAPHIC SERIES
BRITISH COLUMBIA
Showing Maps Published on Scale
1 INCH TO 2 MILES
SCALE 10 0 25 50 100 150 200

LEGEND
Sheets published shown thus:—
Provincial Government
Price 60¢ per copy
Canadian Government
Price 60¢ per copy
Advance ozalid prints
Price, 30¢ per copy.
When ordering Maps show:—
Index No. 82 L
Sheet quarter SW
e.g. Vernon 82 L/SW



INDEX 13
NATIONAL TOPOGRAPHIC SERIES
BRITISH COLUMBIA
Showing Maps Published
SCALE 1: 1,000,000
LEGEND
Sheets published shown thus
Price 60¢ per copy
Layer Colour Contours
Size of sheets: 25 in.×30 in.

Explanation: The maps published on this scale, will show: water features in blue; relief features (if available) with brown contour lines and cultural features, such as place names, roads, railways, and boundaries, in black. Road classification is shown in red. Provincial maps show vacant Crown land to the date of issue.

Contour Interval: 100 and 200 feet.

Size of sheet: 24 in.×30 in.

REGIONAL MAPS — INDEX 9

Map No.	Year of Issue	Title of Map	Size of Sheet (in Inches)	Scale, Miles, etc.	Per Copy
		LAND SERIES			
2c	1958	Northerly Vancouver Island	28×42	1 in. to 4 m.	.90
2F	1954	Queen Charlotte Islands	28×42	1 in. to 4 m.	.90
		PRE-EMPTOR SERIES			
3A	1960	Fort George	28×42	1 in. to 3 m.	.60
3C	1949	Stuart Lake (contoured)	28×42	1 in. to 3 m.	.60
3E	1960	Peace River (contoured) (Revised status 1963)	28×42	1 in. to 4 m.	.60
3F	1950	Chilcotin (Revised Status 1958)	28×42	1 in. to 3 m.	.60
3G	1949	Quesnel (contoured) (Revised Status 1957)	28×42	1 in. to 3 m.	.60
3H	1958	Tête Jaune	28×42	1 in. to 3 m.	.60
3J	1952	North Thompson (contoured)	28×42	1 in. to 3 m.	.60
		DEGREE SERIES			
‡ 4c	1936	Cranbrook	24×40	1 in. to 2 m.	.30
4p	1957	Fernie	28×39	1 in. to 2 m.	.30
‡ 4E	1925	Upper Elk River	22×32	1 in. to 2 m.	.30
4F	1956	Lardeau	25×42	1 in. to 2 m.	.30
‡ 4G	1956	Windermere	25×42	1 in. to 2 m.	.30

‡ Prints only available.

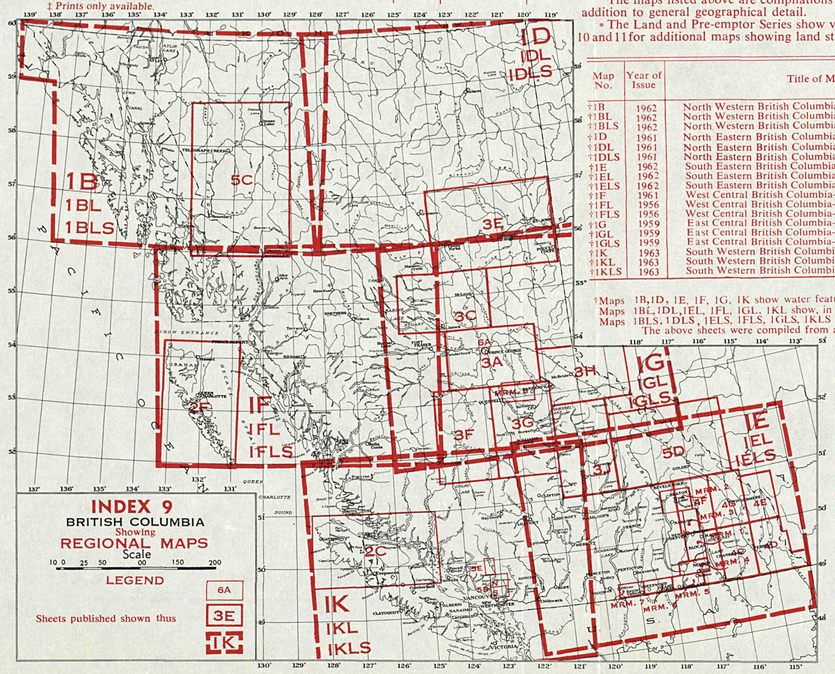
Map No.	Year of Issue	Title of Map	Size of Sheet (in Inches)	Scale, Miles, etc.	Per Copy
		TOPOGRAPHICAL SERIES			
5B s	1929	Howe Sound-Burrard Inlet (contoured), South	28×42	2 in. to 1 m.	.60
5B n	1929	,, ,, North	28×42	2 in. to 1 m.	.60
5c	1929	Stikine River (contoured)	28×42	1 in. to 5 m.	.60
* 5D	1953	Revelstoke-Golden (Big Bend-Columbia River) (cont.)	28×38	1 in. to 4 m.	.60
5E	1952	Lower Squamish Valley (contoured)	25×40	4 in. to 1 m.	.60
		COMPOSITE MAPS *printed*			
6A	1952	Prince George and Vicinity	28×42	1 in. to 800 ft.	.60
		MINERAL REFERENCE MAPS *printed*			
MRM1	1927	Slocan, Slocan City, Ainsworth, and Nelson	32×44	1 in. to 1 m.	.60
MRM2	1928	Trout Lake, Lardeau, and Ainsworth	28×43	1 in. to 1 m.	.60
MRM3	1928	Ainsworth, Trout Lake, and Slocan	22×32	1 in. to 1 m.	.60
MRM4	1929	Nelson and Trail Creek (Ymir)	24×42	1 in. to 1 m.	.60
MRM5	1929	Trail Creek and Nelson (Rossland)	22×42	1 in. to 1 m.	.60
MRM6	1932	Grand Forks, Greenwood, and Trail Creek	22×43	1 in. to 1 m.	.60
MRM7	1934	Greenwood and Osoyoos	22×42	1 in. to 1 m.	.60
MRM8	1935	Barkerville and Lightning Creek	32×44	1 in. to 1 m.	.60

The maps listed above are compilations of all available survey data and show lot surveys in addition to general geographical detail.

* The Land and Pre-emptor Series show vacant Crown land to the date of issue. *See* Indexes 10 and 11 for additional maps showing land status.

Map No.	Year of Issue	Title of Map	Size of Sheet (in Inches)	Scale, Miles, etc.	Per Copy
†1B	1962	North Western British Columbia—Planimetric	30x38	1 in. to 10 m.	.90
†1BL	1962	North Western British Columbia—Landforms	30x38	1 in. to 10 m.	1.15
†1BLS	1962	North Western British Columbia—Special	30x38	1 in. to 10 m.	1.15
†1D	1961	North Eastern British Columbia—Planimetric	30x38	1 in. to 10 m.	.90
†1DL	1961	North Eastern British Columbia—Landforms	30x38	1 in. to 10 m.	1.15
†1DLS	1961	North Eastern British Columbia—Special	30x38	1 in. to 10 m.	1.15
†1E	1962	South Eastern British Columbia—Planimetric	28x38	1 in. to 10 m.	.90
†1EL	1962	South Eastern British Columbia—Landforms	28x38	1 in. to 10 m.	1.15
†1ELS	1962	South Eastern British Columbia—Special	28x38	1 in. to 10 m.	1.15
†1F	1961	West Central British Columbia—Planimetric	30x38	1 in. to 10 m.	.90
†1FL	1956	West Central British Columbia—Landforms	30x38	1 in. to 10 m.	1.15
†1FLS	1956	West Central British Columbia—Special	30x38	1 in. to 10 m.	1.15
†1G	1959	East Central British Columbia—Planimetric	30x38	1 in. to 10 m.	.90
†1GL	1959	East Central British Columbia—Landforms	30x38	1 in. to 10 m.	1.15
†1GLS	1959	East Central British Columbia—Special	30x38	1 in. to 10 m.	1.15
†1K	1963	South Western British Columbia—Planimetric	30x38	1 in. to 10 m.	.90
†1KL	1963	South Western British Columbia—Landforms	30x38	1 in. to 10 m.	1.15
†1KLS	1963	South Western British Columbia—Special	30x38	1 in. to 10 m.	1.15

†Maps 1B, 1D, 1E, 1F, 1G, 1K show water features, place-names, railways, roads, airports, parks, etc.
Maps 1BL, 1DL, 1EL, 1FL, 1GL, 1KL show, in addition, relief in grey. (1BL, 1EL, 1KL also available in sand.)
Maps 1BLS, 1DLS, 1ELS, 1FLS, 1GLS, 1KLS show only water features and relief in brown.
The above sheets were compiled from air photographs.



INDEX 9
BRITISH COLUMBIA
Showing
REGIONAL MAPS
Scale
10 0 25 50 00 150 200
LEGEND
Sheets published shown thus 6A 3E 1K

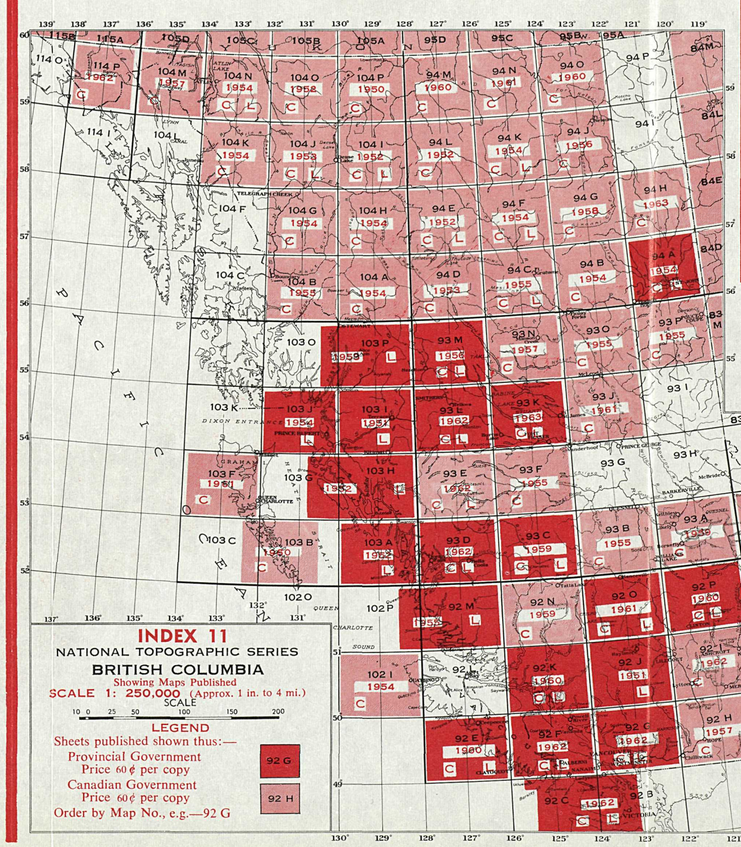
PROVINCIAL PARK MAPS—ADVANCE PRINTS ONLY

Map No.	Title of Map	Scale	Per Copy
P.S.G. 1	Garibaldi Park—planimetric	1 in. to 4 m.	$0.30
P.S.G. 2	Garibaldi Park—contoured	1 in. to 2 m.	.60
P.S.G. 3	Western Garibaldi—contoured	1 in. to 1 m.	.30
P.S.T. 1	Tweedsmuir Park—planimetric	1 in. to 8 m.	.30
P.S.T. 2	Tweedsmuir Park—planimetric	1 in. to 4 m.	.60
P.S.W. 1	Wells Gray Park—planimetric	1 in. to 4 m.	.30
P.S.W. 2	Wells Gray Park—contoured	1 in. to 2 m.	.60

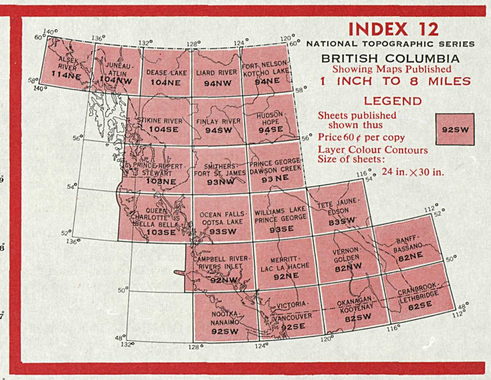
For Vacation and Tourist Information, write to:—
The British Columbia Government Travel Bureau, Victoria, B.C.

INDEX 11

ONLY SHEETS SHOWN IN RED ARE PUBLISHED



INDEX 11
NATIONAL TOPOGRAPHIC SERIES
BRITISH COLUMBIA
Showing Maps Published
SCALE 1: 250,000 (Approx. 1 in. to 4 mi.)
SCALE 10 0 25 50 100 150 200
LEGEND
Sheets published shown thus:—
Provincial Government
Price 60¢ per copy
Canadian Government
Price 60¢ per copy
Order by Map No., e.g.—92 G



INDEX 12
NATIONAL TOPOGRAPHIC SERIES
BRITISH COLUMBIA
Showing Maps Published
1 INCH TO 8 MILES
LEGEND
Sheets published shown thus 92SW
* Price 60¢ per copy
Layer Colour Contours
Size of sheets: 24 in.×30 in.

EXPLANATION:

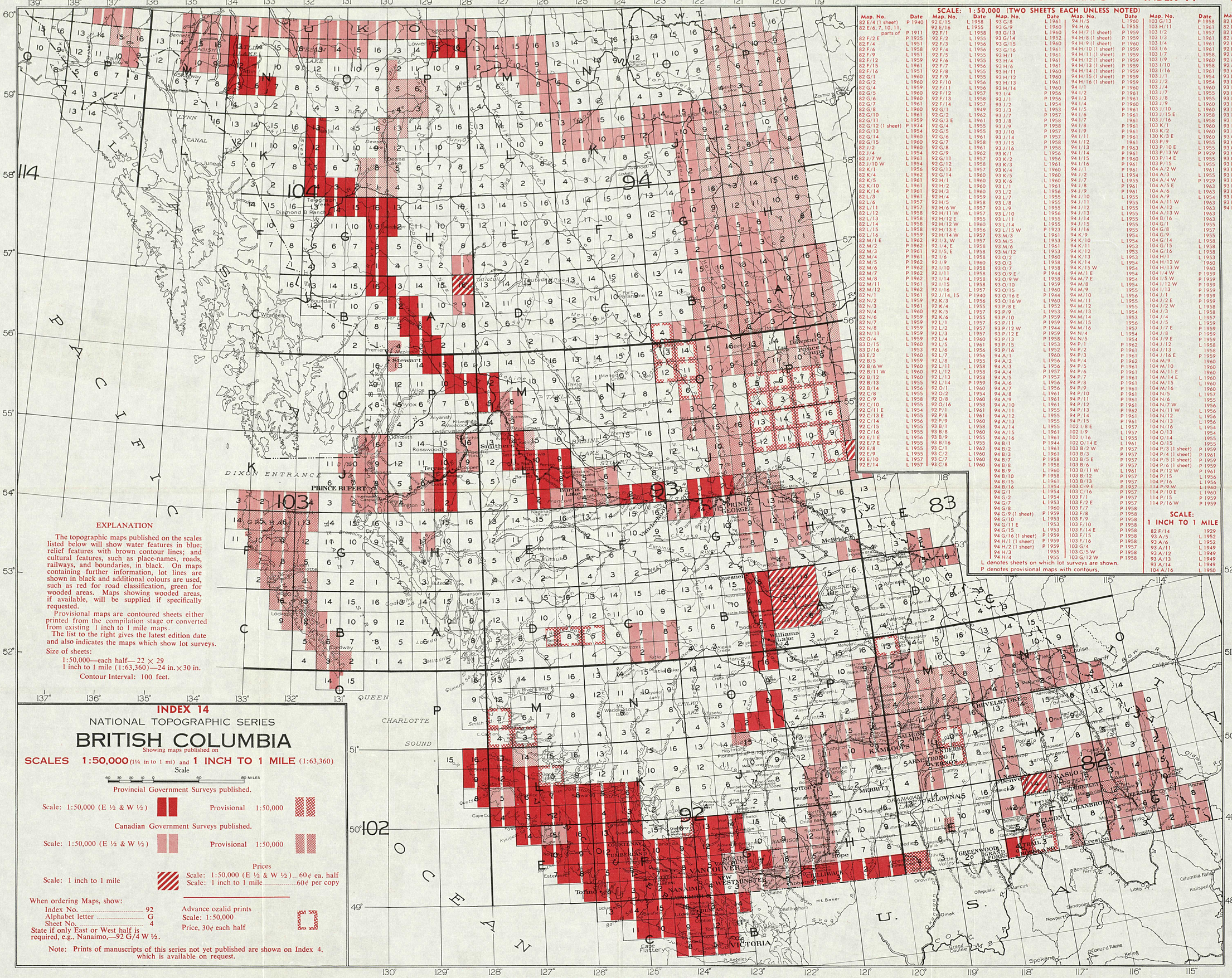
The maps published on this scale, on the index to the left, will show: water features in blue; relief features (if available) with brown contour lines and cultural features, such as place names, roads, railways, and boundaries, in black. On provisional editions water features and contours are also shown in black. Canadian Government series showing wooded areas, if available, will be supplied if specifically requested. Provincial maps show vacant Crown land to the date of issue.

Contour Interval: 500 feet.

Size of sheets: 24 in.×30 in.

1952—denotes date of publication.
C—denotes sheets showing contours.
L—denotes sheets on which lot surveys are shown. All published Provincial maps show land status.
P—denotes provisional maps.
A—denotes Advance ozalid prints only, no contours. Price, 30¢ per copy.

ONLY SHEETS SHOWN IN RED ARE PUBLISHED



EXPLANATION

The topographic maps published on the scales listed below will show water features in blue; relief features with brown contour lines; and cultural features, such as place-names, roads, railways, and boundaries, in black. On maps containing further information, lot lines are shown in black and additional colours are used, such as red for road classification, green for wooded areas. Maps showing wooded areas, if available, will be supplied if specifically requested.

Provisional maps are contoured sheets either printed from the compilation stage or converted from existing 1 inch to 1 mile maps.

The list to the right gives the latest edition date and also indicates the maps which show lot surveys.

Size of sheets:

1:50,000—each half— 22 × 29
1 inch to 1 mile (1:63,360)—24 in. × 30 in.

Contour Interval: 100 feet.

INDEX 14

NATIONAL TOPOGRAPHIC SERIES

BRITISH COLUMBIA

Showing maps published on

SCALES 1:50,000 (1¼ in to 1 mi) and **1 INCH TO 1 MILE** (1:63,360)

Scale

40 30 20 10 0 40 80 MILES

Provincial Government Surveys published.

Scale: 1:50,000 (E ½ & W ½)

Provisional 1:50,000

Canadian Government Surveys published.

Scale: 1:50,000 (E ½ & W ½)

Provisional 1:50,000

Scale: 1 inch to 1 mile

Prices

Scale: 1:50,000 (E ½ & W ½) ... 60¢ ea. half
Scale: 1 inch to 1 mile ... 60¢ per copy

Advance ozalid prints
Scale: 1:50,000
Price, 30¢ each half

When ordering Maps, show:

Index No. 92
Alphabet letter ..... G
Sheet No. 4

State if only East or West half is required, e.g., Nanaimo,—92 G/4 W ½.

Note: Prints of manuscripts of this series not yet published are shown on Index 4, which is available on request.

LIST OF PUBLISHED MAPS — INDEX 14

SCALE: 1:50,000 (TWO SHEETS EACH UNLESS NOTED)

Map. No.	Date	Map. No.	Date	Map. No.	Date	Map. No.	Date	Map. No.	Date
82 E/4 (1 sheet)	P 1940	92 E/15	L 1958	93 G/8	L 1961	94 H/5	L 1960	103 G/13	P 1958
82 E/6, 7, 10, 11, parts of	P 1911	92 E/16	L 1955	93 G/9	L 1960	94 H/6	L 1955	103 H/11	L 1961
82 F/2 E	P 1922	92 F/1	L 1958	93 G/13	L 1960	94 H/7 (1 sheet)	P 1959	103 G/12	L 1957
82 F/4	P 1951	92 F/2	L 1955	93 G/14	L 1952	94 H/8 (1 sheet)	P 1959	103 L/3	L 1961
82 F/6	L 1958	92 F/3	L 1956	93 G/15	L 1960	94 H/9 (1 sheet)	P 1960	103 I/4	L 1961
82 F/9	L 1951	92 F/4	L 1956	93 G/16	L 1961	94 H/11 (1 sheet)	P 1959	103 I/6	L 1961
82 F/12	L 1959	92 F/5	L 1958	93 H/1	L 1961	94 H/12 (1 sheet)	P 1959	103 I/7	L 1958
82 F/15	L 1961	92 F/6	L 1955	93 H/4	L 1961	94 H/13 (1 sheet)	P 1959	103 I/9	L 1960
82 F/16	L 1951	92 F/7	L 1956	93 H/6	L 1961	94 H/14 (1 sheet)	P 1959	103 I/10	L 1958
82 G/1	L 1960	92 F/8	L 1955	93 H/11	L 1960	94 H/15 (1 sheet)	P 1959	103 I/16	L 1961
82 G/2	L 1960	92 F/9	L 1955	93 H/12	L 1960	94 H/16 (1 sheet)	P 1959	103 J/1	L 1954
82 G/4	L 1959	92 F/10	L 1956	93 H/13	L 1961	94 I/1	P 1960	103 J/2	L 1954
82 G/5	L 1960	92 F/11	L 1956	93 H/14	L 1960	94 I/2	P 1961	103 J/4	L 1960
82 G/6	L 1960	92 F/12	L 1957	93 I/4	P 1956	94 I/3	P 1961	103 J/7	L 1955
82 G/7	L 1961	92 F/13	L 1958	93 I/1	P 1956	94 I/4	P 1960	103 J/8	L 1955
82 G/8	L 1960	92 F/14	L 1957	93 J/2	L 1954	94 I/5	P 1961	103 J/9	L 1960
82 G/10	L 1961	92 G/1	L 1949	93 J/3	L 1953	94 I/6	P 1961	103 J/10	L 1960
82 G/11	L 1959	92 G/2	L 1962	93 J/7	P 1957	94 I/7	1961	103 J/15 E	P 1958
82 G/12 (1 sheet)	P 1934	92 G/3 E	L 1961	93 J/8	P 1958	94 I/8	P 1961	103 J/16	L 1958
82 G/13	L 1954	92 G/4	L 1955	93 J/9	P 1958	94 I/9	P 1961	103 K/1	L 1960
82 G/14	L 1960	92 G/5	L 1955	93 J/10	P 1957	94 I/11	P 1961	103 K/2	L 1960
82 G/15	L 1960	92 G/6	L 1961	93 J/14	P 1957	94 I/12	1961	130 K/3 E	L 1960
82 J/2	L 1960	92 G/7	L 1958	93 J/15	P 1958	94 I/13	P 1963	103 P/9	L 1955
82 J/4	L 1954	92 G/8	L 1961	93 J/16	P 1958	94 I/14	P 1961	103 P/10 E	L 1957
82 J/7 W	L 1961	92 G/9	L 1962	93 K/1	L 1956	94 I/15	P 1960	103 P/13 W	P 1929
82 J/10 W	L 1954	92 G/11	L 1957	93 K/2	L 1956	94 I/16	P 1961	103 P/14 E	L 1955
82 K/1	1956	92 G/12	L 1958	93 K/3	L 1961	94 J/1	P 1961	103 P/15	L 1955
82 K/4	L 1962	92 G/13	L 1957	93 K/4	L 1960	94 J/2	L 1954	104 A/2 W	1961
82 K/5	L 1961	92 G/14	L 1960	93 K/5	L 1960	94 J/7	L 1955	104 A/3	L 1955
82 K/10	L 1961	92 H/1	L 1960	93 K/6	L 1960	94 J/8	P 1961	104 A/4 W	P 1929
82 K/14	P 1961	92 H/2	L 1960	93 L/1	L 1961	94 J/9	P 1961	104 A/5 E	1963
82 L/3	L 1961	92 H/3	L 1960	93 L/2	L 1956	94 J/10	L 1955	104 A/6	L 1963
82 L/6	L 1957	92 H/4	L 1959	93 L/7	L 1955	94 J/11	1955	104 A/9	L 1954
82 L/11	L 1957	92 H/5	L 1958	93 L/8	L 1955	94 J/12	L 1955	104 A/11 W	1963
82 L/12	L 1958	92 H/6 W	L 1957	93 L/9	L 1955	94 J/13	L 1955	104 A/12	1963
82 L/13	L 1958	92 H/11 W	L 1957	93 L/10	L 1956	94 J/14	L 1955	104 A/13 W	1963
82 L/14	L 1958	92 H/12 E	L 1955	93 L/11	L 1955	94 J/15	L 1955	104 B/16	1963
82 L/15	L 1958	92 H/12 W	L 1960	93 L/14	L 1955	94 J/16	1955	104 G/8	1957
82 L/16	L 1959	92 H/13 E	L 1956	93 L/15 W	P 1923	94 K/9	1954	104 G/9	1955
82 M/1 E	L 1962	92 H/14 W	L 1957	93 M/3	L 1961	94 K/10	L 1954	104 G/14	L 1958
82 M/2	P 1962	92 I/3, W	L 1957	93 M/5	L 1953	94 K/11	1953	104 G/15	L 1958
82 M/3	P 1961	92 I/4, E	L 1958	93 M/6	L 1961	94 K/12	1953	104 G/16	L 1958
82 M/4	P 1961	92 I/5, E	L 1958	93 M/12	L 1953	94 K/13	1953	104 H/1	L 1953
82 M/5	P 1962	92 I/6	L 1958	93 O/2	L 1960	94 K/14	L 1954	104 H/12 W	1960
82 M/6	P 1962	92 I/9	L 1960	93 O/3	L 1958	94 K/15 W	1954	104 H/13 W	1960
82 M/7	P 1962	92 I/11	L 1958	93 O/7	L 1958	94 M/1 E	1954	104 I/4 W	P 1959
82 M/8	P 1962	92 I/14	L 1958	93 O/9 E	P 1944	94 M/7 E	1954	104 I/5 W	P 1959
82 M/11	L 1961	92 I/15	L 1958	93 O/9 W	L 1958	94 M/8	L 1954	104 I/12 W	P 1959
82 M/12	L 1962	92 I/16	L 1957	93 O/10	L 1959	94 M/9	1955	104 I/13	P 1959
82 N/1	L 1961	92 J/14, 15	P 1940	93 O/15	L 1960	94 M/10	L 1956	104 J/1	P 1959
82 N/2	L 1959	92 K/3	L 1956	93 O/16 E	P 1944	94 M/11	L 1955	104 J/2 E	P 1959
82 N/3	L 1961	92 K/4	L 1955	93 O/16 W	L 1960	94 M/12	1955	104 J/2 W	L 1958
82 N/4	L 1960	92 K/5	L 1957	93 P/8 E	L 1952	94 M/13	L 1954	104 J/3	L 1958
82 N/6	L 1959	92 K/6	L 1955	93 P/10	L 1953	94 M/14	1953	104 J/4	L 1957
82 N/7	L 1959	92 L/1	L 1957	93 P/11	P 1959	94 M/15	1956	104 J/5	L 1959
82 N/8	L 1959	92 L/2	L 1957	93 P/12 W	P 1944	94 M/16	1957	104 J/7 E	P 1959
82 N/11	L 1959	92 L/3	L 1957	93 P/12 E	P 1959	94 N/4	L 1954	104 J/8	P 1959
82 O/4	L 1959	92 L/4	L 1960	93 P/13	P 1958	94 N/5	1954	104 J/9 E	P 1959
83 D/15	L 1960	92 L/5	L 1961	93 P/15	L 1953	94 P/1	P 1962	104 J/12	L 1958
83 D/16	1953	92 L/6	L 1956	93 P/16	L 1952	94 P/2	P 1961	104 J/13	L 1958
83 E/2	L 1960	92 L/7	L 1956	94 A/1	1960	94 P/3	P 1961	104 J/16 E	P 1959
92 B/5	L 1959	92 L/8	L 1955	94 A/2	L 1956	94 P/4	P 1962	104 M/9	1960
92 B/6 W	L 1960	92 L/11	L 1958	94 A/3	L 1956	94 P/5	P 1961	104 M/10	L 1960
92 B/11 W	L 1960	92 L/12	L 1958	94 A/4	P 1957	94 P/6	P 1961	104 M/11 E	1960
92 B/12	L 1960	92 L/13	L 1958	94 A/5	P 1957	94 P/7	P 1961	104 M/14 E	L 1960
92 B/13	L 1955	92 L/14	P 1959	94 A/6	L 1956	94 P/8	P 1961	104 M/15	L 1960
92 B/14	L 1955	92 O/1	L 1960	94 A/7	L 1956	94 P/9	P 1961	104 M/16	1960
92 C/8	L 1955	92 O/2	L 1954	94 A/8	L 1961	94 P/10	P 1961	104 N/5	L 1957
92 C/9	L 1958	92 O/8	L 1960	94 A/9	L 1961	94 P/11	P 1961	104 N/6	1955
92 C/10	L 1955	92 O/16	L 1958	94 A/10	L 1961	94 P/12	P 1961	104 N/7 W	1956
92 C/11 E	L 1954	92 P/1	L 1961	94 A/11	L 1955	94 P/13	P 1962	104 N/11 W	L 1956
92 C/13 E	L 1955	92 P/8	L 1961	94 A/12	L 1955	94 P/14	P 1961	104 N/12	L 1956
92 C/14	L 1956	92 P/9	L 1960	94 A/13	1955	94 P/15	P 1961	104 N/13	L 1956
92 C/15	L 1955	93 B/1	L 1958	94 A/14	L 1955	102 I/8 E	L 1957	104 N/16	L 1954
92 C/16	L 1955	93 B/8	L 1960	94 A/15	L 1961	102 I/9	L 1957	104 O/13	1954
92 E/1 E	L 1956	93 B/9	L 1955	94 A/16	L 1961	102 I/16	L 1955	104 O/14	1955
92 E/7 E	L 1955	93 B/16	L 1955	94 B/1	P 1944	102 O/14 E	L 1961	104 O/15	1955
92 E/8	L 1955	93 C/1	L 1962	94 B/2	L 1961	103 B/2 W	P 1957	104 P/3 (1 sheet)	P 1959
92 E/9	L 1955	93 C/2	L 1960	94 B/3	L 1961	103 B/3	P 1957	104 P/4 (1 sheet)	P 1961
92 E/10	L 1957	93 C/7	L 1960	94 B/7	P 1958	103 B/5 E	P 1957	104 P/5 (1 sheet)	P 1959
92 E/14	L 1957	93 C/8	L 1960	94 B/8	P 1958	103 B/6	P 1957	104 P/6 (1 sheet)	P 1959
				94 B/9	L 1960	103 B/11 W	L 1961	104 P/12 W	P 1961
				94 B/10	P 1958	103 B/12	P 1957	104 P/15	L 1956
				94 B/15	L 1961	103 B/13	P 1957	104 P/16	L 1956
				94 B/16	L 1954	103 C/9 E	P 1957	114 P/9 W	L 1960
				94 G/1	L 1954	103 C/16	P 1957	114 P/10 E	L 1960
				94 G/2	L 1954	103 F/1	P 1957	114 P/15	P 1959
				94 G/7	L 1953	103 F/2 E	P 1957	114 P/16 W	P 1959
				94 G/8	1960	103 F/7	P 1958		
				94 G/9 (1 sheet)	P 1959	103 F/8	P 1958		
				94 G/10	L 1953	103 F/9	P 1958		
				94 G/11 E	1953	103 F/10	P 1958		
				94 G/15	L 1953	103 F/14 E	P 1958		
				94 G/16 (1 sheet)	P 1959	103 F/15	P 1958		
				94 H/1 (1 sheet)	P 1959	103 F/16	P 1958		
				94 H/2 (1 sheet)	P 1959	103 G/4	P 1957		
				94 H/3	1955	103 G/5 W	P 1958		
				94 H/4	1955	103 G/12 W	P 1958		

L denotes sheets on which lot surveys are shown.
P denotes provisional maps with contours.

ADVANCE OZALID PRINTS

Map. No.	Date	Map. No.	Date
82 F/3	LP 1960	82 L/7	LP 1958
82 L/10	LP 1958	82 M/13	LP 1959
82 F/16 E	LP 1957	92 L/10	LP 1956
92 M/3	LP 1959	92 M/4	LP 1959
92 M/5	LP 1959	93 C/5	LP 1959
93 D/7 E	LP 1959	93 D/8	LP 1959
93 I/8	P 1956	93 I/9	P 1956
93 I/10	P 1956	93 I/11	P 1957
93 I/12	P 1957	93 I/13	P 1957
93 I/14	P 1957	93 I/15	P 1956
93 I/16	LP 1956	93 O/6	LP 1957
93 O/11	P 1957	93 O/12	P 1957
93 O/13	LP 1957	93 O/14	P 1957
93 P/1	LP 1956	93 P/2	P 1956
93 P/3	LP 1957	93 P/4	LP 1957
93 P/5	P 1957	93 P/6	LP 1957
93 P/7	LP 1956	93 P/8 W	LP 1956
94 B/4	LP 1957		

SCALE:
1 INCH TO 1 MILE

Map. No.	Date
82 F/14	1929
93 A/5	L 1952
93 A/6	L 1952
93 A/11	L 1949
93 A/12	L 1949
93 A/13	L 1949
93 A/14	L 1949
104 A/16	L 1950

ONLY SHEETS SHOWN IN RED ARE PUBLISHED

1963

INDEXES 15 TO 18

PROVINCE OF BRITISH COLUMBIA
DEPARTMENT OF LANDS, FORESTS, AND WATER RESOURCES
LANDS SERVICE

HON. R. G. WILLISTON - - MINISTER
E. W. BASSETT DEPUTY MINISTER OF LANDS

DECEMBER 31st, 1962

INDEX TO AIR PHOTO COVER AND AIR PHOTO INDEX MAPS

EXPLANATION

Indexes 15, 16, 17, and 18 show the Air Photo cover of British Columbia and a sample air photo index map as follows:—

Index 15 — Sample Air Photo Index Map.
Index 16 — Basic vertical photo cover.
Index 17 — Basic tri camera photo cover and small scale vertical.
Index 18 — Special photo cover (inc. Forest Inventory, 20 chain.)

There are two main sources of photos covering the Province. For the photography done by the Canadian Government, negatives are held in Ottawa. The numbers for these are prefixed by "A." For the photography done by the Provincial Government, negatives are held in Victoria. The numbers for these are prefixed by the letters "BC," and also by the letter "X" for tri camera photography.

AIR PHOTO INDEX MAPS — Index 15.

For ease of reference, photos are keyed as accurately as possible on appropriate maps, copies of which are available at the prices noted. *See* Index 15 for sample. These are indexes to air photographs only. For maps compiled from air photographs obtain Indexes 4, 5, 6, 10, 11, and 14.

BASIC VERTICAL PHOTO COVER — Index 16.

Basic vertical photos are taken from heights between 17,500 and 20,000 feet above sea-level, and the scale of the photos varies according to the height above ground from which they were taken. In hilly country the scale varies within each photo, and averages about 2,640 feet to the inch on a 9" x 9" print. The area covered by each photo varies from about 26 to 34 square miles, depending on the terrain.

TRI CAMERA PHOTO COVER — Index 17.

The term "tri camera" refers to single runs of photos taken from various altitudes using an assembly of three cameras. One camera points straight down and obtains standard vertical photos, while the other two point, one to the right and one to the left, and obtain oblique photos that cover the ground from the horizon to a line that slightly overlaps the vertical photo.

The three cameras are exposed simultaneously so that a tri camera assembly will consist of three photos, two obliques and one vertical, that cover the ground from horizon to horizon. Any of the three photos may be ordered individually.

For ease of reference, all tri camera photos are recorded with a number prefixed by the letter "X" in addition to the "BC" number. The left obliques are prefixed "XL," the right obliques "XR," and the centre vertical "XC."

SMALL SCALE VERTICAL — Index 17

Small-scale vertical photography has been flown by the Canadian Government. These photos were taken from an altitude of 35,000 feet above sea-level and are at a scale of approximately 1 mile to 1 inch. Each photo covers approximately 80 square miles.

SPECIAL PHOTO COVER — Index 18.

Special tri-camera, forest inventory and vertical photography generally at a larger scale is taken to supplement basic cover as required. The area covered by a single photo will vary considerably, depending upon height of aircraft above ground and focal length of camera used.

B.C. PROVINCIAL AIR PHOTO LIBRARY

A library of air photos taken in B.C. by both Provincial and Canadian governments is maintained by the Air Division, Surveys and Mapping Branch, Department of Lands and Forests, Victoria, B.C., and is available for both departmental and public reference. Basic photo cover (Indexes 16 and 17) is available on loan in Canada only.

A minimum service charge of $1 for loan up to and including five prints. Additional prints loaned at the same time, 10 cents per print over and above the minimum charge (i.e., seven prints $1.20). All charges to be prepaid with order.

Time-limit for loans in Lower Mainland area, two weeks; elsewhere, three weeks. Failure to comply with return date will result in additional assessment equal to purchase price of reprints.

Graduated service charge for viewing air photos in Air Photo Library. Minimum charge 50 cents.

METHODS OF ORDERING AIR PHOTOGRAPHS

When an index map is available the exact photo number and roll number may be ascertained (*see* Index 15). Otherwise, it is necessary to specify the area for which photos are required in sufficient detail so it can be located on a map.

The size of a standard print is 9" x 9" but enlargements up to 30" x 30" of those photos taken by the Provincial Government may be obtained on request.

The following is a price list for British Columbia Government air photos:—

Size	Price Per Print
9" x 9"	$0.70
18" x 18"	4.60
20" x 20"	5.25
30" x 30"	8.30
30" x 30" (retouched)	12.00

Air Photo Index Maps are available at 30 or 60 cents per print.

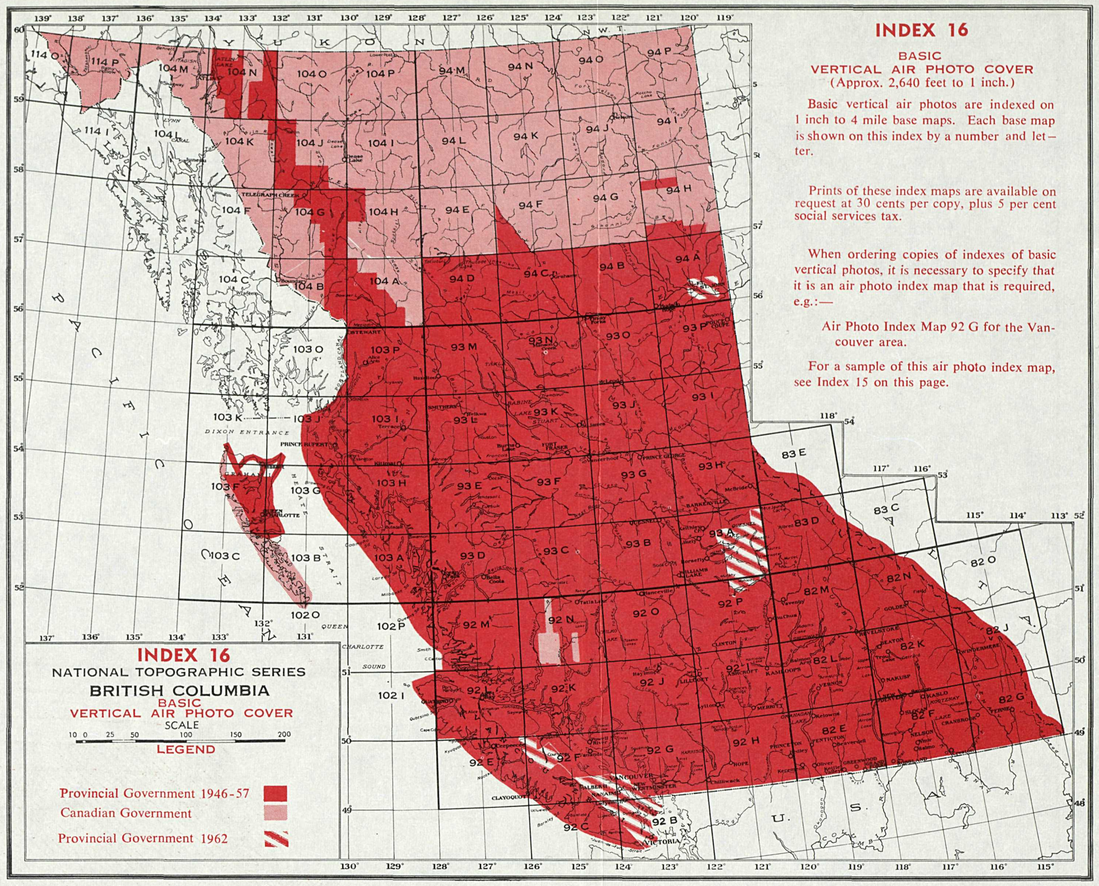
Address all orders and inquiries to:—

Director, Surveys and Mapping Branch,
Attention: Air Division,
Department of Lands, Forests, and Water Resources, Victoria, B.C.

Applicants are requested to enclose the correct payment with their orders as Government Publications must be paid for in advance. Orders to points within Canada may be sent C.O.D. upon request. For orders to be delivered within the Province 5-per-cent social services tax must be added. Cheques or money orders should be made payable to the Minister of Finance for British Columbia.

Further information regarding Canadian Government photos and prices may be obtained by writing directly to:—

National Air Photo Library
Department of Mines & Technical Surveys
Ottawa.



INDEX 16

BASIC
VERTICAL AIR PHOTO COVER
(Approx. 2,640 feet to 1 inch.)

Basic vertical air photos are indexed on 1 inch to 4 mile base maps. Each base map is shown on this index by a number and letter.

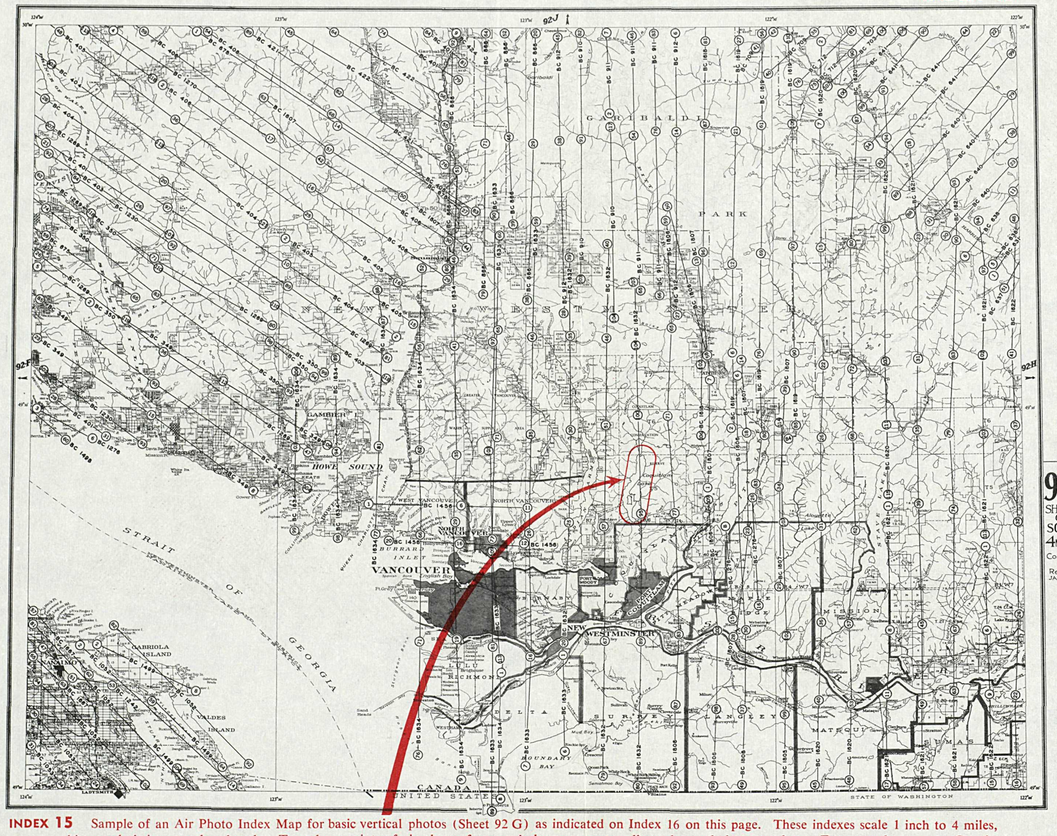
Prints of these index maps are available on request at 30 cents per copy, plus 5 per cent social services tax.

When ordering copies of indexes of basic vertical photos, it is necessary to specify that it is an air photo index map that is required, e.g.:—

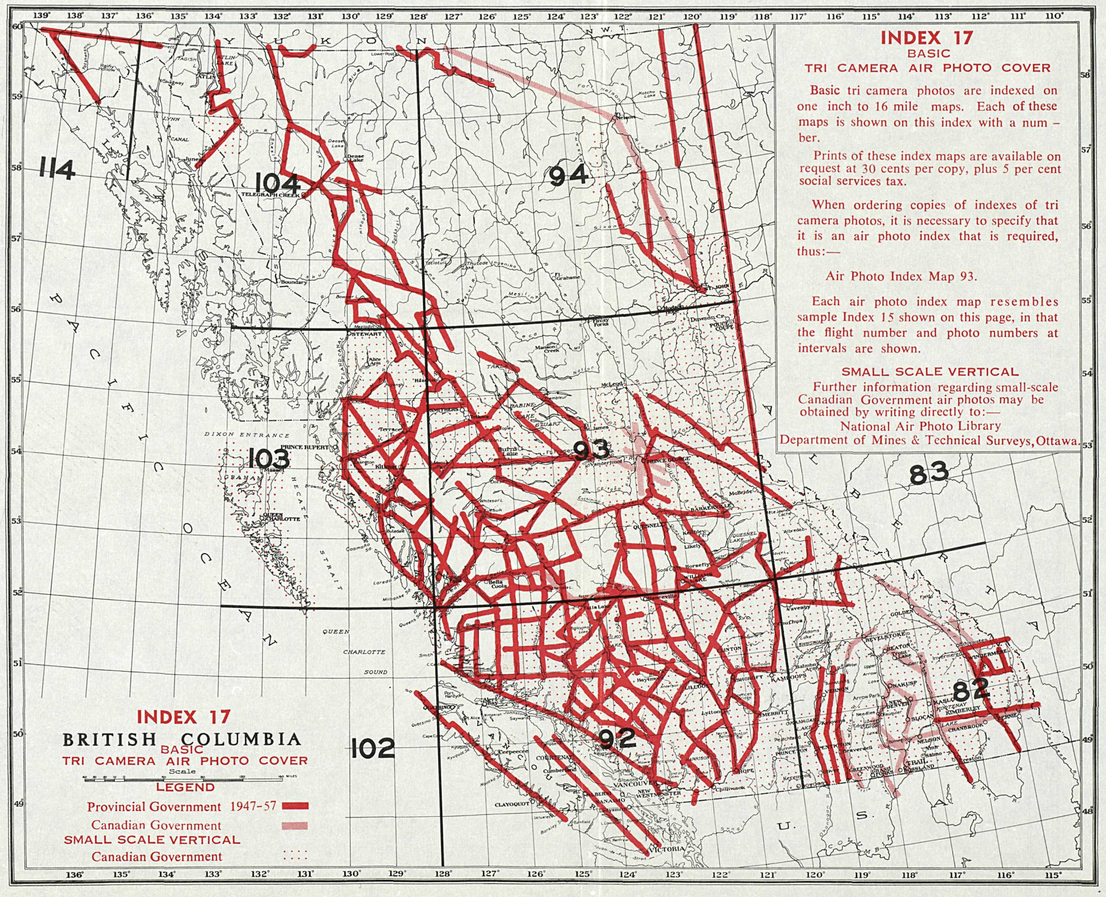
Air Photo Index Map 92 G for the Vancouver area.

For a sample of this air photo index map, see Index 15 on this page.

INDEX 15



INDEX 15 Sample of an Air Photo Index Map for basic vertical photos (Sheet 92 G) as indicated on Index 16 on this page. These indexes scale 1 inch to 4 miles, this sample being at reduced scale. To order reprints of air photos from an index map quote roll number and photo numbers. For example, to cover Coquitlam Lake photos B.C. 1632:95–99 inclusive would be required for stereoscopic viewing, with the necessary 60% overlap. If photos are not required for stereoscopic use, alternate photographs, e.g., B.C. 1632:95, 97, 99 will provide cover of Coquitlam Lake. Where an area has been photographed more than once there may be more than one air photo index.



INDEX 17

BASIC
TRI CAMERA AIR PHOTO COVER

Basic tri camera photos are indexed on one inch to 16 mile maps. Each of these maps is shown on this index with a number.

Prints of these index maps are available on request at 30 cents per copy, plus 5 per cent social services tax.

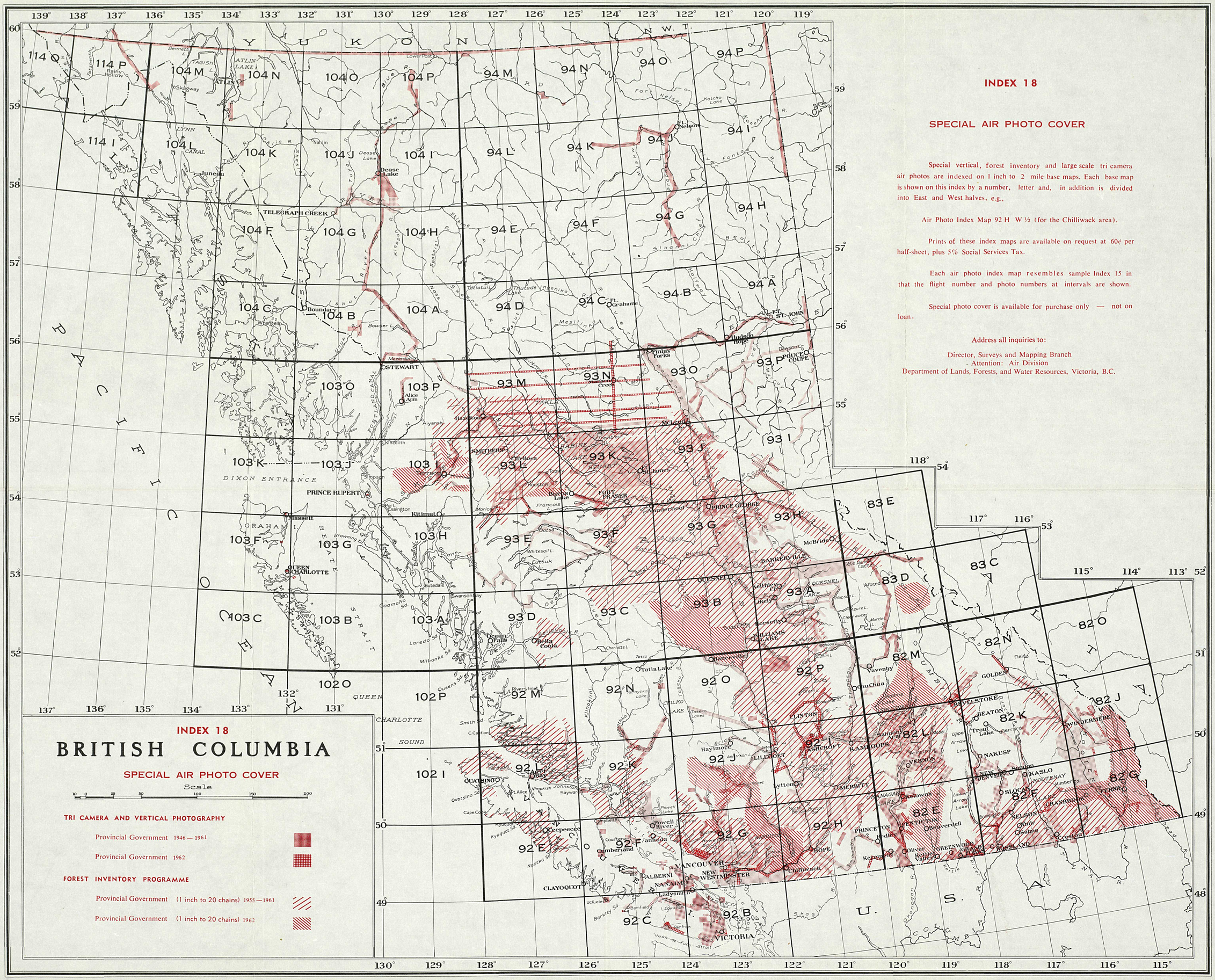
When ordering copies of indexes of tri camera photos, it is necessary to specify that it is an air photo index that is required, thus:—

Air Photo Index Map 93.

Each air photo index map resembles sample Index 15 shown on this page, in that the flight number and photo numbers at intervals are shown.

SMALL SCALE VERTICAL

Further information regarding small-scale Canadian Government air photos may be obtained by writing directly to:—
National Air Photo Library
Department of Mines & Technical Surveys, Ottawa.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Provincial Government 1962
FOREST INVENTORY PROGRAMME
Provincial Government (1 inch to 20 chains) 1955 — 1961
Provincial Government (1 inch to 20 chains) 1962
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N.W.T.
PACIFIC OCEAN
DIXON ENTRANCE
HECATE STRAIT
QUEEN CHARLOTTE SOUND
U.S.A.
TELEGRAPH CREEK
STEWART
PRINCE RUPERT
QUEEN CHARLOTTE
SMITHERS
PRINCE GEORGE
FORT FRASER
BARKERVILLE
QUESNEL
WILLIAMS LAKE
PRINCE RUPERT
KITIMAT
VANCOUVER
NEW WESTMINSTER
VICTORIA
NANAIMO
PALBERNI
CLAYOQUOT
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LILLOOET
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ASHCROFT
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MERRITT
PENTICTON
PRINCETON
HOPE
KELOWNA
VERNON
REVELSTOKE
GOLDEN
NELSON
TRAIL
CRANBROOK
KASLO
NAKUSP
NEW DENVER
SILOCAM
ROSSLAND
GREENWOOD
GRAND FORKS
BEAVERDELL
OLIVER
KEREMEOS
CHILLIWACK
MCBRIDE
MCLEOD
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TAGISH
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INDEX 18
SPECIAL AIR PHOTO COVER
Special vertical, forest inventory and large scale tri camera air photos are indexed on 1 inch to 2 mile base maps. Each base map is shown on this index by a number, letter and, in addition is divided into East and West halves, e.g.,
Air Photo Index Map 92 H W ½ (for the Chilliwack area).
Prints of these index maps are available on request at 60¢ per half-sheet, plus 5% Social Services Tax.
Each air photo index map resembles sample Index 15 in that the flight number and photo numbers at intervals are shown.
Special photo cover is available for purchase only — not on loan.
Address all inquiries to:
Director, Surveys and Mapping Branch
- Attention: Air Division
Department of Lands, Forests, and Water Resources, Victoria, B.C.