PROVINCE OF BRITISH COLUMBIA

DEPARTMENT OF LANDS AND FORESTS

HON. E. T. KENNEY, *Minister* C. D. ORCHARD, *Deputy Minister of Forests*

REPORT

of

THE FOREST SERVICE

YEAR ENDED DECEMBER 31ST

1948

VICTORIA, B.C.:
Printed by DON MCDIARMID, Printer to the King's Most Excellent Majesty.
1949.

The visibility mapper.

VICTORIA, B.C., March 18th, 1949.

To His Honour COLONEL C. A. BANKS, C.M.G.,
Lieutenant-Governor of the Province of British Columbia.

MAY IT PLEASE YOUR HONOUR:

Herewith I beg respectfully to submit the Annual Report of the Forest Service of the Department of Lands and Forests for the calendar year 1948.

E. T. KENNEY,
Minister of Lands and Forests.

The Honourable E. T. Kenney,
Minister of Lands and Forests, Victoria, B.C.

SIR,—There is submitted herewith the Annual Report on activities of the Forest Service during the calendar year 1948.

C. D. ORCHARD,
Deputy Minister and Chief Forester.

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REPORT OF THE FOREST SERVICE.

The volume of work entailed in carrying on the diversified activities of the Forest Service continued at a high level during 1948. Although there was some improvement in available technical and non-technical personnel, supplies, and automotive and other equipment, conditions are still difficult and the work is thereby hampered. In addition, high wage-rates and costs of materials and equipment make operating expenses proportionately higher for the results achieved.

In addition to minor amendments to the "Forest Act" at the 1948 session of the Legislature, provision was made in the Act for the establishment of farm wood-lots in conjunction with bona-fide farmsteads. This legislation permits the extension to small holdings of the principle of sustained-yield management of forest land and provides the means whereby farm-owners may supplement their cash income from a forest crop.

At the same session an increase in moneys allotted to the Forest Protection Fund over that of the previous year, amounting to $250,000, was made.

Increases in technical staff permitted the Economics Division to extend its survey and investigative work. Four forest-survey parties were maintained during the summer, two working from vessels along the coast and two using truck transportation. Surveys were completed on 3,593,428 acres. Studies in mensuration, growth and yield, damage resulting from logging in the Interior, seed production, thinning and pruning of Douglas fir and red alder, rodent-control in direct seeding, and soil and site classification were carried out.

The Reforestation Division was seriously hampered in its spring programme by late spring frosts and cold, wet weather on the nursery and planting sites, but achieved its objective of 10,000,000 seedlings planted and seed-beds sown for 10,000,000 seedlings for the 1950 planting season. Labour-supply was improved. Experiments in hemlock-seed planting were instituted, and a site selected for a nursery in the yellow-pine region of the Southern Interior.

Early indications of a good seed-year for Douglas fir failed to materialize due to faulty pollination.

Following completion of spring planting, snag-falling was commenced on projected planting-sites, 151,937 snags on 16,843 acres being removed. Unfavourable weather hampered the road-building programme. Conversely, the above-normal precipitation favoured establishment of the new plantations and survival checks indicate a better-than-average percentage.

During the year the Parks Section of the Economics Division was segregated and created as a separate Division of Parks and Recreation. This change in administrative set-up formally recognizes the increasing public interest in the superb recreational areas in the Province and acknowledges the magnitude of the task of developing the potentialities of those areas to meet the needs of our growing population and tourist traffic.

Values of forest production reached a record figure of $363,786,000, as compared with $282,288,388 in 1947. All four major products—lumber, pulp and paper, shingles, and plywood—showed increases. The average stumpage price, including royalty, was $4.36 per thousand, the same as during the last six months of the preceding year.

Total cut during the year was 4,293,465 M—an all-time record. Douglas fir was the leading species cut, with a total of 1,671,863 M feet, followed by hemlock, 874,515 M, and cedar 804,478 M. The number of timber sales made was 2,612—only 15 short of the 1946 record.

The number of operating sawmills increased during the year from 1,634 to 1,671, but the 68 operating shingle-mills was 5 less than in 1947.

Although short periods of high hazard occurred periodically in all forest districts, the year was, generally, one of the most favourable ever experienced. The total of 799 fires recorded was the lowest since 1913 and represents only 51 per cent. of the past ten-year average. Lightning was, once again, the agency responsible for the greatest number of fires. Fires due to campers and smokers were in the usual ratio, but there was a marked reduction in the percentage caused by railroad operations. The Forest Service expended $36,050 on fire suppression and other agencies $80,872. The total area burned was 384,356 acres, which represents an increase over the ten-year average, but the high figure is accounted for by the inclusion of 371,501 acres of non-commercial cover and non-productive site in the Peace River area. Total damage has been estimated at $287,192.

Panoramic lookout photography was suspended due to lack of trained personnel, but fire-weather investigations and other research projects were maintained. Thirteen suppression crews were in operation. Aircraft patrol and transport was continued under charter contract.

A " drop-on " tanker unit was designed, constructed, and placed in the field; thirty-five initial-action suppression pumps were manufactured at the Marine Station, and the usual diversified work of that unit maintained at a high level. The radio network of the Service was expanded by establishing a number of new stations. There was a large increase in the number of messages handled. Two new remote-control stations were put into operation.

It is evident that spring slash-burning is finding increasing favour with the industry. A total of 3,026 acres was burned over during the spring of 1948.

In British Columbia all basic research in forest entomology and forest pathology is conducted by the Dominion Government. The assistance and unfailing co-operation of the two Dominion services charged with the study of these problems in this Province are herein recognized and acknowledged.

Through the courtesy and co-operation of the Victoria offices of Forest Insect Investigations and Forest Pathology Investigations, Science Service, Dominion Department of Agriculture, it is possible to include reports on the situation in British Columbia with respect to forest insect pests and fungous diseases. Of particular interest during the year was the helicopter-spraying of an area in the East Kootenays to control false hemlock looper in Christmas-tree stands. This is the first instance in Canada of controlling a forest insect by spraying from a helicopter.

During the year construction was commenced, and almost completed, of a new Ranger School building on the Green Timbers Forest Station. New dormitory and living-quarters were designed and a contract for their construction was signed. They will be ready for occupancy early in 1949. A third class of twenty students completed the prescribed course of study and a special ten-day course was given for the training of lookout-men.

The adverse weather conditions in some areas curtailed hay production, and a reduction in stock in those areas may be anticipated. However, the range crop was excellent, and prices to the stockmen reached new records. Grasshopper damage was less than usual. On one range a serious outbreak of blackleg occurred, necessitating a radical change in range management to facilitate vaccination.

The programme of range reconnaissance was stepped up, and a total of 1,017,796 acres covered by intensive surveys. Forty Live-stock Associations are now operating in the Province. The number of grazing permits issued and stock covered attained a record high figure.

Weather conditions curtailed the range-improvement programme and reduced the number of wild horses disposed of, in comparison with previous years.

All these varied activities of the Forest Service are treated in detail in the following pages.

FOREST ECONOMICS.

FOREST SURVEYS.

In the general field of map-making it has been recognized at all times that the Forest Service was not attempting to usurp any of the functions of the Surveys Branch of the Department of Lands, which is charged with the responsibility of producing the official maps for the Province. The forest-survey maps are designed to show the forest-cover but, at the same time, the boundaries of the various types must be related to established surveys. For this reason, the first step in preparing a forest-survey map is to obtain from the Surveyor-General the best base-map information available. By reason of lack of adequately trained personnel it was not feasible for the Surveys Branch to prepare all of the base maps required; consequently it was necessary for the Forest Service to participate in these activities. Commencing in July of this year the Surveys Branch assumed responsibility for supplying all the base maps for the forest-survey programme, and our future map-making work will deal solely with delineation of forest types and their description. This change necessitated transfer of certain personnel from this Division to the Surveys Branch.

Four forest-survey parties were maintained throughout the field season, two of which worked from launches and two used light trucks for transportation. Surveys were completed on 3,593,428 acres, distributed by project as follows:—

	Acres.
Completion of Esquimalt and Nanaimo Railway Belt survey	412,800
Completion of Smith Inlet survey	108,000
Kyuquot survey	473,360
Upper Fraser survey	800,000
Kitimat-Douglas Channel survey	1,580,000
Princeton survey	219,268

The final maps, estimates, and reports for these surveys are being compiled and will be available in due course. The Kyuquot survey having been completed, the West Coast of Vancouver Island has been covered in full in recent years and, with the revision surveys of the Sayward Forest and the Esquimalt and Nanaimo Railway Belt at hand, it will be possible to issue a revised inventory of the forest resources of Vancouver Island in about one year's time.

REVISED INVENTORY OF SAYWARD PROVINCIAL FOREST.

The new estimate and forest-cover maps for the Sayward Provincial Forest and the White River Valley have been completed and will be made available on request. The total volume of merchantable timber as of December 31st, 1947, is estimated to be 6,869,450 M F.B.M., of which 36.9 per cent. is alienated by way of Crown grants, timber licences, or timber leases and 63.1 per cent. is vacant Crown timber. All volumes are considered accessible. The details of timber volumes (over 11 inches D.B.H.) are as follows:—

Species.	Crown-granted.	Timber Leases and Licences.	Vacant Crown Land.	Totals (Thousands of Board-feet).
Douglas fir	50,130	634,650	425,790	1,110,570
Western red cedar	8,150	645,780	689,440	1,343,370
Western hemlock	27,780	660,190	1,745,980	2,433,950
Sitka spruce	7,560	1,720	5,000	14,280
Balsam (white fir)	9,050	454,480	1,242,980	1,706,510
Yellow cedar	40	24,420	192,260	216,720
Western white pine	370	18,470	22,940	41,780
Alder	140	50	1,130	1,320
Broad-leaf maple	30	10	910	950
Totals	103,250	2,439,770	4,326,430	6,869,450

The classification of areas is as follows:—

	Acres.	Acres.
Productive forest land:		
Mature timber:		
Accessible	203,890	
Inaccessible	*Nil*	
Total		203,890
Immature timber:		
1– 5 years	25,840	
6– 10 „	29,630	
11– 20 „	24,530	
21– 40 „	22,030	
41– 60 „	3,330	
61– 80 „	720	
81–100 „	570	
Total		106,650
Not satisfactorily stocked:		
Logged	9,480	
Logged and burned	47,730	
Burned	300	
Deciduous	10,880	
Coniferous	6,550	
Total		74,940
Total sites of productive quality		385,480
Non-productive and non-forest land:		
Cultivated and villages	2,280	
Barren, scrub, and alpine	106,530	
Swamp and water	23,690	
Total non-productive sites		132,500
Total area		517,980

The previous survey of the Sayward Forest reported conditions as at the end of 1928 and estimated the stand of merchantable timber as being 274,900 acres carrying 12,207,020 M F.B.M. The revised inventory as at the end of 1947 indicates a reduction of forest capital in the Sayward Forest of 6,387,500 M board-feet in nineteen years. The average annual cut during the period 1935 to 1945 was 262,000,000 feet per year. However, for the period 1943 to 1947, inclusive, the average annual cut has fallen off to 132,000,000 board-feet per year, of which 105,000,000 was from alienated lands and 27,000,000 was cut from timber sales on Crown lands.

In 1928 it was recognized that the Sayward Forest was being heavily overcut, and the new inventory clearly demonstrates the serious situation that can develop as a result of harvesting more than the land can produce. In a period of nineteen years the forest capital of this highly productive region has been reduced by 52 per cent. The impact of this excessive drain on capital is emphasized if it is assumed that the average annual cut from alienated lands will continue to be 105,000,000 feet a year, in which case the operations on such lands will be cut out in eighteen years. After that time the entire drain must come from Crown lands.

At the conclusion of the 1928 survey it was estimated that the allowable cut from the Sayward Forest could have been 147,000,000 feet per year on a continuous-production basis. The excessive cut over the intervening years has seriously reduced the allowable cut so that, as of 1948, the allowable cut cannot be more than 106,000,000 board-feet. Present consumption, therefore, exceeds productive capacity by about 20 per cent. This situation is common to all of the forests in the Lower Coastal Region, but it is particularly noticeable when new inventory figures are available. The problem of overcutting was pointed out twenty years ago, and the longer the delay in adjustment, the more serious are the obstacles to reaching an equilibrium between rate of harvest and productive capacity.

PROVINCIAL FORESTS.

During 1948 there were thirteen minor adjustments of the boundaries of Provincial forest reserves. Eleven of these were eliminations involving 766.7 acres, required largely for commercial and industrial development. The remaining adjustments involved the addition of 356.5 acres of forest land, thereby reducing the net loss in acreage of Provincial forests to 410.2 acres. In addition, one new forest reserve was created in the Interior—namely, the Slocan Forest—which is 1,200 square miles in area. The system of Provincial forest reserves now consists of fifty-four forests, comprising an area of 32,334 square miles. The summary of the forests to date is as follows:—

Class of Forest.	Coast Region.		Interior Region.		Total.	
	Number.	Area.	Number.	Area.	Number.	Area.
		Sq. Mi.		Sq. Mi.		Sq. Mi.
Productive	20	11,658	27	20,411	47	32,069
Scenic	....	.....	2	233	2	233
Research	4	4	1	28	5	32
Totals	24	11,662	30	20,672	54	32,334

FOREST RESEARCH.

Mensuration.

The programme of re-examination of permanent growth-study plots was maintained with the remeasurement of 37 standard plots and 160 line plots. An additional 5 standard plots and 92 line plots were established in the North Coast types and 48 line plots in the Upper Fraser.

Volume Tables.

During the year new volume tables based on cubic feet were prepared and are presented herewith, as follows:—

Site-class Volume Table, Douglas Fir.
Site-class Volume Table, Western Hemlock.
Site-class Volume Table, Western Red Cedar.
Site-class Volume Table, Coast Balsam.
Site-class Volume Table, Sitka Spruce.

PRELIMINARY SITE-CLASS TABLE—MATURE DOUGLAS FIR (*PSEUDOTSUGA TAXIFOLIA*).

(Gross merchantable cubic feet.)

D.B.H.	Site Index.											
	60.		80.		100.		120.		140.		160.	
	Total Height.	Volume.	Total Height.	Volume.	Total Height.	Volume.	Total Height.	Volume.	Total Height.	Volume.	Total Height.	Volume.
8		3		4		5		6		7		8
10		8		10		12		14		16		18
12		16		19		22		25		27		30
14		25		29		33		38		41		45
16		34		40		46		52		58		64
18		45		52		61		70		78		86
20		57		66		78		90		100		100
22		69		82		97		110		130		140
24	87	82		100		120		140		160		170
26	88	96	110	120		140		160		190		210
28	89	110	112	140		160		190		220		250
30	90	125	114	160	139	190		230		260		290
32	90	140	115	180	141	220	167	260	193	300		340
34	90	160	115	200	142	250	170	300	197	340		390
36	90	170	116	230	143	280	172	330	200	390		440
38			116	250	143	300	173	370	203	430	233	500
40			116	280	144	330	174	400	205	470	236	550
42			116	300	144	360	174	440	206	520	239	600
44					144	390	174	480	206	560	240	650
46					144	420	174	520	206	610	241	720
48					144	460	174	560	206	660	241	780
50					144	490	174	600	206	710	241	840
52					144	520	174	640	206	760	241	900
54					144	560	174	680	206	820	241	970
56					144	590	174	730	206	870	241	1,030
58					144	630	174	780	206	930	241	1,100
60					144	660	174	830	206	990	241	1,170
62							174	880	206	1,050	241	1,250
64							174	930	206	1,120	241	1,320
66							174	970	206	1,170	241	1,400
68							174	1,020	206	1,220	241	1,470
70							174	1,170	206	1,370	241	1,550

Gross volume merchantable cubic feet. No allowance for breakage and decay. Base site on dominant trees in stand.

NET MERCHANTABLE CUBIC-FOOT VOLUME TABLE—MATURE WESTERN HEMLOCK (*TSUGA HETEROPHYLLA*).

(By site classes.)

D.B.H. O.B.	Site Index. 60. Average Maximum Height or Height of Dominant Trees. 80. Total Height.	Gross Merch. Volume.	Cull.	Net Merch. Volume.	Site Index. 80. Average Maximum Height or Height of Dominant Trees. 110. Total Height.	Gross Merch. Volume.	Cull.	Net Merch. Volume.	Site Index. 100. Average Maximum Height or Height of Dominant Trees. 140. Total Height.	Gross Merch. Volume.	Cull.	Net Merch. Volume.	Site Index. 120. Average Maximum Height or Height of Dominant Trees. 175. Total Height.	Gross Merch. Volume.	Cull.	Net Merch. Volume.	Site Index. 140. Average Maximum Height or Height of Dominant Trees. 210. Total Height.	Gross Merch. Volume.	Cull.	Net Merch. Volume.	Stump Height.	Top D.I.B.
In.	Ft.	Cu. Ft.	Per Cent.	Cu. Ft.	Ft.	Cu. Ft.	Per Cent.	Cu. Ft.	Ft.	Cu. Ft.	Per Cent.	Cu. Ft.	Ft.	Cu. Ft.	Per Cent.	Cu. Ft.	Ft.	Cu. Ft.	Per Cent.	Cu. Ft.	Ft.	In.
8	49	4.6	7.5	4.2	57	5.4	7.5	5.0	60	5.7	7.5	5.3	62	5.9	7.5	5.4	60	5.7	7.5	5.3	1.0	6.0
10	57	10.7	10.2	9.6	67	12.7	9.2	11.5	72	13.7	8.8	12.5	74	14.1	8.6	12.9	72	13.7	8.6	12.5	1.0	6.0
12	64	18.6	12.8	16.2	77	22.5	10.9	20.0	83	24.3	10.1	21.8	85	25.0	9.7	22.6	83	24.3	9.7	21.9	1.2	6.3
14	70	28.4	15.3	24.0	85	34.8	12.6	30.4	93	38.2	11.3	33.9	96	39.5	10.8	35.2	95	39.0	10.8	34.8	1.4	6.6
16	74	39.4	17.9	32.3	92	49.4	14.3	42.4	102	55.1	12.6	48.2	107	57.9	11.9	51.0	106	57.4	11.9	50.6	1.4	6.9
18	77	51.7	20.6	41.0	98	66.6	16.0	55.9	110	75.0	13.8	64.7	117	79.9	13.0	69.5	116	79.2	13.2	69.0	1.6	7.2
20	79	64.4	24.2	48.8	103	85.3	17.6	70.2	117	97.5	15.0	82.9	126	105.0	14.1	90.2	126	105.0	14.1	90.2	1.8	7.5
22	80	77.5	29.5	54.7	106	104.0	19.2	84.0	123	122.0	16.3	102.0	134	133.0	15.2	113.0	135	134.0	15.2	114.0	2.0	7.8
24	80	90.1	37.0	56.7	108	124.0	21.2	97.8	128	148.0	17.5	122.0	141	164.0	16.3	137.0	143	167.0	16.3	140.0	2.2	8.1
26	80	103.0	46.5	55.1	109	144.0	23.4	110.0	133	177.0	18.7	144.0	148	197.0	17.5	162.0	151	201.0	17.5	166.0	2.2	8.4
28	80	117.0	57.5	49.7	110	164.0	26.4	121.0	136	206.0	19.9	165.0	154	234.0	18.6	190.0	159	242.0	18.6	197.0	2.4	8.7
30	80	130.0	70.0	39.0	110	184.0	30.0	129.0	138	235.0	21.4	185.0	159	272.0	19.7	218.0	166	285.0	19.7	228.0	2.6	9.0
32					110	205.0	34.6	134.0	139	264.0	23.0	203.0	163	311.0	21.0	246.0	173	331.0	21.0	261.0	2.8	9.3
34					110	226.0	40.3	135.0	140	293.0	25.0	220.0	167	353.0	22.3	274.0	180	381.0	22.3	296.0	3.0	9.6
36					110	248.0	46.8	132.0	140	321.0	27.6	232.0	170	395.0	23.8	301.0	185	431.0	23.8	328.0	3.0	9.9
38					110	269.0	53.6	125.0	140	348.0	30.6	242.0	172	434.0	25.8	322.0	190	481.0	25.8	357.0	3.2	10.2
40					110	289.0	61.2	112.0	140	375.0	34.0	247.0	174	474.0	28.0	342.0	194	531.0	28.0	382.0	3.4	10.5
42					110	312.0	70.0	93.5	140	403.0	38.0	250.0	175	515.0	31.0	355.0	198	588.0	31.0	405.0	3.4	10.8
44									140	432.0	42.4	249.0	175	550.0	34.0	363.0	201	635.0	34.0	419.0	3.6	11.1
46									140	460.0	47.2	243.0	175	586.0	37.0	369.0	204	690.0	37.0	435.0	3.8	11.4
48									140	488.0	52.1	234.0	175	622.0	41.0	367.0	206	740.0	41.0	436.0	3.8	11.7
50									140	516.0	57.7	219.0	175	656.0	45.0	361.0	208	789.0	45.0	434.0	4.0	12.0
52									140	543.0	63.5	198.0	175	692.0	49.5	349.0	209	836.0	49.5	422.0	4.2	12.3
54									140	570.0	70.0	171.0	175	727.0	54.2	333.0	209	882.0	54.2	404.0	4.2	12.6
56													175	760.0	59.0	312.0	210	928.0	59.0	380.0	4.4	12.9
58													175	795.0	64.0	286.0	210	970.0	64.0	349.0	4.6	13.2
60													175	830.0	70.0	249.0	210	1010.0	70.0	303.0	4.6	13.5

Tables based on site index determined by average height of dominant and codominant trees at age 100 years. Equivalent average maximum height of the stand at maturity is shown. Total height obtained from parabolic D.B.H.-height curves for each site. Gross merchantable volume read from Table III, British Columbia Forest Service volume tables for western hemlock, Coast region, 1931. Cull per cent. for site index 120 supplied by Dominion Pathology Service, 1948. Cull includes decay and falling breakage, but does not include yarding or subsequent breakage. In cruising, tally all living trees regardless of defect and apply net tables to obtain merchantable cubic-foot volume. Average cull, 25 per cent.

PRELIMINARY SITE-CLASS TABLE—MATURE WESTERN RED CEDAR (*THUJA PLICATA*).

(Gross merchantable cubic-foot volume.)

D.B.H.	Site Class. VI. Total Height.	VI. Volume.	V. Total Height.	V. Volume.	IV. Total Height.	IV. Volume.	III. Total Height.	III. Volume.	II. Total Height.	II. Volume.	I. Total Height.	I. Volume.	Top D.I.B. (In.).	Stump Height (Ft.).
10	28	5	38	7	47	9	55	11	64	13	72	14	6.0	2.1
12	31	9	43	12	54	15	64	18	74	21	83	23	6.3	2.2
14	35	13	48	18	60	23	72	27	84	32	94	35	6.6	2.3
16	38	19	53	26	67	33	80	39	93	46	105	51	6.9	2.4
18	40	26	57	36	73	45	87	54	101	61	115	69	7.2	2.6
20	43	34	61	47	78	59	94	70	109	80	124	90	7.5	2.8
22	45	42	65	59	83	74	100	87	117	100	133	113	7.8	3.0
24	47	51	68	72	88	90	106	108	124	124	142	140	8.1	3.1
26	48	61	71	86	92	110	112	130	131	150	150	170	8.4	3.3
28	49	71	73	100	95	130	117	155	137	180	157	200	8.7	3.4
30	50	82	75	115	98	150	121	180	143	210	164	235	9.0	3.6
32			77	130	101	170	125	210	148	240	170	275	9.3	3.8
34			78	150	104	200	129	240	152	280	175	320	9.6	3.9
36			79	170	106	220	132	270	156	320	180	365	9.9	4.1
38			80	190	107	245	134	305	160	360	185	420	10.2	4.2
40			80	210	108	275	136	340	163	410	189	470	10.5	4.4
42			80	230	109	305	138	385	165	460	192	530	10.8	4.6
44			80	250	109	335	139	425	167	510	195	590	11.1	4.7
46			80	270	110	365	140	465	168	560	197	650	11.4	4.9
48			80	295	110	400	140	505	169	610	198	710	11.7	5.0
50			80	315	110	435	140	550	170	660	199	770	12.0	5.2
52					110	465	140	590	170	710	200	830	12.3	5.4
54					110	500	140	630	170	770	200	890	12.6	5.5
56					110	540	140	680	170	820	200	950	12.9	5.7
58					110	580	140	730	170	880	200	1,020	13.2	5.8
60					110	620	140	780	170	930	200	1,090	13.5	6.0
62					110	660	140	830	170	990	200	1,160	13.8	6.2
64					110	700	140	880	170	1,060	200	1,230	14.1	6.3
66					110	740	140	930	170	1,120	200	1,300	14.4	6.5
68					110	780	140	980	170	1,180	200	1,380	14.7	6.7
70					110	830	140	1,040	170	1,250	200	1,460	15.0	6.8
72							140	1,100	170	1,320	200	1,530	15.3	7.0
74							140	1,160	170	1,390	200	1,610	15.6	7.1
76							140	1,220	170	1,460	200	1,690	15.9	7.3
78							140	1,280	170	1,530	200	1,780	16.2	7.5
80							140	1,340	170	1,600	200	1,870	16.5	7.6
90							140	1,670	170	2,000	200	2,330	18.0	8.4
100							140	2,050	170	2,440	200	2,850	19.5	9.2

Gross table—no allowance for defect or breakage. Base site on dominant trees in stand.

(By site classes.)

D.B.H. O.B.	Site Index. 60. Average Maximum Height or Height of Dominant Trees. 80. Total Height.	Gross Merch. Volume.	Cull.	Net Merch. Volume.	80. 110. Total Height.	Gross Merch. Volume.	Cull.	Net Merch. Volume.	100. 140. Total Height.	Gross Merch. Volume.	Cull.	Net Merch. Volume.	120. 170. Total Height.	Gross Merch. Volume.	Cull.	Net Merch. Volume.	140. 200. Total Height.	Gross Merch. Volume.	Cull.	Net Merch. Volume.	Stump Height.	Top D.I.B.
In.	Ft.	Cu. Ft.	Per Cent.	Cu. Ft.	Ft.	Cu. Ft.	Per Cent.	Cu. Ft.	Ft.	Cu. Ft.	Per Cent.	Cu. Ft.	Ft.	Cu. Ft.	Per Cent.	Cu. Ft.	Ft.	Cu. Ft.	Per Cent.	Cu. Ft.	Ft.	In.
10	66	10.2	14.3	8.8	74	12.2	14.3	10.4	74	12.2	14.3	10.4	70	11.0	14.3	9.4	62	9.4	14.3	8.1	1.0	6.0
12	72	20.8	10.4	18.6	82	24.6	14.3	21.1	84	25.2	14.3	21.6	80	24.0	14.3	20.6	73	21.2	14.3	18.2	1.2	6.3
14	76	33.0	7.3	30.6	91	39.5	12.1	34.7	93	40.5	14.3	34.7	91	39.5	14.3	33.8	83	36.2	14.3	31.0	1.4	6.6
16	79	45.4	8.8	41.4	97	56.2	9.1	51.1	102	59.0	12.6	51.5	100	58.0	14.2	49.8	92	53.2	14.3	45.6	1.4	6.9
18	80	58.0	14.9	49.4	103	73.8	7.4	68.3	111	78.6	10.0	70.7	109	77.4	13.0	67.3	101	72.6	13.3	63.0	1.6	7.2
20	80	71.0	26.9	51.9	107	92.6	7.4	85.8	119	101.0	8.2	93.0	118	101.0	10.8	90.0	110	95.0	11.3	84.3	1.8	7.5
22	80	83.0	47.0	44.0	109	110.0	8.8	100.0	124	124.0	7.3	115.0	125	124.0	9.3	112.0	118	118.0	9.7	106.0	2.0	7.8
24	80	96.0	70.0	28.8	110	128.0	11.6	113.0	129	148.0	7.2	137.0	133	152.0	8.1	140.0	126	145.0	8.5	132.0	2.2	8.1
26					110	147.0	16.3	123.0	133	175.0	8.0	161.0	139	182.0	7.4	168.0	133	175.0	7.6	162.0	2.2	8.4
28					110	166.0	22.7	128.0	136	204.0	9.5	184.0	145	218.0	7.2	202.0	140	210.0	7.2	195.0	2.4	8.7
30					110	187.0	31.5	128.0	139	233.0	11.8	206.0	151	252.0	7.5	233.0	148	247.0	7.3	229.0	2.6	9.0
32					110	210.0	43.7	118.0	140	265.0	15.0	225.0	155	288.0	8.3	264.0	154	286.0	7.8	264.0	2.8	9.3
34					110	230.0	57.0	99.0	140	290.0	19.6	233.0	159	328.0	9.4	297.0	160	330.0	8.8	301.0	3.0	9.6
36					110	255.0	70.0	76.5	140	315.0	25.5	235.0	163	368.0	11.0	327.0	166	375.0	10.0	337.0	3.0	9.9
38									140	345.0	32.3	234.0	166	410.0	13.1	356.0	171	422.0	11.8	372.0	3.2	10.2
40									140	380.0	40.9	224.0	168	450.0	16.0	378.0	175	468.0	14.0	402.0	3.4	10.5
42									140	415.0	50.5	206.0	169	492.0	19.4	397.0	179	522.0	17.0	433.0	3.4	10.8
44									140	450.0	60.2	179.0	170	540.0	23.5	435.0	183	579.0	20.2	462.0	3.6	11.1
46									140	490.0	70.0	147.0	170	590.0	28.2	423.0	186	638.0	24.4	482.0	3.8	11.4
48													170	630.0	34.0	416.0	189	697.0	29.2	494.0	3.8	11.7
50													170	680.0	40.5	405.0	192	768.0	35.0	500.0	4.0	12.0
52													170	740.0	48.0	385.0	195	840.0	41.0	495.0	4.2	12.3
54													170	790.0	55.5	352.0	197	908.0	48.5	468.0	4.2	12.6
56													170	840.0	63.0	311.0	198	972.0	56.6	422.0	4.4	12.9
58													170	900.0	70.0	270.0	199	1,045.0	63.0	387.0	4.6	13.2
60																	200	1,110.0	70.0	333.0	4.6	13.5

Tables based on site index determined by average height of dominant and codominant trees at age 100 years. Equivalent average maximum height of the stand at maturity is shown. Total height obtained from parabolic D.B.H.-height curves for each site. Gross merchantable volume read from unpublished British Columbia Forest Service table compiled in 1948 from data previously collected in the Coast region. Cull per cent. for site index 100 supplied by Dominion Pathology Service, 1948. Cull includes decay and falling breakage, but does not include yarding or subsequent breakage. In cruising, tally all living trees regardless of defect and apply net tables to obtain merchantable cubic-foot volume. Average cull, 20 per cent.

PRELIMINARY NET MERCHANTABLE CUBIC-FOOT VOLUME TABLE—MATURE SITKA SPRUCE (*PICEA SITCHENSIS*).

(By site classes.)

D.B.H. O.B.	Site Index. 80. Average Maximum Height or Height of Dominant Trees. 110. Total Height.	Gross Merch. Volume.	Cull.	Net Merch. Vol.	Site Index. 100. Average Maximum Height or Height of Dominant Trees. 145. Total Height.	Gross Merch. Volume.	Cull.	Net Merch. Vol.	Site Index. 120. Average Maximum Height or Height of Dominant Trees. 185. Total Height.	Gross Merch. Volume.	Cull.	Net Merch. Volume.	Site Index. 140. Average Maximum Height or Height of Dominant Trees. 225. Total Height.	Gross Merch. Volume.	Cull.	Net Merch. Volume.	Stump Height.	Top D.I.B.
In.	Ft.	Cu. Ft.	Per Cent.	Cu. Ft.	Ft.	Cu. Ft.	Per Cent.	Cu. Ft.	Ft.	Cu. Ft.	Per Cent.	Cu. Ft.	Ft.	Cu. Ft.	Per Cent.	Cu. Ft.	Ft.	In.
10	65	10.5		10	66	10.8		11	67	11.0		11	67	11.0		11	2.1	6.0
12	74	20.9		21	76	21.5		22	78	22.2		22	78	22.2		22	2.2	6.3
14	81	31.8		32	85	33.5		34	89	35.2		35	90	35.6		36	2.3	6.6
16	88	44.9	0.5	45	94	48.2		48	98	50.4		50	100	51.5		52	2.4	6.9
18	94	60.0	3.0	58	102	65.6		66	107	69.0		69	110	71.1		71	2.6	7.2
20	100	77.6	5.7	73	110	86.0	1.5	85	116	91.1	0.1	91	119	93.7		94	2.8	7.5
22	103	94.9	7.4	88	116	108.0	3.2	105	123	115.0	1.5	113	128	120.0	0.3	119	3.0	7.8
24	106	115.0	8.4	105	122	132.0	5.2	125	131	143.0	3.0	139	137	150.0	1.5	148	3.1	8.1
26	109	136.0	8.8	124	127	159.0	6.5	149	139	175.0	4.5	167	145	183.0	2.8	178	3.3	8.4
28	110	155.0	9.2	141	132	189.0	7.6	175	146	209.0	5.8	197	153	220.0	4.1	211	3.4	8.7
30	110	174.0	9.8	157	136	219.0	8.3	201	152	245.0	6.9	228	161	261.0	5.3	247	3.6	9.0
32	110	193.0	10.9	172	139	249.0	8.6	228	158	285.0	7.8	263	167	302.0	6.3	283	3.8	9.3
34	110	212.0	13.0	185	141	279.0	8.8	255	163	325.0	8.3	298	174	349.0	7.2	324	3.9	9.6
36	110	234.0	14.7	200	143	312.0	9.2	284	168	372.0	8.5	340	181	402.0	7.8	371	4.1	9.9
38	110	257.0	16.1	216	144	346.0	9.5	313	172	420.0	8.7	384	187	459.0	8.3	421	4.2	10.2
40	110	280.0	17.7	230	145	381.0	9.9	343	175	468.0	9.0	426	192	516.0	8.5	472	4.4	10.5
42	110	303.0	20.0	242	145	415.0	10.7	370	178	519.0	9.3	471	198	584.0	8.7	533	4.6	10.8
44	110	326.0	23.8	248	145	450.0	12.0	396	181	573.0	9.6	518	202	647.0	8.9	590	4.7	11.1
46					145	485.0	13.6	419	183	627.0	9.9	565	206	711.0	9.1	646	4.9	11.4
48					145	525.0	14.6	448	184	681.0	10.5	610	210	785.0	9.4	712	5.0	11.7
50					145	565.0	15.4	478	185	737.0	11.5	653	213	859.0	9.6	776	5.2	12.0
52					145	602.0	16.5	503	185	785.0	12.8	685	216	932.0	9.9	840	5.4	12.3
54					145	643.0	17.7	529	185	837.0	14.0	720	218	1,001.0	10.4	898	5.5	12.6
56					145	685.0	19.0	555	185	893.0	14.6	763	220	1,080.0	11.2	960	5.7	12.9
58					145	727.0	21.1	574	185	952.0	15.4	806	222	1,160.0	12.3	1,018	5.8	13.2
60									185	1,015.0	16.3	850	223	1,238.0	13.4	1,072	6.0	13.5
62									185	1,075.0	17.3	889	224	1,324.0	14.2	1,137	6.2	13.8
64									185	1,145.0	18.3	936	225	1,415.0	14.8	1,206	6.3	14.1
66									185	1,215.0	19.6	977	225	1,495.0	15.4	1,266	6.5	14.4
68									185	1,285.0	21.5	1,010	225	1,585.0	16.2	1,330	6.7	14.7
70									185	1,360.0	23.8	1,038	225	1,675.0	17.0	1,390	6.8	15.0
72													225	1,765.0	17.8	1,450	7.0	15.3
74													225	1,855.0	18.8	1,506	7.1	15.6
76													225	1,945.0	20.1	1,555	7.3	15.9
78													225	2,035.0	21.8	1,592	7.4	16.2
80													225	2,125.0	23.8	1,620	7.6	16.5

Tables based on site index determined by average height of dominant and codominant trees at age 100 years. Equivalent average maximum height of stand at maturity is shown. Total height obtained from parabolic D.B.H.-height curves for each site. Cull based on data supplied by Dominion Pathology Service. Cull includes decay and falling breakage, but does not include yarding or subsequent breakage. In cruising, tally all living trees regardless of defect and apply net tables to obtain merchantable cubic-foot volume. Average cull, 11 per cent.

A series of age-site class volume tables based on total cubic feet, merchantable cubic feet, and merchantable board-feet, B.C. Rule, was prepared for second-growth Sitka spruce.

Growth Studies.

A complete analysis of the data from permanent plots on the Coast and in the Interior is being continued.

The following data were derived from growth-and-yield permanent plots established 1948.

NORTH COAST.

Plot No.	Plot Type.	Number of Sub-plots.	Age.	Site Index.	Basal Area.	Average D.B.H.	Total Volume.	Mean Annual Increment.
Kitimat Valley—Hemlock-Balsam Types.							Cu. Ft.	
322	Normal	....	56	100	262	4.8	6,655	119
326	Empirical	9	64	110	270	7.7	7,711	120
321	Empirical	9	69	125	320	13.4	14,345	208
327	Empirical	8	77	80	348	6.6	9,682	126
329	Empirical	4	91	55	311	4.9	6,975	77
328	Empirical	16	92	90	323	9.6	13,419	146
331	Normal	....	102	100	380	11.3	15,876	156
324	Empirical	9	113	100	383	12.7	16,218	143
323	Normal	....	138	95	377	14.3	17,171	124
333	Empirical	4	144	85	385	12.5	15,291	106
330	Normal	....	149	95	368	13.8	16,635	112
325	Normal	....	178	95	413	14.5	19,688	111
Kitimat—Cottonwood.								
332	Normal	....	60	.....	187	15.3	7,883	131
Lakelse—Hemlock-Balsam.								
334	Empirical	9	96	74	324	5.7	9,534	99
337	Empirical	9	109	70	276	10.4	8,483	78
Lower Kitsumgallum—Hemlock-Balsam.								
335	Empirical	16	108	70	306	8.2	9,363	87
336	Empirical	2	169	62	178	9.5	5,346	32

Normal plots are single units, 0.4 to 1 acre in area, selected in well-stocked stands. Empirical plots consist of a series of 0.1-acre units systematically distributed through the stands so as to give average conditions. Volumes are based on entire stems inside bark. These plots indicate the high yields of the areas sampled and variation due to habitat toward the Interior.

Upper Fraser—Even-aged Spruce-Balsam Type.

There are considerable areas of even-aged spruce-balsam type in the Upper Fraser drainage.

Here is the pertinent data from three empirical plots established in 1948. All values have been reduced to 1-acre basis.

Plot No.	Plot Type.	Number of Sub-plots.	Age.	Site Index.	Basal Area.	Average D.B.H.	Volume.		Mean Annual Increment.	
							Total.	Merchantable.	Total.	Merchantable.
							Cu. Ft.	Cu. Ft.	Cu. Ft.	Cu. Ft.
356	Empirical	8	100	90	238	9.0	8,612	7,381	86	74
		8	100	75	195	8.0	6,521	5,433	65	54
357	Empirical	11	100	100	225	9.6	8,448	7,421	84	74
		5	100	85	201	8.3	7,313	6,107	73	61
358	Empirical	7	111	100	228	9.8	9,114	8,158	82	74
		9	111	90	213	7.5	7,728	6,822	70	61

The sixteen sub-plots forming each main plot were subdivided into two site-class groups for volume computation. The average mean annual increments for total and merchantable volume are 77 cubic feet and 67 cubic feet respectively. These stands have very little defect.

The following table is based on fifteen standard plots scattered through an uneven-aged stand at Aleza Lake. These plots were established in 1928 and re-examined at five-year intervals to 1948.

	Increment per Acre—Total Cubic Feet.		
	1928–38.	1938–48.	1928–48.
Gross growth	88.0	91.4	89.7
Mortality	119.4	68.7	94.0
Net growth	—31.4	22.7	—4.3

These uneven-aged, overmature stands typical of large areas are not even holding their own in net total volume, and a further loss is due to hidden defect. They occupy land capable of producing 80 cubic feet of wood per acre per year.

One of the standard yield tables for Douglas fir as compiled by the Forest Service in the past does not show the merchantable cubic content of the stands for the diameters 7 inches D.B.H. and up. To assist in converting total cubic volume to merchantable cubic volume in this table, a table of converting factors is presented as follows:—

PRELIMINARY TABLE—DOUGLAS FIR (*PSEUDOTSUGA TAXIFOLIA*).

Average Stand Diameter Trees 1 In. D.B.H.	Per Cent. of Total Volume in Merchantable Trees 7 In. D.B.H.
2.6	0
3	10
4	21
5	33
6	44
7	54
8	63
9	71
10	77
11	81
12	84
13	86
14	88
15	89
16	90

(Based on 52 sample plots.)

This table indicates the large proportion of cubic volume of wood that is unmerchantable in the younger, immature stands. A part of this volume is in stumps and tops, but the larger portion is due to trees which are below merchantable size.

Development of Lodgepole-pine Type in the Northern Interior following Selective Logging for Ties.

A series of nine permanent plots was established in 1926 and re-examined periodically until 1948. On the six plots selectively cut for hewn ties in 1926, horses were used in yarding. The other three plots were not cut over. Increment borings were

made to determine the diameter growth for twenty years prior to logging. The growth after logging was based on diameter-tape measurements. The stands at time of cutting were 90 to 120 years old and growing on site class 70 to 80 based on British Columbia tables.

The economic selective cutting of lodgepole-pine stands for hewn ties removed 20 per cent. of the pine in the 9-inch D.B.H. class, 45 per cent. in the 10-inch class, and 93 per cent. of the trees in the 11- to 14-inch diameter classes. A further 10 per cent. of all species in the residual stand was destroyed in logging.

The average diameter growth of the pine during twenty years before and after logging was 0.84 inch and 0.70 inch respectively. Below 11 inches the residual pine had grown slightly less following logging than they did for a similar period before logging. Another economic cut for ties within thirty-five years depends on tie-sized trees left at time of cutting rather than accelerated growth on the residual stand of trees.

The residual spruce and balsam showed twice the increase in diameter after logging than it did before logging. The average D.B.H. increase during twenty years before logging was 0.85 inch, and for the same period after logging it was 1.68 inches.

A total volume of 1,500 cubic feet of spruce and balsam, all unmerchantable, in the residual stand grew to 4,000 cubic feet in the forty years following logging. A normal stand starting on bare land with immediate full stocking produces a volume of 1,500 cubic feet in forty-eight years and 4,000 cubic feet in sixty-seven years on a comparable site. The normal stand takes only nineteen years to grow from 1,500 to 4,000 cubic feet, compared to forty years for equivalent growth on the residual stand; hence the initial forty-eight-year gain by conserving advance growth is reduced to twenty-seven years by the time the stand volumes are 4,000 cubic feet. However, the residual stand has passed through a stabilization period to complete restocking, and the twenty-seven-year gain in growth should be maintained till the end of the rotation. It is noted that no regeneration period was allowed for the normal stand which would increase the gain and further emphasize importance of conserving advance growth in this type.

Lodgepole pine in these plots did not regenerate after the hewn-tie operation but, where spruce and balsam were of seed-bearing size, these species continued to seed in until the areas were well stocked.

This study indicates that where mature pine occurs in mixture with an understory of spruce and balsam, the pine should be cut to the minimum diameter economically possible so as to remove the mature overstory and create conditions favourable for the growth of the potentially vigorous understory.

Logging Damage in the Spruce-Balsam Type of the Upper Fraser.

The conservation of advance growth is also the key to the perpetuation of the spruce-balsam type in the Upper Fraser. On the average, the residual stands resulting from unregulated cuts of the last thirty years have satisfied the barest minimum requirements for stocking.

Recent trends toward heavier equipment, the use of tractors instead of horses, and the practice of skidding long logs up to full tree lengths indicate that, without regulation, the minimum requirements may not be met in the future. With a view to securing factual information on the problem, a preliminary study was undertaken to estimate the damage to the residual stand caused by heavier equipment and tree-length logging.

Five conditions were studied on areas logged by Companies A, B, and C. Each condition, except C, was sampled by sixteen 0.1-acre plots. All values were reduced to 1-acre totals, spruce and balsam being the only species considered.

COMPARATIVE DAMAGE BY FIVE METHODS OF LOGGING.

Operator.	A.	B.	B.	B.	C.
Length skidded	16′	32′	32′	Tree length	Tree length
Equipment	Horses	D7 and pan	D7 and pan	D7 and pan	D7 without pan
Season	Summer	Summer	Winter	Summer	Summer
Original stand—No. of trees	514	575	430	445	
Utilized—No. of trees	56	39	39	64	
Destroyed—No. of trees	143	256	86	226	
Actual residual—No. of trees	315	280	305	155	
Based on percentage values of sixteen individual plots in each method the mean per cent. destruction is	29.4	44.2	21.0	59.4	90 (estimate)
Standard error of mean per cent	2.0	3.9	3.7	4.7	

The differences between any two pairs of comparable examples are highly significant; that is, they are real differences due to other factors than to sampling. Absolute values are valid only for the operations studied, but the relative differences in damage by the various methods of logging will probably hold for different operators.

The greater destruction caused by heavy tractors skidding long logs up to tree lengths apparently reduces the limited stocks of advance growth in the spruce-balsam type below the minimum requirements for a second cut. It has been shown for other types in North America that measures—including educating woods workers, exercising care in falling and bucking, limiting swamping to a minimum, limiting heavy caterpillar tractors to pre-located skidroads, and using drum winches, long chokers, horses, or light tractors to bunch for heavier skidding equipment—can reduce destruction by 17 per cent. It appears desirable on the basis of the information at hand to restrict summer logging by tree lengths to ground conditions which demand special consideration.

PERMANENT STUDY-PLOTS ESTABLISHED AND IN USE AS AT JANUARY 15TH, 1949.

Description of Project.	Number of Plots. Project.	Group.
Growth and Yield Studies—		
Coast forest types	559	
Southern Interior types	42	
Central Interior types	185	
	—	786
Silvicultural Studies—		
On cut-over land—		
Seed dissemination from standing trees	14	
Survival of seed trees	4	
Artificial seeding	3	
Growth of exotic trees	1	
Competition between broom and Douglas fir	1	
In young stands—		
Thinnings	10	
Prunings	7	
Christmas-tree cuttings	1	
In mature stands—		
Selective cutting	4	
Slash-disposal methods	6	
	—	51
Total number of plots		837

Regional Studies— Natural regeneration in representative districts—	Number of Plots.	Acres.
Alberni, Vancouver Island	1,200	4.8
Cowichan Lake, Vancouver Island	600	6.0
Alouette Lake, Fraser Valley	500	5.0
Cumshewa Lake, Queen Charlotte Islands	80	0.1
Totals	2,380	15.9

SILVICULTURAL STUDIES.

This year, seed production was again studied on 108 sample trees on the margins of stands at the Cowichan Lake Experiment Station. In that locality, Douglas fir bore very variable crops on 61 per cent. of the trees. Eighty per cent. of the grand fir had fair to good crops, and western white pine was low with 70 per cent. of the 75-year-old trees bearing an average of thirty-six cones per tree. The crop on western hemlock was very light, and on cedar it was fair. Germination tests on seed disseminated by these two species showed it was under 40 per cent. viable. All these crops contrast sharply with those produced by the same species in 1947. Of the fifty-one Douglas fir trees that bore cones this year, twenty had fair to good crops, as compared to forty-three bearing the excellent crop of 1945. In the intervening years, five trees had poor crops in 1946 and none bore cones in 1947. This year the indicated crops, in the best cone-class of trees in each age-group, varied, as follows:—

Age-class.	Height-class.	Best Cone-class.	
		Type of Crop.	Average Number of Cones per Tree.
200	190	Good	14,500
200	120	Poor	180
90	130	Good	4,870
50	130	Fair	620
40	100	Fair	1,250

This Douglas fir crop suffered the usual heavy losses of fair and poor crops. The three trees with the best crops in the 90-year class produced upwards of 5,000 cones each. Comparative counts indicated that 16 per cent. of these cones were "wormy," or failed to develop, and 42 per cent. were taken by squirrels before and after seed matured. The accompanying photograph shows the detritus from green cones eaten as soon as picked by one or more squirrels perched on a branch of a Douglas fir tree.

The viability of seed from these trees was noticeably low. This was due largely to parthenospermy, a condition producing empty seed by lack of fertilization. Suitable seed-traps were set out to sample the seed-fall from a selected acre of forest on which there were six trees producing crops of cones. Four trees, in the 200-year age-class, had fair crops, while the remaining seed-bearing trees were from the 90-year age-class and carried poor crops. Twenty-four ¼-milacre traps caught seed with viability, as indicated below:—

Period of Seed-fall.	Seed caught (M per Acre).	Germination per Cent. in Germinator.
September, 1948	87	6
October	118	31
November	26	33
December	5	10

In the Annual Report for 1947 mention was made of the initiation of two tests in the study of direct seeding. One of these was the broadcast sowing of small-seeded species, and the other was an effort to protectively treat Douglas fir seed for sowing. In the former test, 20 acres of a 7-year-old logged and burned area were sown with *Tsuga heterophylla* and *Thuja plicata* on May 1st, 1946. Two and one-half ounces of seed were used per acre—namely, 1 oz. of hemlock seed, 57 per cent. viable, and 1½ oz. of cedar seed, 78 per cent. viable. There is little change from the survival reported last year, but most of the surviving seedlings can now be considered established. Satisfactory restocking (1,000 or more seedlings per acre) occurs on 56 per cent. of the

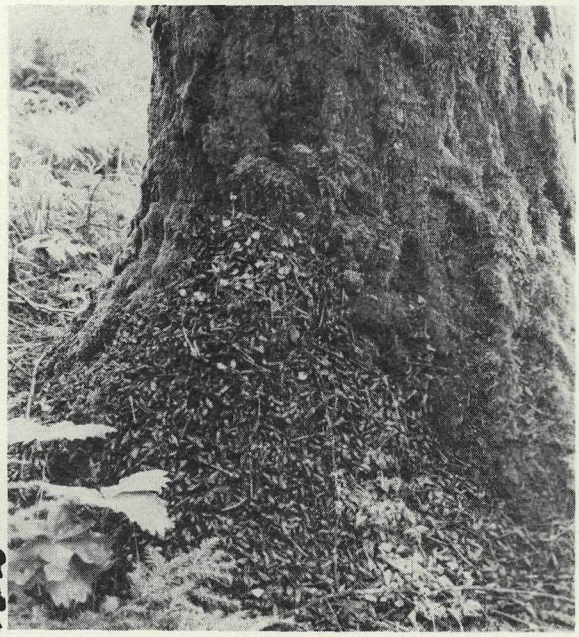
area. An effort was made to use the minimum amount of seed; results indicate that 4 oz. of good-quality seed should be ample for artificial seeding with hemlock and cedar, if the site is carefully selected.

The field-work carried out in connection with the treatment of Douglas fir seed has, as its main objective, the finding of some repellent which could be applied to the seed as protection against the deer-mouse (*Peromyscus*), which is present in great numbers on logged-over lands. At the present time, direct seeding of Douglas fir is mainly prevented by the attacks of this mouse on the seed. Forty-one organic and inorganic treatments in different strengths were tested with replications as possible repellents against the mice. They were both in liquid and solid form and were conveyed to the seed by different means. The treated seed was sown on seed spots on three areas logged and burnt at different times, and all attacks by rodents were noted. Only one treatment has been found as yet which gives some evidence of being effective, but results in this case are not conclusive. Further tests are being carried out with it. This treatment is mink castor, which is embodied with the seed in a pellet. Pelletting appears to be the best method of combining seed and repellent in such a way that the repellent's strength remains constant. Some preliminary work was carried out with seed-pelletting. The ingredients used are kaolin, sodium carboxy methyl cellulose, fly ash, and collodion flexile, and germination has been obtained from seed pelletted with these materials. Much work remains to be done in finding out the best composition of the pellet so that it will not disintegrate till forced to by the germination of the seed and will not delay or prevent germination. Field tests showed that mice attacks on treated seed varied on different areas and were the most intense on an area logged and burnt in 1947. Trapping showed that this area supported a relatively small population, but there would be less food available than on areas logged some years previously. Results of the field tests show that any promising repellent must be tried out on as many areas as possible to thoroughly test out its effectiveness. Mice were also studied in captivity and various cage tests carried out. These studies, together with results of the field tests, show that the mice find the seed by their sense of smell, which is developed to a very marked degree. It was found that the average nightly consumption of Douglas fir seed by five mice kept separate on a seven-day feeding test was 217. The highest number of seeds eaten in one night by a mouse was 349. Field tests with treated seed were found to be more reliable than tests with captive mice. Snap-back trapping was carried out on six different areas once a month, the areas ranging from undisturbed forest, areas logged and burnt at different dates, to second growth. The purpose of this study is to find out at what period of the year the mouse population starts to drop and at what period it starts to rise again. This information could have an important bearing on the time of year in which direct seeding should be carried out. This study will be carried on till results of a full year's trapping are obtained. Results already show that populations vary greatly on different areas, being heaviest on areas logged some years ago. An area trapped three weeks after a slash fire in May showed an even distribution of mice over the whole area. Fourteen mice were caught in a trap-line of 190 traps. The population very quickly built up, and twenty-four mice were caught in 184 traps one month later. Trapping to date shows that populations rise steadily from May and June (when trapping started) to August, with a sharp rise in September and October, decreasing in November, and falling sharply in December. The rodent ecology project organized by the Johns Hopkins University over North America is also being participated in, and results of simultaneous trapping over a three-day period on an area logged and burnt in 1947, and in undisturbed forest, showed a larger population on the former area.

Two thinning experiments were commenced during the year—one in alder stands of two ages, and the other in Douglas fir. Both are at the Cowichan Lake Forest

Forest Economics.

SILVICULTURAL STUDIES.



Debris from immature cones eaten by squirrels, at base of Douglas fir.

Aspect of crown canopy in 20-year-old red alder; height to base of green crown is 50 feet.

Before thinning.

After removing 50 per cent. of total volume.

Experiment Station. The pure stands of red alder there are characterized by a high number of stems per acre. In such stands the production of economic quantities of sawlog material is greatly retarded due to the slow rate of natural thinning in the early stage of their development. However, studies of volume increment just completed showed rapid volume production in the first twenty years of growth and indicated that a stand of merchantable timber can be obtained on a technical rotation of forty years if controlled by thinning. Accordingly, a series of experimental thinning plots, totalling 12 acres, were established in natural red alder stands 20 and 40 years of age. Their purpose was to study the effects of three replicated thinning grades upon tree development and to gain a working knowledge of the management of red alder stands both from the economic and silvicultural aspect. Some of these aspects, based upon observations in the 40-year age-class, are discussed more fully in Research Note No. 14. Doubtless the preliminary suggestions in this publication will be liable to modification because practical evidence of the cultural treatment will not be forthcoming until studies now initiated in the 20-year age-class have been conducted for a further period of time. The effect of one degree of thinning treatment upon crown density in the 20-year age-class is illustrated by the accompanying photographs. With regard to intermediate yields from these experimental thinnings in the 40-year age-class, 30- and 40-per-cent. cuts realized 18 and 25 cords per acre (merchantable volume) respectively; a 50-per-cent cut in a 20-year-old stand yielded 24 cords per acre (total volume).

An industrial tool, the dial indicator, has been adapted for measurement of tree growth at the Experiment Station. The method was proposed in the United States a number of years ago but, as far as is known, it has not been tested in practice. A mount was designed to enable measurement of radial growth by readings within an error of 0.001 inch. During the grand period of seasonal growth in stands of young Douglas fir, this experimental error is exceeded by daily increment. Preliminary experiments with this instrument were reported last year (Report of Forest Service for 1947, page 21). On the basis of further study, it seems desirable to enlarge upon its use.

The growth-indicator gauge has been used this year to measure and compare growth responses after thinning as an aid in discovering better silvicultural techniques. Radial growth is being measured by this method to supply information on three phases of thinning treatment, and a study is also being made of daily growth, and an instrument check. All measurements are on Douglas fir trees in the 35–40-year fir type on similar sites at the Cowichan Lake Forest Experiment Station. In order to study daily changes in growth and to test the accuracy of measurements, three trees were used. One was used to determine any correction that may have been necessary from a physical standpoint, but the instrument and the method proved to be absolutely reliable, showing no aberration or other errors. Two trees of the same age and each 7 inches D.B.H. were used to compare growth in the open and in a stand. For the twelve-month period from October 1st, 1947, the tree with unlimited growing space added 0.244 inches radial growth, while the stand tree added 0.154 inches. The curves of growth showed no divergence to April 29th, then the open-growing tree increased more rapidly and continued to increase to mid-September, about three weeks longer than the tree in the stand. During this period, both trees were subject to daily fluctuations of similar pattern, and long-period deviations from trend which were not concurrent. Three phases of thinning practice are being studied by this method. These are: (1) The amount and period of response compared for different treatments, (2) the effect of excessive exposure on trees of intermediate crown-class, and (3) the responses to thinning during the growing season compared to similar treatment during the dormant period. Phase (1) is being studied on crown and low thinnings made in July, 1947. On these plots the growth in October, 1947, was much greater than for October, 1948, but as the untreated check-plot followed the same pattern, this stimulus

in October was not a result of treatment. However, the crown-thinned plot made rapid growth during the following summer and totalled 0.142 inch of growth for the year. As this is 30 per cent. more than the average growth in the low-thinned plot, the resulting response, three to fifteen months after thinning, favours crown-thinning. Phase (2) is a study of Class 3 (intermediate crown-class) trees that normally would have been removed in a heavy low-thinning, but were left to protect natural gaps in the stand. One such tree left in a gap appeared to suffer depression in growth, but two other similar trees released from the oppression of dominant alder trees, and thereby exposed to full light, grew faster but not more so than the stand left after normal low-thinning. Phase (3) is still in its early stages, as thinnings were made in June and November, 1948, and one more is in prospect for March, 1949. The immediate effect of crown-thinning was very noticeable after these cuttings. In July the summer-thinned stand grew more than twice as fast as the untreated stand and maintained a relatively faster pace to the end of September, when diameter growth finished. In this stand the average radial increment for the year was 0.085 inch in the untreated portion, while the plot thinned in June added 0.142 inch. The latter increment was exactly the same as current increment on the plot similarly crown-thinned in July, 1947, but, of course, part of the response in the latter plot came before the current growth measurements started on October 1st. It is hoped to publish more details of this study shortly.

In a study of pruning plantations at Green Timbers Forestry Station (Report of the Forest Service, 1942, 1946, and 1947) 13-year-old Douglas fir trees live-pruned in July and September, 1942, healed 96 and 95 per cent. of their respective knot-areas by September, 1944. These and other trees were pruned at 17 years of age in June and September, 1946; these groups each showed 95 per cent. of knot-area healed by August, 1948. Thus age made no difference to rate of healing, but the autumn-pruned trees recovered somewhat faster than those pruned in the summer. The pruning in 1942 demonstrated that healing is facilitated when part of the living tissue forming a collar at the base of branches is removed in pruning. It now appears detrimental to remove much of the collar. Three groups of trees pruned in 1946 showed differing rates of recovery, for no other reason than variation in the amount of branch-collar removed in pruning. The results for two years are as follows:—

Per Cent. of Total Knot-area occluded.		
In One Year.	In Two Years.	Ratio of Area of Collar.
48	90	2.73
58	95	1.98
64	99	1.56

Comparisons in this table, though based on only forty knots, indicate that very little of the branch-collar needs to be removed in order to obtain occlusion of knots in minimum time. This study revealed that rate of healing was not affected by pruning in different years, nor was there any difference in healing rate when pruning was done in one stage and two stages, the latter four years apart.

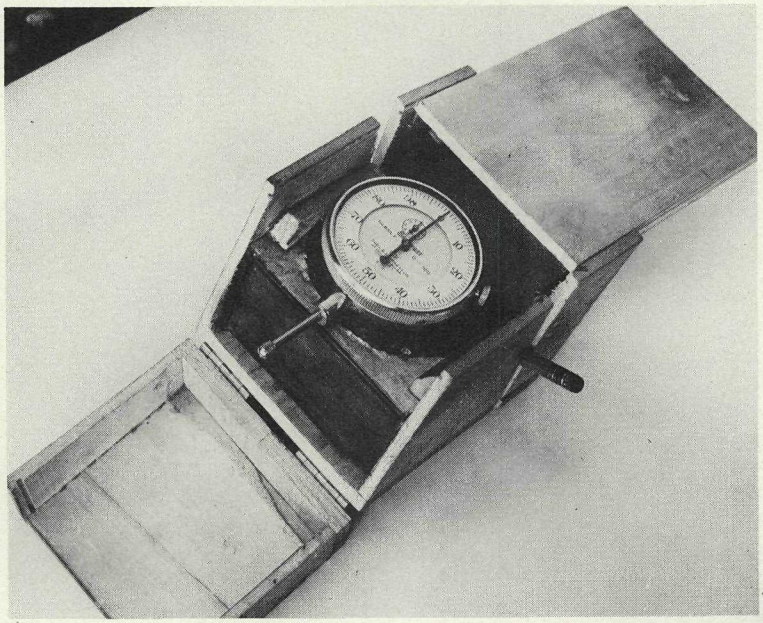
Some work has been done on the measurements of introduced species of trees planted in the Fraser Valley and near Sidney. The data obtained for these and other plantings will shortly be published in a research note to make available information showing the relative value of exotic trees growing in the Coastal climate.

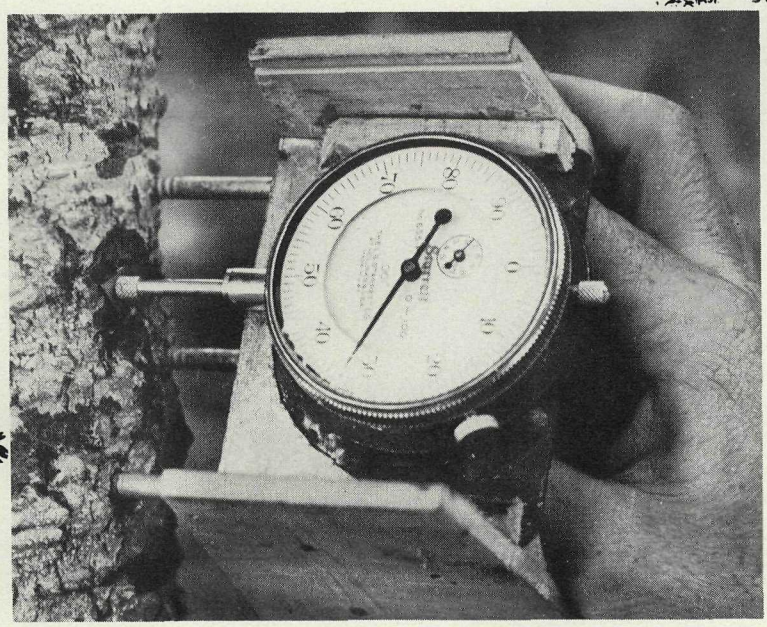
SOIL AND SITE-TYPE STUDIES.

During May and June a study was made of site-types in second-growth hemlock stands near Nootka on the West Coast of Vancouver Island. The P or sword-fern site-type of the Douglas fir region was easily recognized in hemlock stands, though the general plant community was slightly modified. Deer fern is often more abundant than sword fern. Beech fern, wild lily of the valley, salmonberry, and elderberry are

Forest Economics.

SILVICULTURAL STUDIES.





Two views of indicator gauge developed to measure radial growth in trees.

also common. The intermediate PG and G site-types were difficult to recognize. Salal, the most abundant plant of the Douglas fir region, is not conspicuous, except in understocked stands and along the shore-line. Tall blue bilberry, false azalea, and evergreen huckleberry are quite common, but their value for site identification is doubtful. The poorest site-types, G Pa and G U, could not be directly recognized, because, in general, tree lichens were rarely found. However, a new, equivalent site-type was noted. It contains salal, bunchberry, and sphagnum moss. It appears to be typical of shallow soils in which pockets in the bedrock form permanent pools of water. The forest stand consists of stunted hemlock and spike-topped cedar. Further study is needed, particularly in the poor sites, before adequate information is obtained on site-types for the hemlock region.

In co-operation with a private company, an attempt was made to correlate site-types with commercial cruises. The stand examined was overmature. It was found that the site-type generally indicated a much better stand than actually existed. This was due to the extent to which decay and wind-throw had reduced the original mature forest-cover.

Assistance was given to a private company in organizing a site-type survey. No previous attempt had been made to survey and map an area using the ground cover as an indicator of site quality, consequently some valuable experience was gained. It was found that a crew unfamiliar with botany was soon able to identify most plants of indicator value and to correctly assess site values after three or four days' field supervision. For mapping purposes, compass lines 20 chains apart would appear to be a maximum if site-types are to be reasonably accurately drawn. A few additional cross-lines at key-points greatly increase the precision. A satisfactory scale for mapping would appear to be about 20 chains to the inch. A topographic base map is an assistance because to some extent, but not entirely, site quality and topography are correlated. A standardized field sheet and legend is desirable, particularly if additional information such as degree of stocking, age of stand, advanced reproduction, etc., is needed. About 2 to 2½ miles of strip can be covered in a day. This allows sufficient time for careful work and additional notes that may be required.

NURSERY FERTILITY STUDIES.

As in previous years, soil and seedling samples were collected from each Forest Service nursery for analysis. The purpose is to maintain a constant check on soil fertility and seedling growth so that appropriate measures may be taken when deterioration becomes evident.

Seedling samples were taken from the fertilizer experimental beds established in 1947. Positive results were obtained at Green Timbers, while no results could be seen from the Duncan and Quinsam experiments. Chemical fertilizers were applied at one and two times the following basic rates: Ammonium sulphate, 150 lb. per acre; superphosphate, 600 lb.; and muriate of potash, 100 lb. The following statistics were obtained at Green Timbers:—

Seedling Data.	Standard Error of Mean Difference.	Check.	NP.	NK.	PK.	NPK.	2NPK.	N2PK.	NP2K.
Average length of top (c.m.)	±1.10	9.70	13.00	12.30	14.70	12.70	12.70	13.00	13.30
Average dry weight (gms.)	±0.13	0.70	1.23	1.00	1.13	1.03	1.03	1.03	1.03
Average number of primary roots	±0.50	8.50	8.40	9.90	8.50	8.40	9.40	8.30	9.30

In a second experiment at Quinsam the above fertilizers were applied to 1–0 stock this spring. The following results were obtained:—

Seedling Data.	Standard Error of Mean Difference.	Check.	NP.	NK.	PK.	NPK.
Average length of top (c.m.)	±1.90	14.30	19.70	19.00	18.70	21.00
Average dry weight (gms.)	±0.23	1.37	2.03	1.73	1.60	1.93
Average number of primary roots	±0.80	6.20	8.40	7.90	7.50	8.50

Further experiments are being carried on this year so that, when the need arises, there will be adequate information for fertilizer recommendations.

Some survival studies were undertaken this spring. The object was to try to find out the seedling characteristics associated with high field survival; that is, the optimum length of top, top to root ratio, etc. Six widely varying types of seedling were set out in plots. However, due to the unusually cool, moist summer, survival was uniformly high and little information was obtained. Survival varied from 96 to 99.5 per cent.

REFORESTATION.

FOREST NURSERIES.

The most important development of the year was the selection of a site near Elko for a forest nursery in the yellow pine region of the Southern Interior. Experimental seed-beds will be started immediately, but no permanent buildings will be erected until standard forest-nursery techniques have been adapted to local conditions.

Production of 2–0 planting stock at the three nurseries on the Coast was reduced to 10,000,000 trees due to the abnormal weather conditions of 1947 and 1948. Late spring frosts followed by cold, wet weather delayed sowing new seed-beds for more than a month, and it was the end of May before the ground could be worked. Precipitation during the summer months was double the normal average, with a record rainfall in November of 14.5 inches at Green Timbers and 16.8 inches at Campbell River.

Seed-beds were sown this year for 10,000,000 trees and, until circumstances warrant an increase, it is proposed to maintain production at this level. The labour situation eased off considerably during 1948, and essential work was accomplished without the difficulty experienced during the past three years.

Records and experiments on soil-fertility were continued, and details of the work done are given in the Economics Section of this Report under "Soil Surveys and Research." The pathological and entomological services of the Dominion Government also did considerable work in the nurseries on fungous diseases and insect enemies.

Experimental sowing of hemlock seed was carried on at all three nurseries in an attempt to improve the production of hemlock planting stock. In the past considerable difficulty has been experienced in carrying the seedlings through the first winter without frost-heaving and the fact that hardwood sawdust did not give the same protection to hemlock as it does to Douglas fir. Varying proportions of the two species were sown in seed-beds, and at present it appears that the mixture of equal numbers of the two species will give the best results.

At Green Timbers 5,200,000 trees were shipped for spring planting and 500,000 for a fall planting project, leaving 3,500,000 seedlings available for planting in the spring of 1949.

Improvements in the soil-spreading machine now make it possible to use damp soil. The spreading of hardwood sawdust for winter mulch was accomplished with ease, and it is anticipated that no difficulty will arise in spreading soil on seed-beds this spring. As an improvement on the manually operated weed-burner, a trailer for the tractor was fabricated on which three burners were installed, together with a 20-gallon tank. Air-pressure is supplied from the air-pump on the power take-off on the tractor. The three burners give a flame wide enough to cover the full width of the bed in one operation, reducing the number of man-days for burning from 11 to 2½. An electric hedge-clipper was purchased and operated from a portable generator. It trimmed all the hedges around the nursery area in four days, instead of the usual twenty-nine man-days required previously.

At Campbell River 4,159,000 trees were shipped to planting projects in the vicinity of the nursery, and 5,000,000 seedlings will be available for planting in the spring of 1949. The white-grub infestation which appeared for the first time in 1947 is still increasing and, up to the present time, no effective control measures have been established. Considerable improvement in the method of root-pruning was accomplished at this nursery by attaching a stationary blade directly to the Farmall tractor.

At the Duncan nursery a new residence was constructed to provide suitable living accommodation for the superintendent. An underground telephone cable was laid, and considerable quantities of soil were hauled for levelling purposes.

One million trees were shipped to planting projects from the Duncan nursery in the spring of 1948, and 471,000 in November for fall planting. This leaves 1,600,000 Douglas fir for the 1949 spring projects.

The Victoria laboratory of the Dominion Forest Pathology Investigations conducted further experiments in the control of damping-off. No appreciable control was obtained, although some treatments warrant further investigation.

SEED COLLECTIONS.

In the spring all indications pointed to a bumper crop of cones for most forest species on the Lower Coast. However, due to weather conditions, pollination was not complete and, except for the southern part of Vancouver Island, the seed did not develop in the cones, and collections were cancelled. From the small quantities collected, 207 lb. of Douglas fir seed was obtained from 595 bushels, giving a yield of 0.35 lb. per bushel of cones. Hemlock seed amounted to 3.6 lb. from 7 bushels of cones. Four pounds of cedar seed was gathered by shaking the trees after the cones had opened. However, this method did not prove successful with hemlock. Yellow pine seed was also obtained for the new nursery at Elko.

In order to maintain a constant production of seedlings in our nurseries, large collections of cones must be made whenever a good cone-crop occurs. In the past, considerable difficulty has been experienced in obtaining sufficient cones to assure us of enough seed to carry over the intervening years. To facilitate this work, a cone-drying shed was constructed at Courtenay to take green cones directly from the collectors for storage until the peak of the collecting period is over. The shed, 84 feet long and 24 feet wide, is open on all four sides to give the maximum amount of air circulation, but is covered with a wire screen as a protection against rodents and birds.

PLANTING.

Due to a late spring, planting did not get under way until the latter part of March and continued on into May. In normal years, planting starts in February and finishes the first week in April. The subsequent wet summer favoured this late planting, and initial examination shows above-average survival.

A marked improvement in the labour situation resulted in more stability among the planting crews, and most of the men remained for the duration of the project. More interest was shown among the planters than in previous years. Some twenty-five men employed on forest protection during the summer months as assistant rangers, patrolmen, etc., were transferred to the Coast for winter work in planting camps. In most cases these men were trained for planting-crew foremen.

The spring planting programme constituted nine projects, which planted 8,289,500 trees on 9,794 acres. Fall planting was carried on during the latter part of October and November at two projects where 837,200 trees were planted on 770 acres. Fall planting, as a rule, is done at high elevations where snow conditions prevent spring planting. Logging companies planted 1,402,000 trees on 2,140 acres during the year. The complete statistics for the 1948 projects and a summary of planting for the past ten years will be found on page 78 of the Appendix.

No plantations were damaged by fire during the year, and total losses due to fire are less than 1 per cent. of total planted.

PREPARATION OF PLANTING AREAS.

Snag-falling was carried on at 11 projects, and 151,937 snags were felled on 16,843 acres. Most of this work was done with hand-fallers working on an hourly wage. Power-saw fallers contracted the falling of snags on one area and were paid by stump

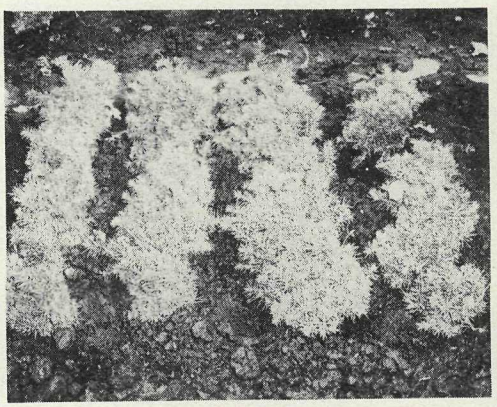
Reforestation

Two-year-old Douglas fir trees in seed-beds.

Trees being lifted and tied in bundles.

Planting logged and burned areas.

Five thousand trees being baled.



Four thousand trees heeled in, ready for planting.

scale (basal area). Another power-saw faller contracted to fall snags by the acre after a thorough reconnaissance of the area had been made in company with a Forest Officer. This latter method is the most desirable, but it is unfortunate that most falling contractors have not sufficient experience to appraise a snag-falling job nor the mobile camp equipment which is necessary on most of these projects.

Road-building was hampered by an unusually wet summer and fall, and more time was required on the maintenance of existing roads. A crawler-type compressor was acquired, which proved to be very effective in ditching and digging out hard-pan. This piece of equipment promises to be a valuable asset. A total of 31 miles of old logging grade were converted for truck use, 3 miles of new roads were constructed, and some 130 miles of road maintained.

One forty-man and two twenty-man camps were moved to new sites. Building material was in better supply and improvements were made to five camps.

PLANTATIONS.

Survival examinations were made in the 1945 and 1947 plantations, and new plots were established in the 1948 planting. Mortality in the plantations was a little less than the 25-per-cent. normal average. In view of the exceptionally wet year, indications are that the 1948 plantings will have a mortality of less than 10 per cent.

A number of road-signs were made and set up on the various plantations. These signs will indicate to the public the reforested areas and the dates on which they were planted.

PARKS AND RECREATION.

INTRODUCTION.

During the past twenty years a growing public demand for increased outdoor recreation has placed new emphasis on the recreational use of forest lands and has pointed to the need for specialized consideration of this phase of forestry. Efforts to meet this need led to the establishment of a Parks Division within the Forest Service in May, 1948.

From its beginning this new Division was charged with responsibility for the administration, development, and operation of all parks created under the "Forest Act" and, more recently, it has been required to assume responsibility for the administration of recreation facilities in Provincial forest reserves.

Preliminary consideration of the park and recreation problems of British Columbia revealed the magnitude of the task of adapting such vast recreational potentialities to the uses and needs of a rapidly growing population and indicated a need for an increased and reorganized staff. Accordingly, the work of the Division has been broken into three phases: (1) Administration and Development, (2) Reconnaissance and Inventory, and (3) Planning.

Specialized sections have been set up within the Division to cover these fields, and the nuclei of their respective staffs have been assigned specific duties. This employment of available personnel has produced a beginning in the assessment of Provincial recreational potentialities and a start in any analysis of our Provincial needs.

ADMINISTRATION AND DEVELOPMENT.

General.

Early in June the Parks Division began the problem of recruiting a suitable staff. The Civil Service Commission provided office personnel and draughtsmen and, as far as their numbers permitted, personnel from the former Parks Section of the Economics Division filled key positions in the new Division. Initial efforts toward reorganization have been complicated by a lack of trained park personnel and, to some extent, by difficulties of adapting accepted park and recreation practices to situations existing in British Columbia.

For the time being it has been necessary to group administration and development as a single section controlled directly by the forester in charge of the Parks Division. However, the allocation of suitable officers to reconnaissance and inventory and planning sections has begun to distribute responsibility and has enabled a sound beginning in the systematic development of adequate Provincial recreational facilities.

Administration.

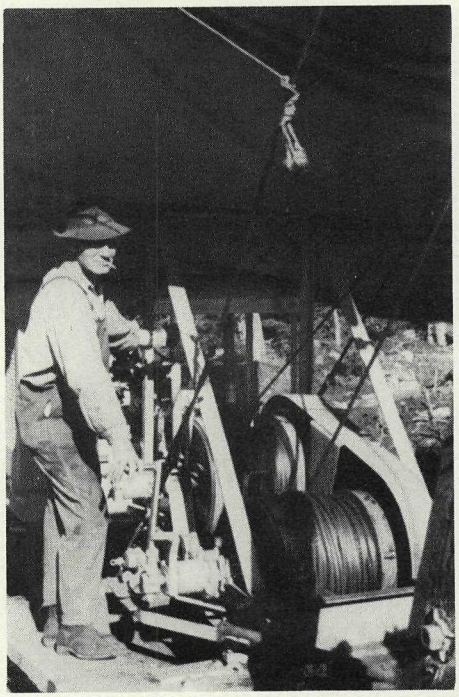
While channels of communication and administrative procedures as established by the older divisions of the Forest Service are being made effective, the shortage of qualified personnel has tended to concentrate administrative problems in Division headquarters. This has delayed the clarification of some problems affecting policy and has prevented an early enunciation of the principles to govern park and recreation administration in the Province. The matter of policy, as applicable to parks and recreation areas, has, however, been given much study, and the Division has acquired extensive material for consideration in the formulation of a practical statement of policy.

Development.

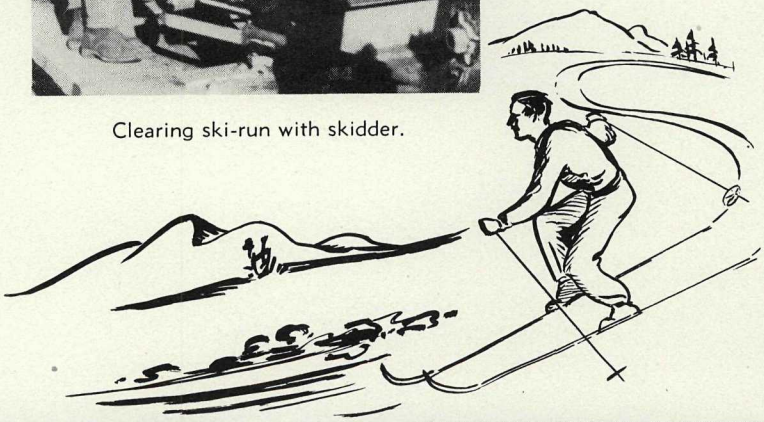
Construction which could be undertaken during 1948 was limited to that for which detailed plans existed or for which such plans could be prepared at short notice. Noteworthy new developments were limited to widely varied projects in six scattered areas.

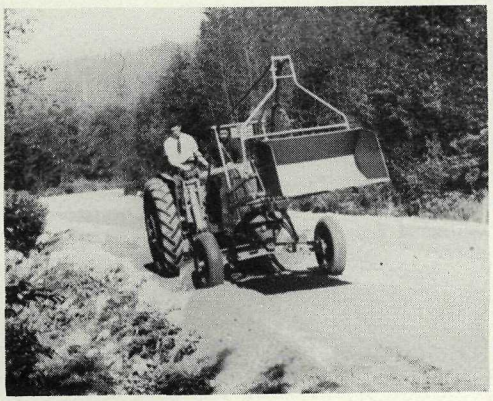
Parks and Recreation

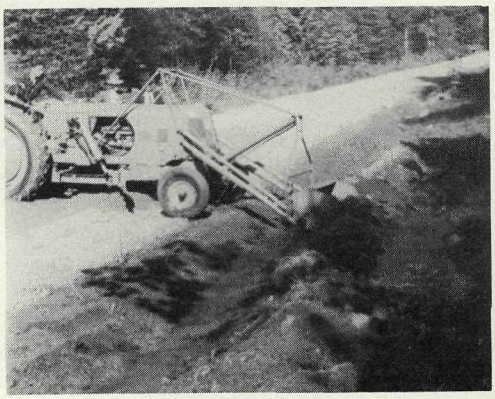
MOUNT SEYMOUR PARK.



Clearing ski-run with skidder.







Grader on road-maintenance and clearing ditches.

Mount Seymour Park.

Construction of the mountain highway, recommenced in 1947 and designed to make Mount Seymour's sub-alpine attractions more readily accessible from Vancouver's crowded thoroughfares, was continued and, except for gravelling of the last 2,000 feet, was completed for a distance of 3.88 miles to "The Upper Parking Lot." Construction of this highway is being carried out by contract.

Parks Division personnel have been employed, with the use of a newly acquired yarder, in clearing and conditioning ski runs and trails and in running location surveys for an additional 4¼ miles of mountain highway.

Peace Arch Park.

Development at this strategically located beauty spot is intended to encourage increased day-use through the provision of all-weather picnic facilities and long-needed toilet installations. The existing water system was extended approximately 800 feet, and approximately 1,000 feet of drainage and sewage pipes were laid by day-labour under staff supervision, while contracts were let for construction of a 30- by 60-foot kitchen-dining building and modern 20- by 27-foot comfort-station building, complete with requisite electrical equipment, plumbing fixtures, filter bed, and septic tank. Incidental to this new work has been the completion of arrangements for the substitution of an underground conduit for the unsightly pole-line which has long carried electrical power through the park to the Peace Arch and the International Boundary Commission's boundary marker. Progress throughout has been satisfactory, and there is every indication that improved recreational facilities will be available for use early in 1949.

Manning Park.

The principal development undertaken in this important park during 1948 was the construction of 3¼ miles of pack-trail, with one 60-foot 20-ton bridge across the Similkameen River, to "Windy Joe Lookout." In addition, one-quarter mile of highway was built from the Hope–Princeton Highway to "Cambie Crossing" and one-quarter mile of protection road was constructed to connect the Lightning Lakes Trail with "Cambie Crossing." A similar connecting-link, approximately one-quarter mile in length, was provided between the highway and the trail to "Windy Joe."

A 25-foot 15-ton bridge was built over a creek on the Lightning Lakes Trail, and the old Cambie Bridge across the Similkameen was reconditioned by the renewal of stringers and decking.

Approximately 2 acres were cleared and seeded to grass in preparation for future development of an adequate administrative headquarters.

Wells Gray Park.

To continue the Dawson Falls Road, begun in 1947, a right-of-way was cleared and a rough access road was grubbed and graded for approximately 1¾ miles.

Little Qualicum Falls Park.

During the summer a small crew constructed a 50-foot bridge, removed and burned unsightly log-jams from the channel of the river, and excavated approximately 600 feet of ditches to drain approximately 10 acres for possible future use as a camp-site area. In October a relocation survey was run over the park-entrance road and, in the middle of November, reconstruction of the road to provide for a 20-foot surface, improved grades, and more direct alignment, was begun. A new roadway, 4,300 feet in length, with required parking and picnic areas has been laid out, and approximately 1,000 feet of subgrade, involving 3,500 cubic yards of excavation, have been completed.

Langford Workshop.

Parks Division personnel are being used in the construction of a 24- by 50-foot workshop on newly acquired property adjacent to the Langford Ranger Station. This two-story building will be used as a shop for the construction of park furnishings and equipment.

Maintenance.

Island parks were maintained throughout the season by employment of five park attendants under the supervision of a full-time parks officer. Routine maintenance was carried out by full-time Parks personnel in Mount Seymour, Manning, and Wells Gray Parks. In Manning Park and Wells Gray Park this consisted largely of normal forest-protection measures to minimize losses through fire and human use and included the establishing of a lookout-man on "Windy Joe Lookout" in Manning Park, while in Mount Seymour Park the chief consideration was continuous road and trail maintenance and snow-removal. The latter problem has been considerably eased by the allocation of a newly acquired Huber grader to this work.

RECONNAISSANCE AND INVENTORY.

General.

The purposes of reconnaissance and inventory within the Parks Division are to enumerate and assess the recreational qualities of selected lands and to take detailed stock of all other resources and other uses of these lands in order that the recreational values may be balanced against these other resources and uses. Equally necessary is the collection of detailed information pertaining to the location and facilities for existing recreation areas. The analyses of recreational needs and preferences of various population groups must be studied in conjunction with the above.

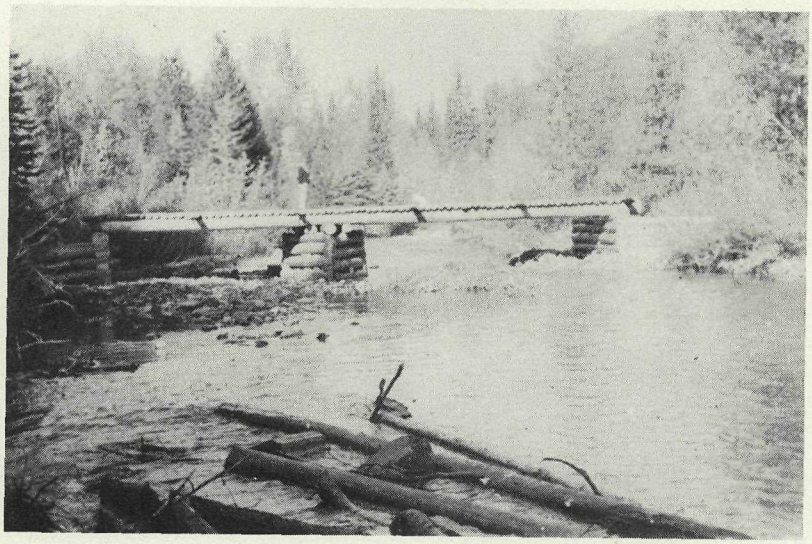
Reconnaissance.

Two sources of information are being probed in search of the information on which to base planning and future development. Through the years a wealth of data has been compiled through earlier reconnaissances in Provincial parks and related areas. Reports on such field-work are being studied, and pertinent information is systematically tabulated. Such research has resulted in the creation of a file system in which approximately 200 parks, recreation reserves, and potential recreational areas are listed. Distribution and natural features of these areas are indicated on a large-scale map. At this time we have reports for only thirty of the areas mentioned above.

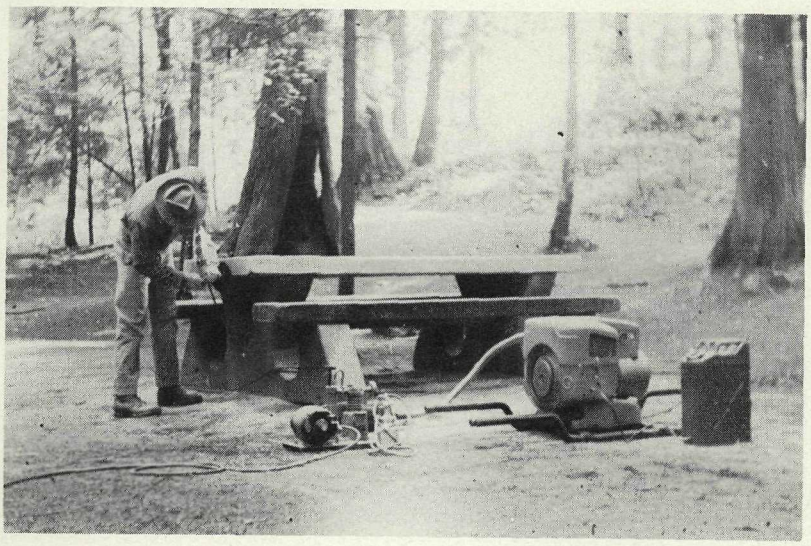
Chilliwack Lake, adjacent to the International Boundary and half-way between Cultus Lake Park and Manning Park, and Tenquille Lake, near Pemberton on the Pacific Great Eastern Railway, were inspected and reported upon. Pavilion Lake, north-east of Lillooet, and Bowron Lake, east of Quesnel, were closely examined and assessed from a recreational view-point, and McMillan Creek, near Prince George, was visited and evaluated. Silver Star Park, in the vicinity of Vernon, was examined as a potential ski-ing area, and the feasibility and desirability of undertaking winter-sports development in this area is being considered. Similar examinations were made of Pilot Bay, on Kootenay Lake, and of a proposed roadside reserve extending along the easterly shore of Kootenay Lake from Pilot Bay toward Creston.

In addition to such field-work, considerable effort has gone into the search for lands capable of filling present and foreseeable recreational needs. Large areas have been statused along the west coast of Vancouver Island and in the vicinity of Cameron Lake, Little Qualicum Falls Park, and MacMillan Park in an effort to locate suitable lands to fill specific needs.

Parks and Recreation



Bridge on " Windy Joe " Lookout trail.



Portable unit for park furniture maintenance.

Inventory.

This phase of park and recreational forestry must provide basically two things: Firstly, we must enumerate and record all resources that lie within our parks and forest reserves. A small beginning has been made in this regard, but it will be some years yet before this important work can be brought up to date. Secondly, we must complete a survey of recreational needs, present and future, as well as an inventory of recreational resources or potential resources existing in parks and forest reserves. In this regard, we were again only able to make a small start.

During 1948 our park inventory changed as follows:—

Class A Parks.

Kitsumgallum (vicinity of Terrace) reduced from 109 acres to 25 acres.

Little Qualicum Falls (vicinity of Parksville) increased from 130.3 acres to 206.86 acres.

McDonald (vicinity of Sidney)—a new park—5 acres.

Petroglyph (vicinity of Nanaimo)—a new park—3.84 acres.

Cultus Lake (vicinity of Chilliwack)—a new park—950 acres.

Class B Parks.

Tow Hill (vicinity of Queen Charlottes)—a new park—480 acres.

Class C Parks.

Nakusp Recreation (vicinity of Nakusp) reduced from 91 acres to 84.1 acres.

Special Parks.

Summit Lake cancelled, 7,200 acres.

The following is a general summary of parks as at January 1st, 1949:—

Class of Park.	Number.	Acreage.
A	21	290,729.950
B	5	7,054,686.000
C	28	4,009.445
Special	4	3,458,695.000
Totals	58	10,808,120.395

PLANNING.

General.

From 1941 to 1948 a limited park staff was occupied mainly with general reconnaissances of park areas and meeting the various planning and supervision requirements that arose from small park projects. With increased emphasis on forest recreation and a rapid expansion of park-development funds the need of detailed recreation plans became a necessity. Because the preparing of such plans for even a few of the more important parks will take several years' work, it was necessary to limit planning in 1948 to a few vitally important areas which are clearly indicated for early intensive use. Mount Seymour and Manning Parks are outstanding in this respect, and these areas were given attention.

Two survey crews were utilized for the specific purpose of doing the necessary survey-work. One such crew of two students and two graduates spent the summer months at Mount Seymour Park, and two other forestry students were assigned to Manning Park.

Mount Seymour Park.

A master plan, on which has been plotted present and future summer and winter recreational-use areas and required development, was drawn up and supplemented with a written explanatory report. Actual "layout" plans were completed as follows:—

Surveys were made of chair tow-lift locations and main ski-runs. Most areas of the park were covered with from 6 feet to 9 feet of snow when work started, so particular attention was given to making traverses of long ski-runs and possible ski-lift locations. The same routes in the summer are very difficult to travel due to heavy undergrowth and so rough as to make judgment of their possibilities subject to error.

A study of biting-insects and measures for their control was undertaken. It is realized that all phases of summer recreation will be greatly limited unless these insects can be controlled. Previous experimental work showed that large numbers of black-fly larvæ could be flushed out of the streams by the use of a water-miscible solution of D.D.T. This work was continued in an effort to find out what strength of solution was needed, how often the streams had to be treated, and how many streams carried insects. Unfortunately, the extremely damp summer made comparative results with previous years impossible of determination. From the past season's studies a fairly adequate control plan can be initiated.

A number of bench-marks were established throughout the park to serve as control points for various survey projects that may be undertaken from time to time. These were established by staff compass traverses and elevations set by precise levels.

A contour map was made of the vicinity of the Administration Building. This particular section of the park is highly important because of the number of improvements planned for it. To enable these to be shown in suitable detail, the map was made with a scale of 1 inch equals 50 feet with 5-foot contours.

A site map was prepared of the vicinity of the Administration Building. This structure should be completed next year. A major part of the work to be done is in stairs, walks, drains, grading, and landscaping. To facilitate this, the map was prepared to a scale of 1 inch equals 4 feet, and with a 1-foot contour interval.

One of the not-too-distant necessities is a new ski lodge. A possible site has been under study for several years, and this year a site plan was prepared after the whole area had been topographically mapped.

To provide parking-space for 1,000 cars in a limited area so that snow-ploughing is possible and, at the same time, the tall trees are not opened up enough to be wind-thrown has posed a problem for some years. This main area has now been topographically mapped, together with an adjacent piece of bench land which is ideally suitable for club cabins.

The survey line theoretically designating the height of land dividing Mount Seymour Park from the Greater Vancouver Water District has been located decidedly in favour of the latter concern. This greatly prejudices possible park improvements which are concentrated along the ridge. A new line was run to take advantage of all terrain that could be drained or graded to place it within the park. This new line will now be inspected by the Water Board surveyor.

A botanical collection was made by a student who mounted specimens of the commoner trees, shrubs, and flowers to be found in the park. This collection will be kept for reference at the Administration Building.

Manning Park.

Proposed improvements are so concentrated that a 2-foot contour map was made for the site planning of the administration area and concession-site.

The main development area embracing ski-runs, pastures, swimming-lake, picnic and camp ground, parking-lots, and various other improvements was covered with a 5-foot contour map.

The survey crew did most of the location for the " Windy Joe Lookout " trail which was built during the summer.

A reconnaissance of road and trail routes to Three Brothers Mountains was made to check on possible routes, and the findings were recorded for future reference.

The principal drawback to summer recreational use is the lack of swimming facilities. Much of the planning depends on how and where this can be overcome. An old river-bed appears to have definite possibilities for excavation and flooding. Detailed survey information was obtained to guide a tentative design.

A 2-foot contour map is now available to guide further planning of the proposed lodge-site and camp-ground area.

Miscellaneous.

From time to time various requests for advice or help are received from cities or communities. Where possible, their problems are investigated and suggestions made.

Advice was asked on the development of the Okanagan Lake water-front, and a preliminary plan prepared. It was accepted almost in its entirety, and a great deal of progress has already been made on the lake water-front as recommended.

Upon the request of the Summerland Ski Club, a short survey of their grounds was made. A complete design and plan for a ski-jump was sent them and, during the summer, work has progressed so favourably that this club has been awarded the Okanagan Ski Zone Tournament.

FOREST MANAGEMENT.

Value of production estimated for 1948 reaches a total of $363,786,000. This reflects the inflationary tendencies of the times and, thus, far exceeds all previous figures. Total cut for the Province, it will be noted, is 4,293,000,000 board-feet, log scale, the greatest volume in our history, and about 106,000,000 feet in advance of 1947.

Statistical tables in the Appendix of this Report supply details of management activity. The comments which follow comprise the highlights of the data enumerated in the detailed tables.

Paper production is about the same as the previous year, but pulp exports increased. Values are up with higher prices.

Water-borne lumber shipments dropped off in the latter part of the year due to reduced shipment to the United Kingdom, which market far exceeded all others in volume absorbed. The reduction from 1947 is about 267,000,000 feet.

The Interior districts account for the gain in production volume, while the Coast region shows a loss of some 20,000,000 feet.

Of the total production of 4,293,000,000 feet—all products in board-feet—Douglas fir again leads in volume by two to one over hemlock and cedar. Spruce and balsam follow, with larch next, over 100,000,000 feet in volume.

As to origin of the cut, timber sales again lead with 1,400,000,000 feet, with old Crown grants a close second with 1,000,000,000 feet. Timber licences are again in third place. Volume production in cubic feet shows an appreciable advance by reason of the tendency toward closer utilization through relogging for salvage values.

Logging inspection reports increased with the wider logging activity and the favourable fire season. Timber-sale operations are the leading type of logging activity. There still exists a load of work in this field far beyond the scope of adequate supervision by the limited number of fieldmen employed.

Trespass cases increased slightly, but volume was lower than the previous year by reason of earlier detection and closer supervision.

With decrease in pre-emptions and added field assistance by Land Inspectors, total inspections number over 100 less than in 1947.

Lands examined for disposition under the "Land Act" remain at about the same level as in the previous year. Increased population and better economic conditions tend to maintain higher levels established. Increasing assistance through Lands Branch Inspectors greatly facilitates this work.

Timber-sale activity is shown by a table indicating existing sales upwards of 6,500 in number, with new sales for the year 2,600, including cash sales numbering 450. Some 1,603,000 acres are held under timber-sale contract with guarantee deposits in excess of $2,000,000.

Stumpage prices on timber sales show a wide range due to inclusion of highly competitive cases. It will be noted the weighted average price bid on all species remains identical with the 1947 figure, based on comparative tables where royalty is included as part of the stumpage price bid.

The number of sawmills throughout the Province showed a slight increase over the number in 1947, but the 37 additional mills is small indeed compared to the 400-mill increase of the previous year. Shingle-mills were reduced in number from 73 to 68.

Log exports for 1948 almost doubled those of 1947, with increase of quotas by the Federal Timber Control Authority. Eighty-four per cent. of the total originated on Crown grants with the export privilege.

The value of minor products marketed outside British Columbia was $5,800,000, slightly higher than 1947 and with the United States market retaining the lead by a wide margin.

With the increase in the total production, timber marks and draughting-office work showed a marked advance over the normal activity in these two directions.

Maintenance of Forest-cover Maps.

Except in the Fort George Forest District, where forest-cover maps are revised seasonally by temporary assistants, all forest district offices maintain their map records on a current revision basis. In the course of the year 1,494 maps were revised, as follows: Victoria, 409; district offices, 494; Rangers' offices, 591. Of the above total maps, 80 are new replacements.

Instruction in forest-cover mapping and the organization of maps and plans was given to sixty-six Forest Service personnel (at twenty-three points throughout the Province), as follows:—

Ranger School, Green Timbers	20
Prince Rupert Forest District	2
Fort George Forest District	3
Kamloops	3
Nelson	8
Vancouver	30
Total	66

The fire atlas for the Province has been maintained from fire and slash hazard reports.

FOREST PROTECTION.

WEATHER.

General weather conditions throughout the Province during the 1948 fire season were the most favourable experienced in many years from a forest-protection point of view. Short periods of high hazard occurred periodically in all districts, but these were only of temporary duration, and at no time during the season was a serious hazard build-up experienced.

In the Vancouver Forest District snowfall was above normal during pre-season winter and early spring months, with run-off retarded into the early months of the fire season. The summer which followed brought well-distributed rain and high humidities. Precipitation was, generally, much above average, with one recording-station showing 150 per cent. over 1947 for the six-month period. Weather records taken at five stations on Vancouver Island in the region south of Nanaimo show only eight days throughout the entire fire season when relative humidity registered below 50 per cent. The season definitely concluded with a general heavy rainfall in mid-September, 2.6 inches precipitation being recorded on September 14th in one particular region of the district.

In the Coastal region of the Prince Rupert Forest District, the early part of April, first half of May, and the first half of June proved hazardous in the Bella Coola region. Low humidity and drying winds created periods of dangerous weather, more severe than encountered in this region for several years. This condition also applied to some extent around Prince Rupert during June. The Queen Charlotte Islands suffered one of the driest seasons remembered, with creeks and wells, which previously gave year-round flow, drying up for a short period. This was of comparatively short duration, but winds from the west and north-west, which are particularly dry, increased the hazard with low-humidity conditions. Other than during the periods mentioned, the season was average for these parts of the district. In the Interior portion of the district, snowfall during the winter of 1947–48 was greater than it had been for several years. Spring run-off was late, with consequent flood conditions occurring in all parts when the usual warm weather and rains prevailed in May and June. The month of May and the first half of June were the only periods at all hazardous. The balance of the season was wet, with fairly numerous electric storms, most of which, fortunately, were accompanied by precipitation. The only exception was a local condition which existed within a small radius of Terrace, where one of the driest seasons in many years was experienced. In this small localized region there were only 4 inches of rainfall from April to mid-September.

In the Fort George Forest District a cold spring followed heavier-than-normal snowfall on both sides of the Rockies and warm weather did not occur until about mid-May. With the warmer weather, that portion of the district west of the Rockies experienced a dry period of approximately six weeks, broken by rain on July 1st. Subsequently, rainfall in this region was heavier than normal, and although a considerable number of electrical storms occurred, no serious outbreaks of fire resulted. East of the Rockies the weather following the May warm-up was similar, but wet weather extended further into the month of July. Generally speaking, the season was favourable.

In the Kamloops Forest District the wet cycle of weather experienced for the past several seasons continued, with even more prolonged periods of precipitation. Unlike 1947, however, the spring hazard proved negligible with actual arrival of the warm weather several weeks later than the previous year. With the late spring, arrived record flood conditions which prevailed until July. Fortunately, during this period of serious flood, with many sections of the country isolated, very few fires occurred. It is

notable that, in the Cariboo portion of the district, many hay meadows remained as lakes all year, a condition which has not been experienced for many seasons. Relatively few electrical storms occurred in the District, and they were, for the most part, accompanied by heavy rains.

Weather in the Nelson Forest District during the season was the wettest recorded for that district. Winter snows were late in melting and, in common with the Kamloops Forest District, serious flood conditions obtained as the warmer weather appeared. During the period May 1st to September 30th, the longest period without rain was a total of seventeen days between August 29th and September 14th. This is something of a record for the district which ordinarily represents the most hazardous section of the Province. It is interesting to note that during this same period rain fell on a total of sixty-four days as compared to only forty-one days in the same period in 1947. Electrical storms followed much the same pattern as last season. The more severe storms occurred in the East Kootenay rather than in the Arrow and Kootenay Lake Districts as is usual. Practically all storms were accompanied by heavy rain, and fire occurrence was comparatively light.

FIRES.

Occurrences and Causes.

With only 799 fires recorded during the season, the year 1948 set a record low for the past thirty-five years, 578 fires having been recorded in 1913. The season's occurrence represents also only approximately 51 per cent. of the past ten-year average of 1,555 fires. The record small number of fires occurring is directly attributed to the outstandingly favourable weather obtaining.

As an indication of trend and for comparison with the tabulation which has appeared in previous Reports, distribution of fire occurrence by forest districts for the past ten-year period is indicated below:—

Forest District.	Fire Occurrence during Ten-year Period 1939–48, inclusive.	Percentage of all B.C.
Vancouver	3,823	24.59
Prince Rupert	586	3.77
Fort George	1,360	8.75
Kamloops	4,750	30.56
Nelson	5,026	32.33
Totals	15,545	100.00

Peak occurrence during the year was earlier than average, with about 58 per cent. of all fires in June and July. In an average year about that same percentage occurs in July and August. The spring hazard, which is usually accountable for about 25 per cent. of occurrence, was, in 1948, negligible and represented only 14 per cent. of all fires.

Dealing with causes, it is noted that lightning was again responsible for more fires than any other agency, roughly one-third of the season's outbreaks. This is slightly under the past ten-year average because most of the electrical storms experienced were accompanied by heavy precipitation. Fires due to campers, smokers, etc., were about the same percentage as the ten-year average, while those due to railways operating showed a marked decrease from 1947 to a point slightly below the ten-year average. There was a notable decrease in number of fires attributed to incendiarism, which this year were practically negligible.

Cost of Fire-fighting.

Full detail under this head is indicated in Tables 53 and 55 on pages 112 and 113. It should be pointed out that the total cost shown in Table 53 covers only expenditure

in wages, food, and transportation for crews actually fighting fire and does not include items of forest-protection organization overhead such as seasonally hired personnel. Also, the cost shown is only cost to the Forest Service and, for a figure of total expenditure on fire suppression for the Province, an estimated sum of $80,872 (Table 42) expended by other agencies must be added.

It must again be reported that cost of fighting lightning-caused fires represented the largest cost in a breakdown by causes, roughly 35 per cent. of total expenditure being represented under this head. Cost of fighting smoker-caused fires approximated 21 per cent. of total expenditure and indicates the need for continued prevention publicity with the general public.

The total cost of suppression, roughly $36,000, represents 23 per cent. of the average over the past ten years. This is due almost entirely to the favourable weather experienced during the season.

Damage.

Total area burned over in 1948 is estimated at 384,356 acres, roughly 80,000 acres above the past ten-year average. Of this area, 371,501 acres occurred in the Fort George Forest District and was roughly 75 per cent. non-commercial cover and non-productive sites. Practically all of this large burn occurred in the Peace River area east of the Rocky Mountains in country extremely difficult of access.

Total estimated damage from all forest fires during the year was $287,192, about 69 per cent. of the average for the past ten years. Here again, the largest percentage—approximately 89 per cent.—occurred in the Fort George Forest District. Total damage to miscellaneous property is estimated at $284,272, about $60,000 over the ten-year average. Sixty-four per cent. of this damage occurred in the Prince Rupert Forest District and was directly attributable to several large operational fires, mainly in the Queen Charlotte Islands.

FIRE CONTROL RESEARCH AND PLANNING.

Planning.

Fire-occurrence maps and fire-analyses ledgers of all forest districts, with the exception of Prince Rupert, have now been compiled and brought up to date with complete information as of the close of the 1947 fire season.

With limited supervisory staff, it was possible to put only two visibility mapping crews in the field again this year. As has been the practice in the past, these crews were recruited from Forest School students at the University of British Columbia and were given a month of intensive training on Vancouver Island before proceeding to the field. This year crews were employed in the southern Kamloops Forest District completing the project commenced last year and continuing up the North Thompson River valley as far north as Valemont.

In addition to the sixty-seven points examined on this project last year, another sixty-five possible lookout-sites were examined in detail this summer, and complete maps and reports made on each. Based on the investigations of the past two summers, a report has been drawn up for the southern Kamloops Forest District and the North Thompson River valley. The report outlines a planned system of lookouts and recommends the development of sixteen new primary lookouts and the abandonment of five existing lookouts that have not proven satisfactory. To supplement the primary lookout network, during periods of reduced visibility and extreme fire danger, secondary points have also been selected and recommended for limited development. Commencement of development of the plan on the ground is proposed in 1949.

Panoramic Lookout Photography.

Loss of trained personnel made it impossible to carry out any of the routine panoramic lookout photography this season. However, a test was made to check the practicability of using coloured film in this work. The results were disappointing; besides being expensive, the coloured prints showed no penetration of haze and no definition of distant detail.

Fire-weather Studies.

Weather-recording.

The trial fire-weather-recording system initiated in a portion of the Nelson Forest District last year and described in the 1947 Annual Report was extended during the summer of 1948 to include all the southern portion of that district. With the 1948 fire season one of the wettest on record in the Nelson District, the recording system did not receive a fair test; however, indications are that it will prove of measurable assistance to general forest-protection activities in the district, and the system is to be put into effect again during 1949.

Investigations.

Investigations to determine optimum elevations for fire-weather stations in different types of topography were continued this summer with the selection of two co-ordinated sites in the vicinity of Cranbrook in the Nelson Forest District.

The Cranbrook area is particularly well suited to a fairly intensive weather study of this nature. With the weather reports from all the reporting Department of Transport stations of Western Canada and North-western United States available at the Cranbrook Airport, and the daily Forest Service weather-station reports available at the Ranger Station, it was hoped that additional information could also be gathered on the location of source regions of our fire weather and the avenues of approach. The local topography was also well suited to all phases of the proposed study. Near Cranbrook the broad Kootenay Valley is joined by the comparatively confined Moyie Valley, a situation particularly suited to a comparison of inversion levels in different types of valleys and to a check of two possible main avenues of approach of fire weather from the hot, dry regions to the south. It had previously been observed that weather conditions in these two valleys often varied considerably, and it was felt that a comprehensive, co-ordinated study there should yield much valuable information.

To sample the weather, two open ridges with southerly exposures were located, one on Moyie Mountain for the Moyie Valley and one on a shoulder of the Steeples Mountain near Bull River for the Kootenay Valley. At each site a series of six weather stations were strung out in open, southerly exposed locations at approximately equal intervals of elevation up the mountain-side from the valley-bottom to the ridge-crest.

The elevations (A.M.S.L.) of the stations on Moyie Mountain were: Station 1, in the valley-bottom, 3,050 feet; Station 2, 3,870 feet; Station 3, 4,530 feet; Station 4, 5,400 feet; Station 5, 6,150 feet; and Station 6, at the lookout, 6,720 feet.

The elevations of the stations near Bull River were: Station 1, on the bench land some 300 feet above the river-bed, 2,800 feet; Station 2, at the foot of the mountain, 3,050 feet; Station 3, 3,730 feet; Station 4, 4,400 feet; Station 5, 5,100 feet; and Station 6, 5,910 feet.

Each station was equipped with a recording hair-hygrograph, a maximum-minimum thermometer, and a set of fuel-moisture indicator sticks and weighing balance. In addition, Stations 1 and 6 of each series were equipped with a rain-gauge. Charts were kept of the fuel-moisture readings, rainfall, and relative humidity.

The location and set-up was ideal for an intensive study of fire weather in this East Kootenay area but, unfortunately from the standpoint of the experiment, the

summer yielded no period of appreciable fire weather—in fact, it turned out to be the wettest summer that most of the local inhabitants could recall.

For this reason, the results of the study are rather meagre and disappointing and, while previous concepts and theories seem to have been reaffirmed and a few new ideas suggested, there was no opportunity for any new discovery of major proportions.

Miscellaneous Projects.

Fuel Moisture Indicator Sticks.—In an attempt to reduce the seasonal weight-loss in fuel-moisture sticks, all possible reasons for the weathering were considered and it was felt that the slightly rough surface of the ½-inch dowelling could be responsible for a large proportion of the weathering.

To test this idea, matched pairs of sticks were exposed for the season on Mount Prevost and the amount of weathering checked at regular intervals. One set of each pair was sanded smooth during the manufacturing process with very fine sandpaper and the other set left unsanded. The results were rather unexpected—and as yet a complete reason cannot be given—but, without exception, the sanded sticks showed a greater weight-loss than the unsanded. With the sanded sticks, the weight-loss seemed to be reasonably steady over the season, whereas the unsanded sticks showed their greatest loss-of-weight rate toward the end of the season. At the end of the season the total weight-loss was very nearly equal for both types, being slightly more for the sanded sets.

Seeding Clouds with Dry Ice.—Through the co-operation of the United States Forest Service, it was possible for this section to receive first-hand instruction from the inventor of the cloud "seeding" principle, Vincent J. Schaeffer, of the General Electric Schenectady Research Laboratory. Depending on the cloud-types present and the amount of dry ice used in the seeding, a hole can be cut in the cloud layer to allow the ascent or descent of aircraft; precipitation can be produced from suitable clouds; and clouds can be stabilized. The prospects of using this last idea for killing potential lightning-storms in their initial stages of development are being studied by Mr. Schaeffer.

FIRE-SUPPRESSION CREWS.

A fire-suppression crew organization was again placed in the field in 1948, functioning for a period of approximately 100 days in mid-season. A total of thirteen crews were in operation comprising, in all, about 135 men.

Four crews functioned on Vancouver Island in the Vancouver Forest District in the form of three 8-man and one 10-man crews. Camps were located at Langford, Nanaimo, Parksville, and Campbellton as being most centralized for most hazardous areas. At these locations, permanent camps have been created to the extent that buildings are improved and proper water systems and general facilities of semi-permanent form installed.

In the Kamloops Forest District three 12-man and two 6-man crews were in operation, with headquarters established at Princeton, Vernon, Kamloops, Penticton, and Kelowna. The two 6-man crews were an adaptation from an original 12-man crew, for flexibility in carrying out improvement-work during the season.

Nelson Forest District operated four 12-man crews, with camps established at Elko and Lumberton in East Kootenay and Erie and Kettle Valley in the West Kootenay portion of the district.

In each forest district, crew organization was under direction of a supervisor whose responsibility included training, project supervision, and all business incidental to the district suppression-crew organization. Twelve-man crews generally included a sub-foreman to allow alternating half-crew on stand-by and project work. All crews

Forest Protection.

QUINSAM SUPPRESSION-CREW CAMP.

Typical of four such camps operated on Southern Vancouver Island, in the Vancouver Forest District.

received training in fire-fighting methods, pump operation, etc., immediately camps were opened and periodically throughout the season. Transport usually comprised a ½- or 1-ton pick-up and a 2½-ton truck per crew used as camp service and project vehicles respectively. Crew men were again, for the most part, university or senior high school students.

Due to the particularly favourable season, few fires were fought by the crews, a total of only thirty-four outbreaks being attended. Due to the same factor, however, a very much increased proportion of crew labour was expended on improvement projects, much valuable work on new installations and maintenance of existing improvements being accomplished during the season. As an example, one outstanding project completed was construction of a remote radio receiving-station in the Kamloops District. This project involved ditching and laying of underground cable a distance of something over 2 miles.

As a comparison with the tabulation appearing in previous reports, the record of suppression action for the season is indicated below:—

RECORD OF SUPPRESSION-CREW ACTION, 1948.

Size of Fire when attacked.	Number of Fires.	Subsequent Spread (by Number of Fires).				
		¼ Acre or less.	Over ¼ Acre to 1 Acre.	Over 1 Acre to 5 Acres.	Over 5 Acres to 50 Acres.	Over 50 Acres.
Spot (up to ¼ acre)	30	28	1	....	1	....
Over ¼ acre and up to 1 acre	3	....	2	1	....	....
Over 1 acre and up to 5 acres	....	....	....	....	....	....
Over 5 acres and up to 50 acres	1	....	....	....	....	1
Over 50 acres	....	....	....	....	....	....
Totals	34	28	3	1	1	1

AIRCRAFT.

The contract covering Forest Service charter flying negotiated with a commercial air line prior to the 1946 season expired at the close of the 1947 season. Early in 1948 tenders were called and a new one-year contract subsequently negotiated. Under this contract a total of six aircraft were furnished by the contracting company; two twin-motored land aeroplanes were based in the Nelson Forest District; one twin-motored land aeroplane and one light transport type float aeroplane in the Kamloops Forest District; and two float aeroplanes in the Prince George and Prince Rupert Forest Districts. All aircraft, while based at specific points, were available on call in cases of necessity in other forest districts. During the year a total of approximately 500 hours of flying were completed.

All aircraft were fitted with aircraft-to-ground radio equipment similar to that in effect during the 1947 season. There was a notable improvement in air-to-ground communications.

The season was such that the need for aircraft in protection was at a minimum. Chief usage was in fire detection and light transport of men and supplies, and parachuting of equipment was carried out to a minor extent. Servicing of some of the more inaccessible lookouts and survey parties was also carried out in some districts by parachuting.

From June onward, under the new contract, one of the new De Havilland "Beaver" aircraft was placed in service by the operating company. This type of ship proved particularly adaptable to forest-protection requirements; it operates at a reasonable cost with good pay-load, and altogether gives the impression of being the type of ship

which has been sought for many years for general bush flying. Experience during the summer indicated that this type of aircraft, for many purposes, was capable of handling the work of at least two of other types of aircraft previously employed at a very comparable cost ratio.

In addition to the group charter, local aircraft were hired to a limited degree to cover emergency situations when charter aircraft were otherwise engaged. The outstanding case of this nature during the 1948 season were operations in the Prince Rupert Forest District, out of Terrace, to gain detection coverage over the territory included in the recently negotiated management licence in the Kitsumgallum area to the north during a temporary hazardous period in that area.

MECHANICAL EQUIPMENT.

A gradual but noticeable improvement in the mechanical equipment and supply picture was experienced during the year.

In spite of the persisting steel shortage and the Federal austerity programme involving restriction of imports from the United States, delivery was obtained on the bulk of current and back-ordered items of mechanical equipment.

AUTOMOTIVE.

In the automotive field, only seven of the year's vehicle orders remain unfilled, and factory representatives give assurance that full delivery may be expected in the near future. This is a very much improved situation over that which obtained at this time last year and for some years previous. Additions to the fleet during the year were as follows:—

Sedans	7
Coupes	13
Coaches	2
Sedan deliveries	5
½-ton light deliveries	30
1-ton light deliveries (for conversion to tankers)	2
Jeeps	6
1-ton Willys, four-wheel drive	1
Dodge power wagons	4
Heavy duty 2½–3-ton	10
Total	80

The 80 vehicles include a small number of 1947 back-orders on which delivery was obtained between January and April of this year. Of the 80, 54 were replacement units and the balance additions to the fleet which, at the close of the year, totalled slightly over 400 vehicles of all types.

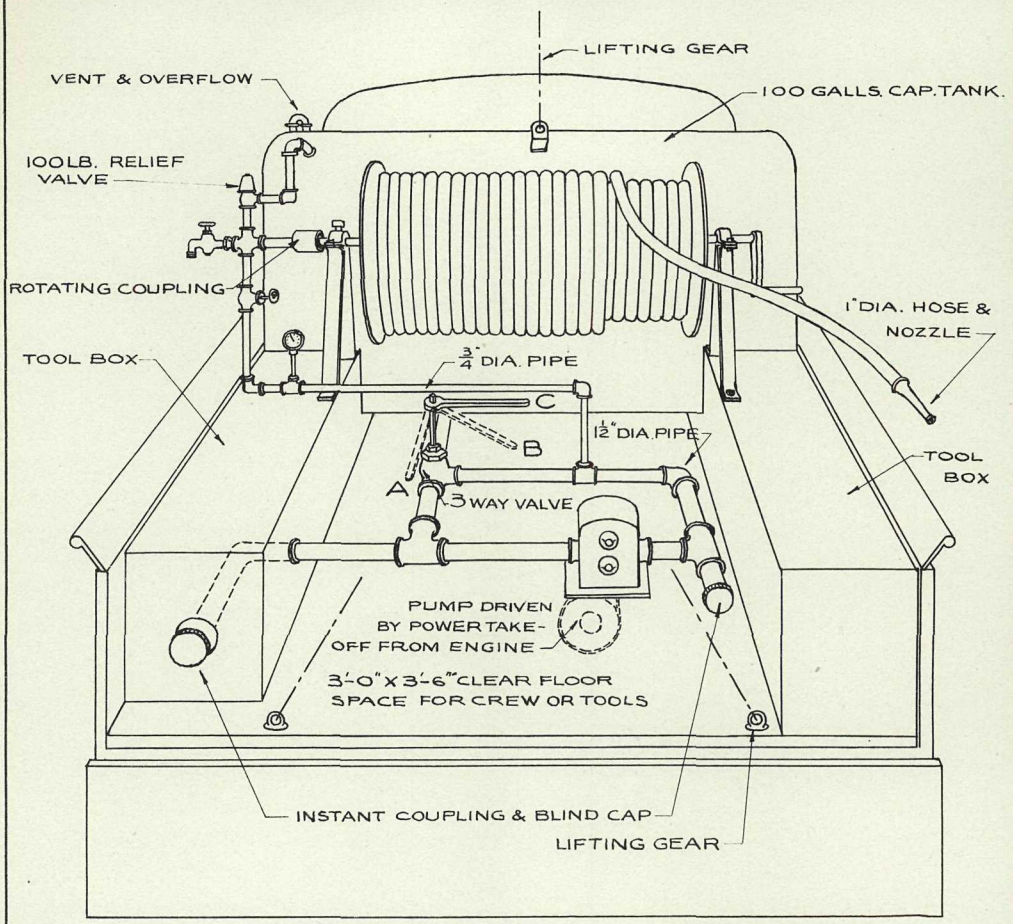
It is worthy of remark that passenger-type models now being manufactured are increasingly unsuited to Forest Service needs. A large proportion of the car travel by rangers and supervisory officers is on back roads, and the restricted clearance, full fenders, and other refinements now being built into passenger cars are unsuited to such use. Passenger-cars with high clearance are currently unobtainable from the manufacturers and, presumably, will be off the market until the backlog of civilian requirements is fully met.

TANKERS.

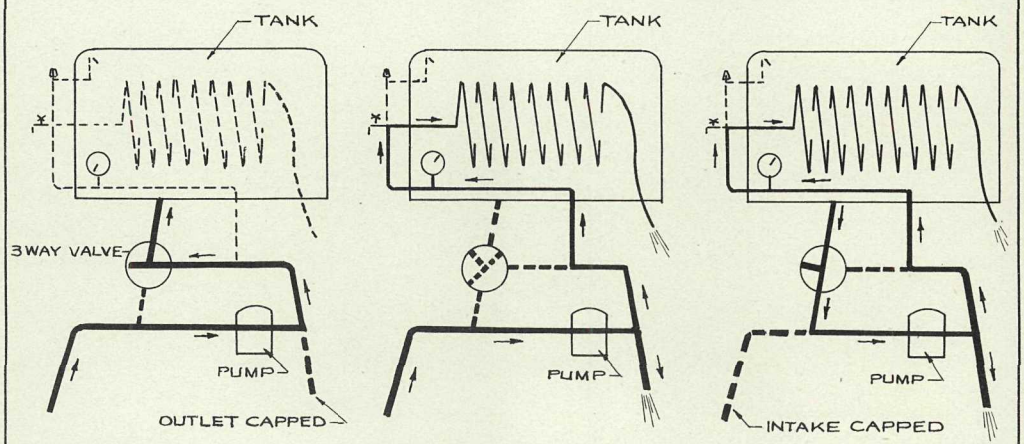
For some years the Service has operated light tank-trucks in more hazardous localities where water is at a premium and roadside fires predominate, or ready truck

BRITISH COLUMBIA FOREST SERVICE.

DROP-ON TANKER UNIT FOR INSTALLATION ON 1 TON TRUCK.



SEE EXPLANATORY DIAGRAMS BELOW FOR VARIOUS ADJUSTMENTS OF VALVE.



FILLING BY SUCTION.
HANDLE AT POSITION: 'A'

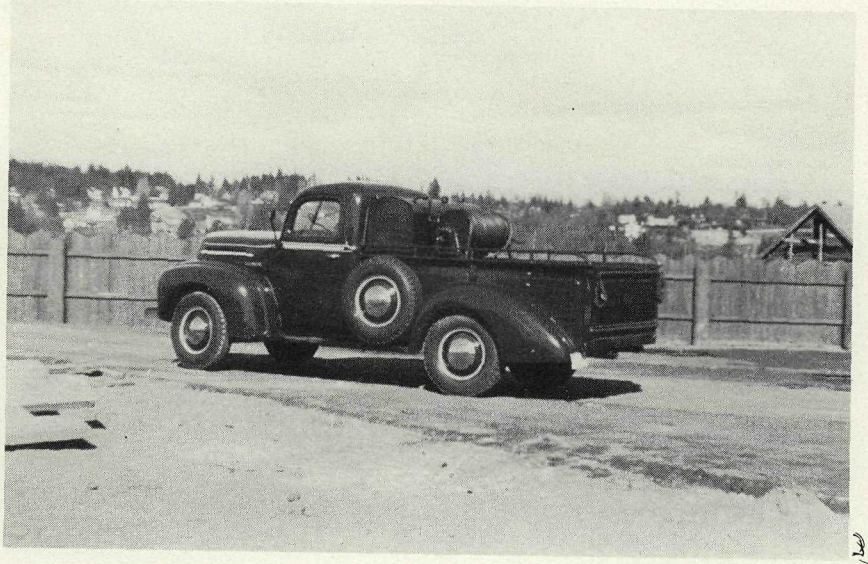
DELIVERY FROM SUCTION.
HANDLE AT POSITION 'B'

DELIVERY FROM TANK.
HANDLE AT POSITION 'C'

FILE: 0143615

Forest Protection.

DROP-ON TANKER UNITS.



Two views of unit installed on standard 1-ton truck.

access to fires is practicable. These tanker units, built to Forest Service specifications, comprised tank, pumper equipment, and live reel grafted as a fixed unit to standard 1-ton trucks. The units, in so far as their function as tankers was concerned, proved very satisfactory but, from a general transport standpoint, were not flexible, inasmuch as the vehicle with a fixed pumping unit attached became a one-purpose vehicle. It was realized that, for more flexible use, it would be desirable to have the tank and pumping equipment designed as a " drop-on " unit which could be removed at the end of the fire season and the vehicle used for general off-season transport purposes.

Accordingly, during 1948, the first " drop-on " tanker unit was designed, constructed, and placed in operation. It may be removed or replaced readily in a matter of a few minutes with proper lifting tackle. The new tanker is illustrated by photograph and diagrammatic sketch elsewhere in this Report and following is a detailed description of the complete unit.

The " drop-on " assembly is based on a sheet of 10-gauge sheet steel suitably reinforced, 7 feet 5 inches long and 53½ inches wide, which is shaped to fit the floor of the rear box. Two steel tool-boxes, 9⅛ inches wide, 11¾ inches high, and 6 feet long, are mounted on this metal base at opposite sides and a 100-gallon tank, 53½ inches wide, 20⅛ inches long, and 42 inches high, is attached to the front of the plate. Just back of the water-tank, between the two tool-boxes, a metal base, 24¾ inches long and 33½ inches wide, is installed on which is mounted a " Granco " 2-inch bronze-lined pump with a capacity of 50 United States gallons per minute at 400 revolutions per minute. A sprocket is fitted to the drive end of the pump, and this is coupled by a chain to a special drive-shaft and sprocket located under the floor of the rear box, coupled to a heavy-duty power take-off which is attached to the transmission gear-box. Two 1-inch holes bored through the mounting plate and deck floor are used to lead the driving chain from the pump to the sprocket on the shaft under the floor. A three-way valve is also bolted to the mounting plate, with the spindle of the valve-body projected vertically through a cover plate which is fitted over the pump assembly and attached to a control handle which may be rotated in a horizontal direction. Three operation positions are available—" fill tank," " straight pumping," and " pump from tank."

The suction pipe is brought to the rear of the assembly through the left tool-box and is accessible by dropping the truck tail-gate. A 1½-inch discharge outlet is brought through the metal sheathing built around the pump assembly, and a live reel containing 250 feet of ¾-inch garden hose is mounted just above the pump. For carrying a 10-foot suction hose, a tube is installed under the truck made of 2½-inch boiler tubing, with a special 6-foot extension tube for the suction hose carried in brackets in the left tool-box.

All necessary plumbing is contained in the " drop-on " unit, the only hook-up between the unit and the truck, other than the four hold-down bolts, being the sprocket chain which can be quickly removed by opening the master link. Plates were built into the truck deck threaded to fit the four hold-down bolts, allowing for quick installation or removal.

The 1-ton pickup-type trucks use a rear box fitted with fender wells. For this reason, it is not possible to slide the tank assembly in and out of the truck. Accordingly, three eyelets were fitted at suitable points and a special lifting chain fabricated which lifts the tanker unit on a level plane.

With the favourable fire season experienced, the trial unit received only limited usage in the field, but reports indicate that it functioned very satisfactorily. If further trials indicate continued success, it is proposed to adopt, in future, this form of tanker in lieu of the fixed-unit type.

Tractors.

Delivery was taken during the year of two medium crawler-tractors with supplementary transport in the form of two heavy-duty trucks. These units were allocated, one each, to the Kamloops and Nelson Forest Districts.

One unusual item acquired in 1948 was a crawler-tractor compressor. This unit was placed in service with the Reforestation Division on development-work in preparation of planting-sites. The unit uses standard parts for the whole mechanism other than the special cylinder heads; the engine, transmission, rear end, and hubs are readily obtainable Ford parts.

Outboard Motors.

It was possible during 1948, for the first time since production was resumed, to acquire outboards of all types. Delivery was delayed on some models, but all orders were eventually filled. A total of fifteen units were acquired and placed in service, comprising three 2.5-horsepower, one 5-horsepower, one 7-horsepower, two 9.8-horsepower, four 16-horsepower, and four 22-horsepower units of various makes.

Fire-pumps.

During the year an additional thirty-five Bennett-MacDonald initial-action pressure pumps were manufactured at the Forest Service Marine Station and supplied to the field. These units are essentially the same as the initial model, with some slight modifications which developed out of experience with the initial units. This small pumper is finding great favour with fieldmen, particularly in those districts where average fire-access is over difficult terrain and the packing-in of heavier pumping equipment is precluded.

In addition to the Bennett-MacDonald pumps supplied to the field, sixteen commercially manufactured medium-weight pumps were acquired and placed in service.

Miscellaneous Mechanical Equipment.

A small number of chain-saws were supplied to the Forest Economics and Parks Divisions and silvicultural crews working in the Kamloops and Nelson Forest Districts. This type of equipment, in the lighter models, is proving of particular value in Interior slash-disposal work involving limbing of down trees, tops, and such light work.

A road-maintainer was acquired for use of Parks Division and at present is in use on the Seymour Mountain Park project in road-maintenance and snow-removal.

Also obtained for Parks Division use during the year was a gasoline-driven yarder. The primary use of this equipment is in clearing ski-runs and general improvement-work in connection with park-development.

Mechanical Inspection.

During the year mechanical equipment in all forest districts, except the Vancouver District, was fully inspected by the mechanical inspection staff. Inspection of the Vancouver District equipment is to be completed shortly after the first of the new year. Loss of personnel during the year and spring floods with resultant impassable roads slowed this work this year and was primarily the reason for deferring Vancouver inspection until next year.

Inspection-staff vacancies have since been filled and will be supplemented by additional personnel in the immediate future. With the completion of training and breaking-in of the new staff, it is proposed to place resident Inspectors in the separate districts functioning as part of the district organization and retain only the mechanical

Forest Protection.

THE LAUNCH "WELLS GRAY."

One of the fleet of Ranger launches serving the Vancouver Forest District. This vessel was rebuilt at the Forest Service Marine Station during 1948.

administration staff and one or two Inspectors at Victoria headquarters. This arrangement will only be possible when the new inspection staff has had the opportunity of assimilating procedure and becoming fully familiar with the work directly under the Mechanical Superintendent at Victoria.

FOREST SERVICE MARINE STATION.

Work performed at the station during the year still maintained a high level, with the usual launch-overhaul programme representing a fair average of past years and extra-routine work, such as building prefabrication, construction of river-boats, renovation of newly acquired launches, manufacture of instruments, and equipment on the pump floor, etc., showing a definite increase.

Staff averaged thirty-one, comprising the superintendent, fifteen permanent and fifteen non-permanent personnel—an increase in permanent staff and about the same number in the non-permanent group compared with 1947. The number of non-permanent staff fluctuated over the year, depending upon the particular type and volume of work going through the station.

It was possible to carry out a number of improvements to the station and ground during the twelve months. This included installation of a blower system, to carry away wood-waste from the carpenter-shop, which has made a considerable saving in labour and clean-up at the close of the day's work. The installation has also materially decreased fire hazard. An incinerator was installed well away from the buildings for disposal of the waste. Drift from the river has always been troublesome in the launch-storage well and ways, and this has been overcome to a large extent by the placing of boom-sticks across the entry-openings to these parts of the station. It was again necessary to carry out dredging to take care of silt deposits at the launch approach to the station. These deposits were particularly heavy this year, due primarily to the heavy flood conditions prevailing on the river in the spring. The dyke along the north-western portion of the station property was also reinforced, and it is hoped that the old trouble of periodic flooding at this point has now been overcome. The station grounds in front of the main building and up to the road approach were landscaped to some extent and, as time allows, this work is to be extended to both sides of the entry drive in the new year. A major improvement carried out was completion of the new marine ways, on which contract was let in the closing months of last year. This set of ways will take the largest launches in the Service with ease and will very much facilitate the general launch-overhaul programme which, in the past, has been held up due to the limitation of ways. Tenders are now being called for the housing-in of this new set of ways as a wing of the present station building. When completed, the new wing will conform in appearance with, and actually form part of, the main station.

During the year, in the marine section of the station, the ways were occupied forty-one times, including several major overhaul and rebuilding jobs. The acquisition of a "swing boat" to rotate in service as relief for Ranger launches up for overhaul has more than proven its worth, and a regular uninterrupted programme for overhaul of Ranger boats is now possible, allowing the Ranger field-work to proceed without interruption while the regular launch is in for repair. One of the major projects undertaken in the marine section during the year was on the launch "Wells Gray," which was rebuilt from the ribs up and accommodation revamped to afford more space and headroom. Three 26-foot cruiser-type launches purchased during the year were remodelled to Service use and reconditioned for Interior lake purposes. Also, a 26-foot hull purchased in unfinished condition was completed as a cruiser-type lake launch. A pilot-house was prefabricated and subsequently installed on the Adams Lake landing-craft in the Kamloops District. Six 30-foot and one 22-foot river-boats were manu-

factured for Interior district use and eight new launch-dinghies were constructed for use and stock. Construction of two new 35-foot blimp-type launches is well under way as replacements for outworn Assistant Ranger launches in the Vancouver District. These craft should be completed and ready for service early in the new year.

In the carpenter-shop and prefabrication-shed, twelve lookout buildings were prefabricated and shipped to various forest districts. These are described elsewhere in this Report. In addition to the buildings, seven complete sets of prefabricated furniture for lookouts were manufactured and will be shipped to districts for service during the coming season. Additional miscellaneous items manufactured in this section of the station included four ship's tables and stools, two launch meat-safes, one office stationery cabinet, and one launch refrigerator.

Work on the pump floor of the station during 1948 included overhaul and repair of 109 fire-pump units and overhaul, repair, or rebuilding of forty-five outboard units. In addition to this routine overhaul programme, thirty-five Bennett-MacDonald pumpers were assembled and distributed for field use; a total of eighteen alidades for lookout use were manufactured; and fifty standard-pump tool-boxes were completed and fitted out for field use. In the experimental line, this section completed work upon a fire-finder, incorporating both vertical and horizontal angles. There are several small refinements yet to be made on this instrument, but details of these have been worked out, and manufacture of an initial fifty units is to be carried out immediately. The instrument was devised by M. K. Bennett, foreman-mechanic at the station, and will be known as the Bennett fire-finder.

BUILDING AND CONSTRUCTION.

In spite of rising costs of materials and labour, plus a continued scarcity of some of the more essential articles, the ambitious construction programme commenced in 1947 was continued in the past year. It was considered essential that the programme be maintained in order to keep pace with the heavy increase in general activities of the Service, these, in the past four or five years, having seriously outgrown existing accommodation both in office and warehouse space.

Following is a tabulation of major new projects undertaken during the year, giving construction agency and progress to date:—

Location.	Type of Building.	Constructing Agency.	Progress to Date.
Alert Bay	Ranger office	Contract	Contract being negotiated.
Alexis Creek	Addition to Ranger office (residence)	Forest Service project	Work proceeding.
Birch Island	Completion of Ranger residence		Pending.
Barriere	Ranger office and stores building	Contract	Work proceeding.
Cowichan Lake	Ranger office and stores building and four-car garage		Clearing site.
Canal Flats	Ranger office and stores building and four-car garage	Contract	Work proceeding.
Columbia Crossing	Assistant Ranger headquarters	Contract (labour only)	Completed.
Duncan	Addition to office	Forest Service project	Completed.
Edgewood	Ranger office and stores building and four-car garage	Contract	Work proceeding.
Elko	Ranger office and stores building and four-car garage	Contract	Work proceeding.
Houston	Ranger office and stores building		Pending.
Kelowna	Alterations to Ranger office and stores building	Contract	Work proceeding.
Kootenay River	Bridge	Forest Service project	Work proceeding.
Kettle Valley	Ranger office and stores building and four-car garage		Pending.
Mission City	Ranger office and stores building and four-car garage	Contract	Work proceeding.
McBride	Ranger office and stores building and four-car garage	Contract	Contract being negotiated.
Nelson	Warehouse		Plans in preparation.
Sechelt	Ranger office and stores building and four-car garage	Contract	Work proceeding.
Sicamous	Ranger office and stores building	Contract	Work proceeding.
Smithers	Four-car garage	Contract	Work proceeding.
Terrace	Ranger office and stores building and four-car garage	Forest Service project	Work proceeding on garage.
Vanderhoof	Four-car garage	Forest Service project	Work proceeding.
Vancouver F.S.M.S.	New wing completion	Contract	Contract awarded.
	New prefabricated building	Forest Service project	Work commenced.
Westbank	Assistant Ranger headquarters	Contract	Work proceeding.

Difficulty was again encountered in all districts in obtaining reasonable tenders from private contractors on various construction projects. In some instances, where need was outstanding, this difficulty was met, as in former years, by organization of Forest Service construction crews.

The need for expansion of facilities at the Forest Service Marine Station has been felt for some years and, during late 1947 and through 1948, a start was made on this project. A new 100-ton ways and carriage was installed and tenders have been called on housing this unit as a wing of the present building. Plans are in the making for a new building to serve as a combination lumber-storage and prefabricated-woodwork shop, eliminating several inadequate temporary structures at present on the property. The year 1949 should see this latter project well under way.

To cope with the expanded building programme, it was found necessary during the year to increase the structural design staff of the Division. The staff now includes a supervising draughtsman, who serves also as a structural superintendent, and two structural draughtsmen. New office-quarters at Victoria have materially bettered the working conditions of the structural section.

Additional to these projects, during the year prefabricated lookout buildings were constructed at the Forest Service Marine Station for distribution to various forest districts. Seven of these buildings were of the standardized sectional-type plywood-construction design established last year, two being cupola type and five single-story

cabin design. The remaining five buildings were of a new-type lookout structure, being an 8- by 8-foot cabin-type sectional building for use on towers or as an observation post on a lookout peak where living-quarters, through necessity, had to be established lower down the mountain. This latter type of building was an adaptation of the cupola portion of the standard single-story-with-cupola building. The prefabricated lookout buildings erected during 1946–47 have stood up to conditions remarkably well and proven themselves from the standpoint of economy and general flexibility in use. A further building programme is planned in these buildings for the coming year.

RADIO COMMUNICATION.

During the year, expansion of the network continued with the establishment of a number of new stations and, although a particularly favourable fire season created less-than-average demand upon radio communication, the number of messages handled showed a marked increase over 1947. The volume of routine Departmental business now being handled by radio is such that it is essential the network be kept at maximum efficiency and all modern improvements within economic reach be incorporated.

New equipment acquired comprised thirty-five standard Forest Service-type portable SPF units and eight PAC electric trans-receivers. Additional to these, nine launch receivers and one launch transmitter of a special type were built to Forest Service specifications by manufacturers. In the Forest Service Radio Laboratory at Victoria, construction was completed on three multi-channel, remote-control receivers, three portable single-channel remote sets, and two headquarters eight-channel transmitters of 200 watts output. In all, the network has been increased during the year by forty-three transmitters and fifteen special-type receivers.

With the marked success of the first remote-control installation at Nelson headquarters in 1945, general policy has been to improve reception by removing receiving equipment from the source of interference. This is a long-term project, but an excellent start has now been made.

The remote-control projects undertaken in 1948 were far more complex than were previous installations. At Kamloops it was necessary to carry two wires across range country up a steep hill to an elevation two miles south of the Government building. Ordinarily, telephone-poles and open wires would have made this a comparatively simple task, but these were impractical for several reasons, and it became necessary, therefore, to bury two miles of lead cable to the summit.

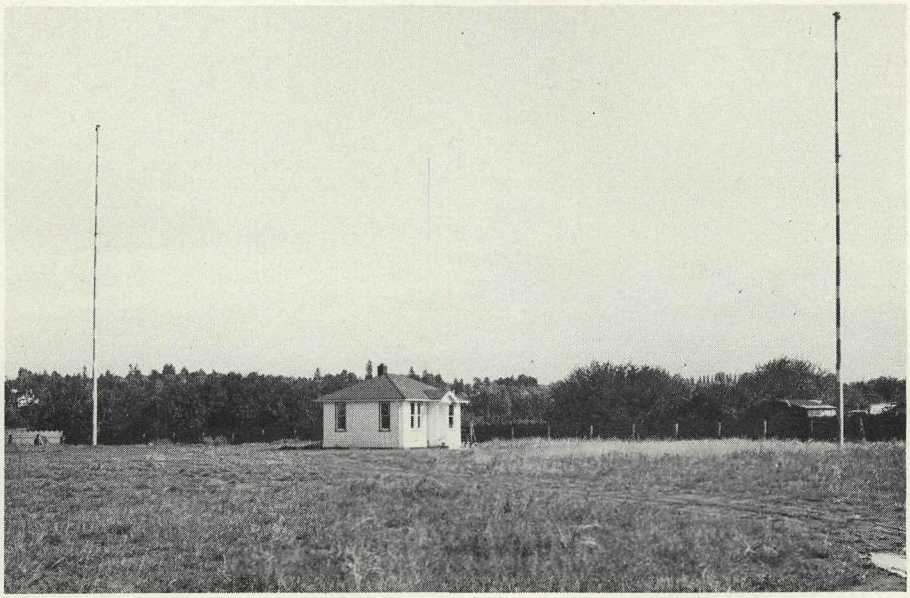
In Victoria, through co-operation of Federal authority, the " remote " site chosen was upon the Dominion Astrophysical Observatory reserve at Little Saanich Mountain. Here, the erection of ordinary poles was again impractical and both power and telephone connections had to be carried over 800 feet of solid rock.

In Prince Rupert, installation-work is still proceeding, but the installation will be complete before the end of the fiscal year. The project involves a telephone-line up Mount Hays and establishment of a receiver at the Department of Transport's remote-control house at the summit. Transfer of signals to the headquarters operating room at the District Forester's office in Prince Rupert will be effected over 2 miles of Forest Service telephone-line and 4 miles of leased Government telegraph-wire.

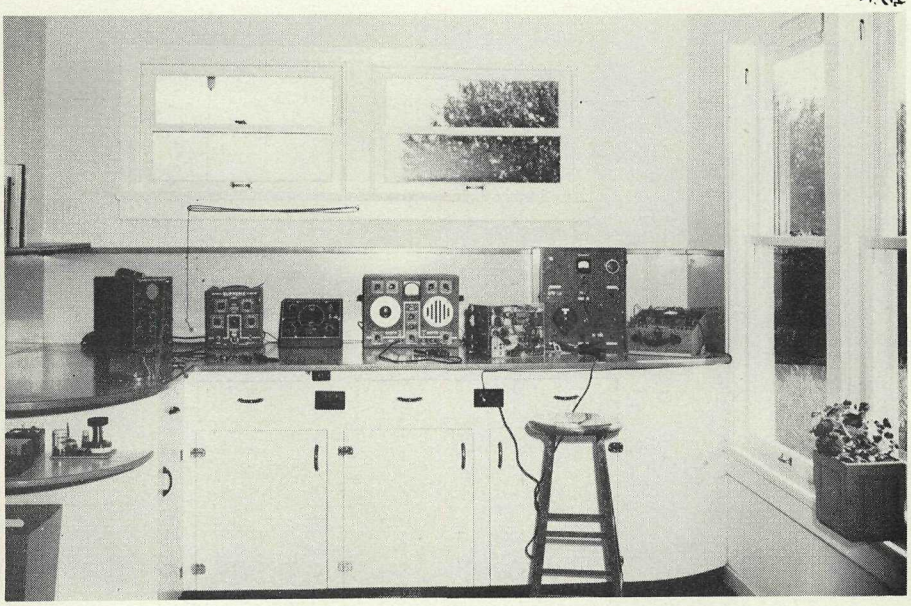
There is a continuing need for special equipment not obtainable in stock models. This need is met as far as possible by construction in the Forest Service laboratory in Victoria and by having equipment built commercially to specifications. For example, with all Vancouver District launch receivers and transmitters now averaging 10 to 12 years in age, decision was made to first replace all receivers. There is no adequate receiver on the market which will operate from battery and supply both medium frequencies and broadcast bands. Special units were, therefore, built to our specifications, based on past experience with launch-work and taking into account future

Forest Protection.

VANCOUVER DISTRICT HEADQUARTERS RADIO STATION.



Building contains operating-room, repair-room, stock-room, and storage-space.
Masts are 70 feet high.



Interior view of repair-room, showing completely equipped service bench.

requirements. These receivers have five crystal-controlled medium-frequency channels and the broadcast band. No extra batteries are required, and units are instantly removable and replaceable by unskilled labour when repairs become necessary. This type of set will, in future, be known as the RFL-MK-I and can be utilized on any launch providing 32-volt power-supply.

None of the standard launch transmitters were replaced in 1948, but a new set using 100 watts in lieu of 50 was constructed commercially to our specifications for the Vancouver headquarters launch " Syrene." So marked was the improvement in signals with the extra power that decision has been made to utilize 100 watts on all future launch sets if it is possible to obtain a unit of that power.

In line with the general policy of increasing power on the network, two 200-watt transmitters were built during the year by Forest Service technicians in the Victoria laboratory — such sets being unobtainable on the market under $3,000 each. Just before the construction of these units was completed, the Service was assigned three extra frequencies in the higher-frequency channels, and the design of the new unit had to be corrected. These two units, when completed, are each capable of transmitting on nine channels up to 9.255 megacycles.

The allotting of additional frequencies to the Service has involved a complete change in style of Forest District headquarters remote-control receivers. These now require eight channels instead of four and employment of an improved control system, allowing receivers to be operated singly, in groups, or all at once. Two of this type of remote receivers will be in operation by the end of the year—one at Prince Rupert and one at Victoria headquarters.

The Service is now in greatly improved position in respect to frequencies. With recent allotment in our favour of 5915-, 7550-, and 9255-kilocycle frequencies, all suitable for long-distance work, it is possible to anticipate a marked improvement in operation of the network as compared to our previous operation on the old frequencies, the highest of which is 3430 kilocycles.

Some experimentation was carried out on the 35–40 megacycle channel, FM, as a preliminary to more extensive work on this band in the future. Results were good up to thirty miles, but it was not possible to establish consistent contact between Victoria and Vancouver. Further FM tests are proposed on 152 megacycles.

With the continued increase in volume of traffic handled and the coincident expansion of network facilities involving stepped-up maintenance and construction of new units, an increase in radio technical personnel was necessary during the year. This involved employment of two additional technicians at Victoria and placing of operators at headquarters stations to release the previous operator-technician at those points for straight technical work.

The construction programme for 1949 includes the redesigning of three remote-control receivers and four transmitters, the latter to be capable of transmitting on eight frequencies each. In addition, in line with the policy of supplying high-noise-level Ranger stations with small remote-control receivers, a number of these will also be built at the Victoria laboratory for installation both on the Coast and in the Interior.

The 1949 programme includes work in connection with Coast Ranger launch installations. With most launch transmitting units in continuous service for ten or twelve years with a minimum of maintenance, it is proposed to replace these old sets gradually with modern multi-channel units. The number to be replaced in the combined Prince Rupert-Vancouver fleets is uncertain at this time, but five new sets are anticipated. These sets will also allow ships to contact Coast telephone stations and, through them, the headquarters office, giving an alternative communication system when conditions prevent contact with their routine headquarters.

In the past, Assistant Ranger launches have not been radio-equipped and, consequently, have given less than optimum value due to inability to communicate direct with their Ranger launches or headquarters. It is hoped that 1949 will see small compact units constructed to operate from a 12-volt system installed on one or two of these Assistant Ranger launches for test purposes. If these prove a success, all Assistant Ranger launches in the Vancouver District will be so equipped in the future.

The possibility of making use of FM, as mentioned in a previous paragraph, is not being neglected. However, until the present major changes planned in the existing system have been completed, affording efficient communication for some years ahead, no great expansion into the FM field is anticipated. Some experimental work is planned in 1949, with the probability that results will allow at least one short-range FM network in 1950.

At the close of 1948 the number of sets and types in use in the Service are: Type SPF sets (portable), 271; type PAC sets, 53; type S-25 sets, 6; HQ transmitters 50-watt, 2; HQ transmitters 100-watt, 1; HQ transmitters 200-watt, 3; launch trans-receivers, 15; HQ remote-receiver installations, 6; Ranger-station battery remote-control receiver installations, 6. Total, all types, 363.

As an indication of the expansion of traffic handled on the inter-district network, it is interesting to note the marked increase in formal messages passed through Victoria Headquarters Station CZ2F. Messages handled in 1945 totalled 1,330; in 1946, 2,558; in 1947, 2,923; and in 1948, 4,886. These totals do not include twice-daily weather reports and weather-station data during the fire-season months, and many hundreds of unnumbered messages and inter-district conversations. Formal messages handled by district headquarters control stations during the year were: Vancouver, 4,093; Kamloops, 2,029; Nelson, 1,523; Prince George, 1,640; and Prince Rupert, 1,242.

SLASH-DISPOSAL AND SNAG-FALLING.

Slash-disposal operations in 1948 indicate that spring burning is finding increasing favour with the industry, with sixty-nine operators conducting spring slash-burns as compared to forty-one in 1947. A total of 3,026 acres was burned over during the spring, as compared to 2,700 acres in the spring of 1947. Results obtained were uniformly satisfactory.

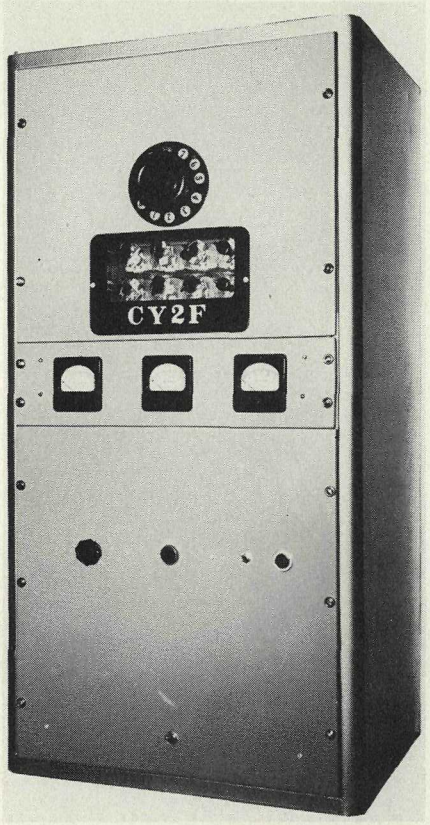
The industry this year was able to function satisfactorily throughout the entire fire season without interruption by industrial dispute, forest closures, or prolonged dry weather. With a consequent maximum acreage logged over, conditions in the fall sharply pointed the continuing need of long-range planning, timely preparation, and prompt action in dealing with hazard abatement. In the most-favoured localities an ideal set-up for broadcast slash-burning was presented only during the four-day period September 9th to 12th, inclusive. On September 14th rainfall of 2.6 inches was recorded. In spite of the fact that broadcast burning was thus terminated abruptly and much earlier than usual, operators continued to spot-burn intermittently as weather allowed until October 21st, when snow on the higher elevations coupled with rain at sea-level halted activity in hazard abatement on practically all areas.

Average cost of disposal, based on figures supplied by operators and considering the total acreage of slash burned during the year, is estimated at $1.46 per acre or approximately 3.6 cents per thousand. Damage occurring through slash-burning is estimated at only $477, comprising a small value in standing forest-cover destroyed and the balance in property and cut products.

In recapitulation, a total of 76,667 acres of forest land was logged during 1948 in the Vancouver Forest District. Of this acreage, 56,778 acres were examined by forest officers and reported upon in connection with hazard abatement. The balance of

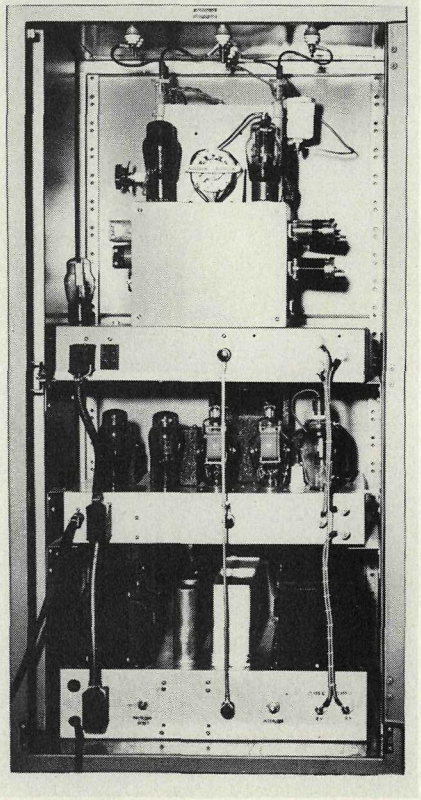
Forest Protection.

RADIO EQUIPMENT.



Front view of an eight-channel transmitter of 200 watts. This unit covers all Forest Service frequencies from 2848 to 9255 kilocycles.

TYPE HQT 200-8.



Rear view, showing the RF deck at top, the modulator unit centre, and the power supply below.

19,889 acres was logged subsequent to September 1st and slash-disposal requirements will accordingly be dealt with in 1949.

Compensation for failure to comply with the provisions of section 113A was levied during the current calendar year as follows:—

Cause.	Number of Operations.	Acres.
Failure to dispose of slash as instructed	83	3,955.75
Failure to fall snags	39	1,765.00
Totals	122	5,720.75

Detailed statistics on all slash-disposal for the year 1948 appear on pages 107 and 108 of this Report.

In addition to snag-falling carried out by the industry concurrent with logging, a Forest Service project in this work was completed during the year under the supervision of the District Forester, Vancouver. This project involved cleaning up scattered snags over an area of some 1,500 acres partially felled in 1947 and snag-falling an additional area of 112 acres in the vicinity of Roberts and Mud Lakes in the Sayward Forest. The project ties in with one recently completed by the Service in the vicinity of the latter lake and establishes a snag break extending southerly through reforested areas from Roberts to Trout Lakes.

PREVENTION.

With the exceptionally favourable fire season, no general closure proved necessary during the year in the Vancouver Forest District. However, the Sayward Forest was closed to travel for the period June 30th to September 18th, with entry allowed only under permit. A new patrol-cabin and gate was established near Elk Falls to control entry to the forest from the south. The old establishment at Duncan Bay was abandoned. Menzies Bay traffic-gate was also manned throughout the period of closure. The Sayward Forest pamphlet was revised and again distributed, and was well received.

In the Kamloops, Prince Rupert, and Prince George Forest Districts the wet season obviated the necessity of any closures.

In the Nelson Forest District, only one closure was invoked under section 119 of the Act—namely, Koch Creek area, which was closed for slightly over five weeks. Later in the season in this district, a closure under authority of section 161 of the Act was placed on the Upper Kootenay Valley roads. This area is one of the better growing-sites in the district and is subject to heavy travel during the hunting season.

Following in tabular form, for comparison with prior Reports, is detail of the 1948 forest closures:—

FOREST CLOSURES, 1948.

Area.	District.	Effective Date.	Date suspended.
Sayward Forest	Vancouver	June 30th	Sept. 18th
Koch Creek	Nelson	July 22nd	Aug. 27th
Upper Kootenay roads (closed under section 161, subsection (3), of the Act)	Nelson	Sept. 20th	Nov. 23rd

CO-OPERATION—OTHER AGENCIES.

The usual excellent co-operation from honorary fire wardens and fire-prevention officers must again be acknowledged with thanks and appreciation. In 1948 the honorary fire-warden organization numbered 775 throughout the Province. These public-spirited citizens voluntarily undertake duties in their local communities year

after year, and perform a most valuable function in the forest-fire-suppression organization.

Acknowledgment must also be made for the excellent co-operation again received from the Royal Canadian Air Force and various commercial air lines and private pilots in detecting and reporting of fires.

FIRE-LAW ENFORCEMENT.

Information was laid in only sixteen cases during the year throughout the Province. This is a very marked reduction over last year's figures and slightly over 50 per cent. of the ten-year average. Of total prosecutions, convictions were obtained in all but two cases, where charges were subsequently withdrawn. Half of the sixteen cases were for burning without a permit and five cases were failure to maintain proper fire-protection equipment. It is notable that not a single prosecution proved necessary in the Nelson Forest District.

INSECT-CONTROL.

In the summer of 1947, patches of severe defoliation in Douglas fir were noted throughout the area extending from Dutch Creek to Radium Hot Springs in the East Kootenay region of the Nelson Forest District. Following examination and study by forest entomologists of the Dominion Science Service, it was determined that the cause was an outbreak of the false hemlock looper, covered approximately 17,000 acres, and that control measures by the Forest Service in 1948 were required if extensive areas of insect-killed forest were to be avoided.

The Province-wide flood situation disrupted all transportation facilities for the greater part of the month of June, with the result that spraying operations did not get under way until the morning of July 1st. The project was completed on July 24th, by which time 11,180 acres had been sprayed, using 11,485 gallons of oil spray containing 1 lb. of D.D.T. in solution per gallon.

Spraying was done with a Bell helicopter, model 47B3, powered with a Franklin 6-cylinder opposed engine generating 178 horse-power. The machine was fitted with 20-foot spray booms, having thirty-two nozzles spaced 6 inches apart. The spray was applied at the rate of 1 gallon per acre with a flying speed of 60 miles per hour. Maximum load for the aircraft was 300 lb. operating at elevations of 3,200 to 3,600 feet above sea-level. The width of strip sprayed was 60 feet and marking was done with the aid of hydrogen-filled balloons. A total of 466 flights were made, averaging about 25 gallons per flight.

Operations were dependent upon the weather, and the best times for spraying were found to be from 4.30 to 9.30 a.m. and from 7 to 9 p.m., when wind velocities were less than 8 miles per hour.

From an operational point of view, experience indicates a helicopter used in conjunction with a fixed-wing aircraft would have been more practicable for the type of area involved. Such a combination would permit the helicopter to treat the broken areas and the fixed-wing aircraft would deal with the large blocks of infestation.

FOREST INSECT INVESTIGATIONS.*

Definite steps were undertaken during the year on the long-deferred plans for the development of Forest Entomology in British Columbia. Progress was made in assembling a nucleus of technical personnel, as yet under training, as a foundation for a service which will be enlarged and improved. This is essential for the comprehensive treatment of the many complicating insect problems relative to the salvage and continuity of the timber resources of the Province.

During the year all forest insect-work in the Province was unified under a central headquarters at Victoria, and plans were formulated for the building of an insectary at Victoria. There will be, therefore, two forest insect-survey centres for the identification and rearing of living insect material—one in the Interior at Vernon and one on the Coast at Victoria. The erection of the Victoria insectary is expected in time for the 1949 season. In addition, alterations and the enlarging of the Cowichan Lake field station were completed, thus providing more adequate facilities for field investigations of specific research problems.

In addition, this plan entails the building of summer stations for forest insect rangers in the various forest districts of the Province to serve as field headquarters for insect rangers located in particular regions. A general survey for such buildings was completed during the year. Personnel employed in 1948 totalled thirty-eight, of which thirteen were insect rangers. In distribution, sixteen were engaged in the Interior and twenty-two in the Coastal regions.

FOREST INSECT SURVEY.

Forest insect-survey collections increased greatly during the year, both in quantity and distribution, as shown below.

Collections.

	1947.	1948.
British Columbia Forest Service—		
Vancouver District	236	275
Kamloops District	120	110
Nelson District	110	122
Prince Rupert District	95	91
Prince George District	134	86
Totals, Forest Service	695	684
Other collections	1,666	3,777
Grand totals	2,361	4,461

Results of the survey are set forth in detail in the Annual Report of the Forest Insect Survey, copies of which are available on request at Victoria, Vernon, or Ottawa. The following summarizes briefly the more important insect problems for the year.

Important Forest Insects for 1948.

The false hemlock looper (*Nepytia canosaria* Wlk.) was of extreme importance during 1948 and produced extensive defoliation to Douglas fir in the Windermere area of the Kootenay District. This outbreak covered an area from Salter Creek on the west side of Columbia Lake to a point 10 miles north of Radium. The infestation reached its peak during the year and collapsed during late summer. Despite this and an aeroplane-spraying programme undertaken during the year, considerable damage

* This section of the Report has been prepared by the Forest Insect Investigations, Science Service, Dominion Department of Agriculture, Victoria and Vernon Laboratories.

occurred over the infested regions. The Douglas fir tussock moth (*Hemerocampa pseudotsugata* McD.) developed to heavy infestations over sections of the Kamloops District, being most severe in the Oregon Jack region, Monte Creek, and Lower Hat Creek which combined represent some 75,000 acres of severe damage. Many other smaller areas of heavy defoliation occurred throughout the Kamloops District. This outbreak apparently reached its climax during the year, and little evidence was found of any residual population for 1949. The hemlock sawfly (*Neodiprion tsugae* Midd.) showed a very marked increase over the Coastal area from the Nass River to the Lower Mainland, and it constitutes one of the most active pests on the Coast at the present time. The spruce budworm (*Choristoneura fumiferana* Clem.) was recorded in several small endemic infestations from the Alaska Border to the Kootenays. The European larch sawfly (*Pristiphora erichsonii* Htg.) was in no instance serious, and several areas showed a marked reduction in populations. The most active infestation was at McRae Creek on the east side of Christina Lake. Hemlock looper (*Lambdina fiscellaria lugubrosa* Hlst.) was practically non-existent in those areas where much havoc was wrought during the past few years. One area, however, may yet develop an active infestation—namely, Bella Coola River—which will be closely surveyed in 1949. Bark-beetles (*Dendroctonus* sp.) in pine inflicted killing in relatively limited outbreaks, the most serious being at Downie Creek on the Big Bend of the Columbia River and in an area near Bella Coola extending toward Tweedsmuir Park. Bark-beetles in Douglas fir (*D. pseudotsugæ*) became extremely active in the green timber adjacent to the hemlock-looper-damaged areas, particularly at Wilson Creek on Vancouver Island. Several other local outbreaks occurred throughout the Interior.

Detailed information on the many other forest insects recorded during the year is set forth in the Annual Report of the Forest Insect Survey referred to above.

THE DETERIORATION OF HEMLOCK-LOOPER-DAMAGED TIMBER.

This study, in operation since 1946, aims at the determination of factors contributing to losses in timber values from both the entomological and pathological aspects and at supplying information that can be used by the Province and the industry in appraising the status of affected timber on occasions of future outbreaks. It was expanded during the year, becoming a joint study of the forest pathologists and forest entomologists. In its scope it includes such aspects as marginal defoliation beyond which recovery is problematical, the relation of site, density, composition, and age-class to resulting mortality, the development of rot and the relation of secondary attack to the introduction of wood-decaying organisms. This study will progress over several ensuing years.

FOREST INSECT-POPULATION STUDIES.

The quantitative measurement of populations of defoliating insects through frass collections appears to offer much in the determination of population trends. This project, in progress for two years, was initiated on the premise that there is a constant relationship between the portion of a leaf giving rise to growth of the insect and that voided as frass. This study, operated at Cowichan Lake, is too young for definite conclusions, but it opens an important avenue for further study in the quantitative analysis of defoliating insects. Its value is of special significance in the determination of population trends in stands of big timber where the insect population is beyond reach and out of sight of the observer.

REFORESTATION INSECT PROJECT.

During 1948, work undertaken on this project aimed at a fuller understanding of such species as the spruce gall adelgid in both its spruce and fir host series; the white

Forest Insects.

Controlling infestation of false hemlock looper by spraying from helicopter.

grubs; the soil insects generally, and general insects of the nursery; the sequoia pitch-moth life-cycle, abundance, and effects; and a survey of seed and cone insects. Basic studies were maintained on the Sitka spruce weevil on the Echo Lake and the Green Timbers plots. Certain lesser insects, such as the spruce aphis, were appraised.

Results to date indicate the spruce gall adelgid as a heavy check on rate of growth and upon tree form in planted spruce. The sequoia pitch-moth has increased in incidence of attack from 24 per cent. in 1939 to over 80 per cent. currently, and has extended, at Echo Lake, from the lodgepole pine to the western yellow pine. In the latter about 20-per-cent. attack exists. The adjacent Douglas fir, although susceptible as a species, is free at present, probably because of the close nature of the stand density. In the nursery, white grubs are present at Campbell River, being dispersed over the entire area to some extent. About 13,000 2-year-old trees are estimated to have been lost from this insect in 1948, and possibly an equal number of 1-year seedlings in addition. The Sitka spruce weevil incidence continued to decline at Echo Lake in 1948, but review of plots at Green Timbers suggests that it has held an average population level for some years past. Insects attacking seeds and cones are not seriously prevalent. Collection of grand fir seed for the Danish Government, on Vancouver Island, was discontinued by private collectors owing to the high incidence of attack to cones. Examination of the seeds contained showed that actually only 12 per cent. of them were affected.

AERIAL SPRAYING FOR CONTROL OF FALSE HEMLOCK LOOPER.

The experimental spraying by a helicopter of more than 11,000 acres of Douglas fir was carried out successfully between July 1st and 24th, 1948, in the Windermere district. The project was undertaken by the Provincial Forest Service to check the outbreak of the false hemlock looper (*Nepytia* nr. *canosaria*), which was a serious threat to the valuable Christmas-tree stands in the district. Officers of the Dominion forest insect unit acted as technical advisers and checked on the effectiveness of the spray. A D.D.T.-oil spray, in the proportions of 1 lb. of D.D.T. to 1 quart of solvent plus diesel oil to make 1 gallon, was applied at the rate of 1 gallon per acre. Excellent results were obtained on the areas treated, with practically 100 per cent. of the larvæ being killed.

The spray was factory-mixed and shipped by rail in 45-gallon drums to Invermere. The drums were hauled by truck to the various landing-sites, and a Forest Service tank-truck was used for loading the aeroplane. The aircraft was a Bell helicopter, model 47B3, equipped with spray booms. As the elevation of the area treated ranged between 2,700 and 3,400 feet above sea-level, the carrying capacity of the aeroplane was limited to an average load of 24.6 gallons. The low capacity was offset by the ability of the helicopter to land and take off alongside the supply truck on small fields close to the stands to be sprayed. Reloading time averaged only about two minutes.

Spraying was conducted, weather permitting, between the hours of 4.30 and 10 a.m. and also, on a few days, from late afternoon until dusk. Operation at other daylight hours was impractical due to wind or thermal activity, which prevented proper control of the spray. The width of the swath, as determined by glass slides, was set at 60 feet. The number of spray flights totalled 466, with an average of approximately 160 acres being treated each flying-hour.

FOREST PATHOLOGY INVESTIGATIONS.*

DISEASES OF MATURE AND OVERMATURE FORESTS.

During 1948, major emphasis was placed on the problems of decay in mature and overmature timber in British Columbia. This action was taken on the basis of the consideration that pathological studies may contribute to the more adequate inventory, utilization, and management of stands of this nature.

No additional studies were undertaken during 1948, but more extensive work was conducted and additional information was obtained in the case of Douglas fir and western hemlock on the Coast and northern spruce and black cottonwood in the Interior.

(1) Western Hemlock on the Queen Charlotte Islands.

A study of the decays and decay relationships of western hemlock was undertaken on the Queen Charlotte Islands from 1945 to 1947 in order to provide essential decay information for this portion of the north Coastal region. A sample of 2,318 trees of merchantable size and an additional 3,072 trees below the present cutting-limit was obtained through the detailed analysis of 183 sample plots representing an area of 47 acres.

Western hemlock was found to reach an advanced age in this region. Fifty-three per cent. of the trees were contained in age-classes above 325 years and 7.9 per cent. above 425 years. Because of the general overmaturity of the stand, appreciable loss from decay was recorded.

Eleven and eight-tenths per cent. of the trees, containing 16.7 per cent. of the total volume, were culled from decay. An additional loss of 10.6 per cent. was realized in the residual trees of the stand. On a total-stand basis, decay losses amounted to 25.5 per cent. of the gross volume.

Scars provided the most frequent method of entrance for the major decays. It was evident that the susceptibility of western hemlock to damage of this nature and the resulting losses through decay constitute important factors to be considered in the management of this species.

The maximum net periodic increment was obtained in the 30-inch diameter class. At this diameter an average loss from decay of 17.8 per cent. was recorded. Thirty inches was considered to represent the critical diameter in the case of priority cutting schedules for this region.

Further information with respect to age and diameter relationships will be available in published form shortly.

(2) Douglas Fir on Vancouver Island.

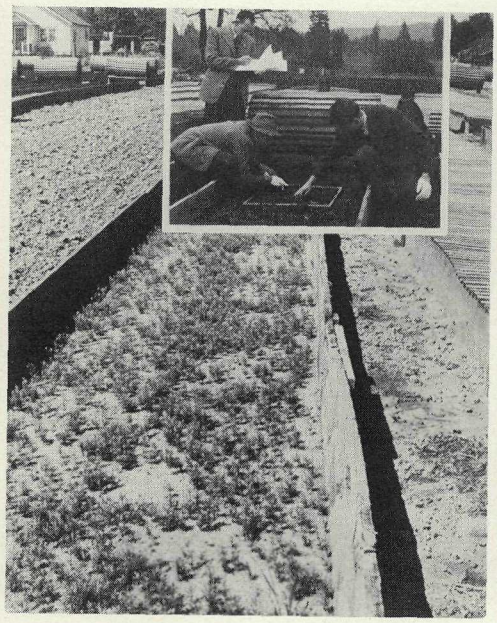
Studies relating to the inventory and management of this species were continued during 1948. An additional 9 acres, involving 534 trees of merchantable size, were sampled in the vicinity of Parksville. A complete analysis of the data will not be undertaken until an adequate sample of the various age, diameter, and site-classes has been obtained.

(3) White Spruce in the Upper Fraser Region.

Further sampling of white spruce in the vicinity of Aleza Lake has increased the total area investigated to 6.3 acres. Six hundred and eighty-one spruce of pulp-wood size, including 499 trees meeting the requirements of saw-timber utilization, have been analysed.

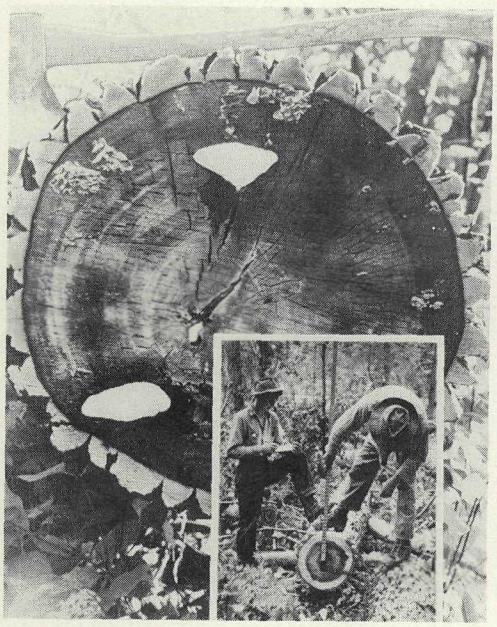
* This section of the Report has been prepared by the Laboratory of Forest Pathology, Science Service, Dominion Department of Agriculture, Victoria, B.C.

Tree Diseases.

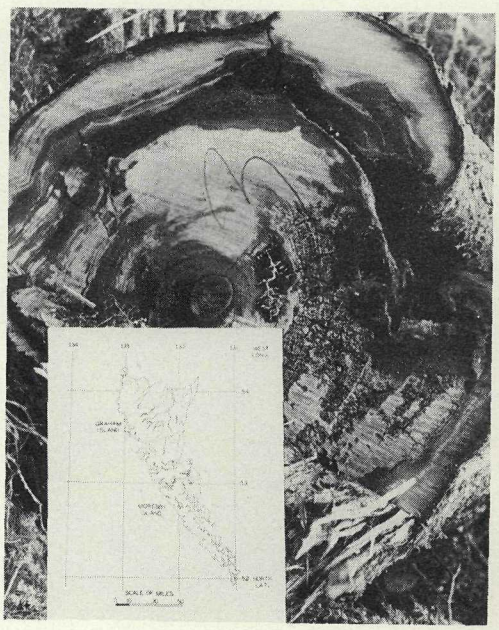


Fungous diseases in nursery seed-beds.

Disease in insect-killed stands.



Diseased black cottonwood in the Interior.



Decay in mature and overmature western hemlock.

On a cubic-foot basis the gross merchantable volume averaged 5,510 cubic feet or 55.1 cords per acre. The loss through decay in this material amounted to 11 per cent. On a board-foot basis, the gross merchantable volume of sawlog material averaged 27,188 feet per acre. Of this volume, 13.5 per cent. was destroyed through decay.

Over 73 per cent. of the total decay volume was associated with basal infections. Additional losses from root-rot were noted in the case of wind-thrown trees. An appreciation of the susceptibility of spruce to losses of this nature will be necessary in the future management of this species.

(4) Black Cottonwood in the Quesnel Area.

A preliminary investigation of cottonwood in the vicinity of Quesnel was continued during 1948. To date 160 trees of pulp-wood size and 98 trees meeting the requirements of peeler stock have been studied.

A gross volume of 19,856 cubic feet has been analysed in detail. Total loss in this material amounted to 17.6 per cent. Of this, 74 per cent. was attributed to decay. On the basis of peeler standards, decay losses in board-feet amounted to 20.3 per cent.

Investigations will be continued during 1949 in order to provide information relative to the management of this species.

DISEASES OF IMMATURE FORESTS.

In view of the increased interest in second-growth stands, plans were initiated during the past year for further and more intensive investigations of the disease and mortality losses in immature forests. Nine of the British Columbia Forest Service permanent sample plots on Vancouver Island were studied in order to determine the possibility of maintaining disease and mortality records. Since all of the areas examined showed evidence of loss from *Poria Weirii* and related root-rotting organisms it is planned to re-examine plots of this nature in order to correlate disease mortality with essential information relating to growth and yield.

DISEASES OF NURSERY AND PLANTATION STOCK.

The excessive mortality losses which reached the 50-per-cent level at the Duncan nursery during 1947 were considerably reduced during 1948. This reduction was attributed in large part to the decreased activity of the top-blight organism *Fusarium oxysporum*. Information obtained during the past year, however, would indicate that normal damping-off losses may be considerably higher than is generally recognized.

Studies are planned for 1949 to determine the biological requirements of the major forest-nursery diseases in order to provide a more adequate basis for control.

ADDITIONAL STUDIES.

(1) Deterioration of Insect-killed Timber on Lower Vancouver Island.

During 1948 a pathological analysis was initiated in the large area of hemlock-looper-killed timber on Vancouver Island. Sample plots were established in the vicinity of Lake Cowichan and in the Nitinat Valley in order to supplement those established by the Division of Entomology.

A random sample of 140 western hemlock was obtained in the Alberni Canal region in order to provide a basis for future work on this problem. It was found that 98 per cent. of the trees contained measurable amounts of decay and that 81 per cent. of the merchantable bole in this species contained rot which had entered subsequent to the death of the tree. The average radial penetration of decay amounted to 1.5 inches, though individual cases of incipient decay extending as much as 6 inches were recorded. The mistletoe problem in this area was found to contribute appreciably to the falling

hazards. Owing to the reduction in strength following decay infection and insect penetration, an increased amount of breakage was noted over that resulting in living trees.

An analysis of the permanent sample plots will be undertaken during 1949 in order to provide information relative to the maximum period the present dead timber will remain in a salvable condition.

(2) Blister-rust of White Pine.

An intensive survey in the Garibaldi region was conducted during the past summer in order to isolate disease-free white pine. Twenty-six trees of this nature were located following a 100-per-cent. cruise of 65 acres in this area. Studies are planned to determine if the twenty-six trees are capable of withstanding blister-rust infection under extreme conditions. Additional surveys will be conducted during 1949 in an effort to isolate a strain of this valuable forest species resistant to the blister-rust disease.

FOREST RANGER SCHOOL.

The third class to attend the Ranger School completed the six-month course of study outlined below on December 18th and are back in their districts again with, it is hoped, a better basic knowledge of various phases of forest administration and the techniques needed in the field.

	No. of Hours.
A. Operation—	
1. Fire law and operation procedure	66
2. Meteorology, fire behaviour, and fire-detection planning	35
3. Public relations, law enforcement, and public speaking	22
4. Preliminary fire organization	28
5. Construction and maintenance of improvements	55
6. Operation and care of mechanical equipment	42
7. Fire-suppression methods and organization	60
B. Management—	
1. Mathematics and surveying (lectures and field-trips)	140
2. Forest mensuration and cruising practice	140
3. Log scaling (theory and practice)	70
4. Stumpage appraisals and cost studies	40
5. Forest botany, pathology, and entomology	80
6. Forest management and general aspects of forestry	110
7. Grazing management	15
8. Office methods, use of air photos, and cover mapping	40

Four Rangers, three Acting Rangers, eleven Assistant Rangers, and two clerks from district offices made up the class. These men came from the various forest districts of the Province, as shown in the table given in the Appendix.

The Ranger School has now given specialized training in Ranger work to sixty men, of whom only fourteen were experienced Rangers prior to attending the school. Vacancies in the Ranger staff caused by promotions, resignations, retirements, and the creation of new districts have been filled from the pool of qualified Acting and Assistant Rangers who have graduated and been recommended by the school. Such vacancies have, in fact, absorbed practically all of the men who passed through the school in 1946 and 1947. The building up of a reserve of trained Assistant Rangers, who will be available for Ranger appointment in the event of a sudden and appreciable expansion of the Ranger staff, really commenced with the class of 1948.

At the end of the regular spring term in April, a ten-day special course of instruction for lookout-men was arranged at the request of the Vancouver Forest District. Seventeen men were given basic training in the details of the work expected from them, and the District Forester, Vancouver, has since advised that the benefits of the training have been very evident. In spite of the fact that a large percentage of the men were new to the job, fire detection and reporting during the summer were of a high standard and there was a minimum of trouble with this phase of fire organization.

As in previous years, the Dominion Meteorological Service provided a specialist for a short course in meteorology; the Divisions of Forest Pathology and Forest Entomology of the Dominion Department of Agriculture gave instruction in tree diseases and forest insects; the Provincial Police Force gave a series of lectures on various phases of law enforcement; and the St. John Ambulance Society provided an instructor for a course in first aid. The school is indebted to these various organizations for the assistance given and gratefully acknowledges it at this time.

During the year, work was commenced in earnest on permanent quarters for the school. A contract for the administration and classroom building, boiler-house, and car-shelter was awarded in the spring, and these buildings are practically completed.

Unfortunately, there was some difficulty with respect to an oil-fuel supply, and the contract for the heating unit was thereby delayed, which in turn has delayed the final completion of the buildings. It is hoped that the offices and classrooms will be ready for use by the end of January, 1949. The main building is an attractive, modern one-story structure housing ample office accommodation, two classrooms, library-room, workshop for instruction in mechanical and other equipment, supply-room, and a 20-by 30-foot tool-cache.

A dormitory building was designed during the year, and the contract for its construction awarded in October. This is a two-story structure finished in varnished vertical cedar siding and will provide individual bedrooms for twenty-one students and a staff of three on the second floor, while the main floor has a suite of three bedrooms for visiting lecturers, lobby and waiting-room space, dining-room, kitchen, main living-room, and a games room. Construction is well advanced, and there is reason to anticipate that the building will be completed in February, 1949.

The new buildings will provide comforts and conveniences both within and without the classrooms that should have an appreciable effect on the ability of the students to absorb the intensive courses given. This is particularly true with respect to lighting, heating, and ventilation in the classrooms. Also, the workshop area will provide room for practical demonstrations not possible in the present temporary quarters.

PUBLIC RELATIONS AND EDUCATION.

As a result of the addition of three members to the staff during the year, it has been possible to advance the basic organization necessary for the development of the public relations and educational work of the Service.

PRESS AND RADIO.

Forest Service protection advertisements and other forestry educational messages were carried in ten daily, seventy-two weekly, and nineteen other publications as part of the Service advertising campaign. This series of advertisements in the press was composed of six different messages contained in a standard layout captioned "Talking of Trees." The layout and copy was a product of this Division, with the art-work again being done by the Government Printing Bureau. Although individual advertisements of this series were used in a number of the nineteen miscellaneous publications mentioned, in many cases special layouts and copy were devised to suit the type of publication concerned.

The press again gave a generous amount of space, both editorially and in news columns, to matters relating to forestry and forest protection. We are indebted to them for this added impetus to our work of public education.

The radio-broadcasting stations throughout the Province, as in previous years, co-operated by issuing fire warnings and other brief warning and educational matter pertaining to forestry.

MOTION PICTURES AND PHOTOGRAPHY.

Motion Pictures.

The film library started the year with a stock of seventy-four subjects, sixty-six of which were silent and the remaining eight sound. During the course of the year two obsolete films were removed from circulation and four new sound and one silent subject were added, which resulted in the library ending the year with a total of seventy-seven films available for loan.

Circulation figures show the increased use resulting from the service rendered by the film library. Outstanding increases were registered over the figures of the preceding year in number of film loans, showings, and the total number of persons to whom our films were shown. Seventy-seven films were shown to 1,293 different audiences comprised of 21,633 adults, 20,455 children, and 42,900 mixed adults and children, for a yearly total of 85,018 persons. Besides the considerable increase over the total audience for 1947, the most significant feature is felt to be resurgence of adult interest in the library. The adult audience showed an increase of 13,624 persons this year.

Members of the Service participated in this phase of our work more than ever before. A total of 172 film showings were given by Service personnel during the year. The Kamloops District led all other divisions of the Service by giving a total of 72 showings to 5,171 persons. All other forest districts, with the exception of Prince Rupert, made use of the film service, but it is felt that projection equipment attached to each district office would do a great deal toward expanding this effective medium of public relations.

Two blocks of National Film Board subjects were given a circulation outlet through our library during the year. These films, thirty-four in all, were shown to a total of 9,181 persons not counted in our own circulation totals.

The three most widely shown forestry films were "Mount Robson Park" (shown seventy-four times to 3,838 persons), "Garibaldi Park" (sixty times to 2,735), and "Tweedsmuir Park" (fifty-three times to 2,387). It might be of interest to point out

that ten of the above showings were given to 559 persons in England through the facilities of British Columbia House, London, England, where one copy of each of these three park films has been made available. We deeply appreciate the co-operation of the Agent-General in arranging circulation and supplying us with these records.

The most distant points to which our films were sent on loan during the year were Helsingsfors, Finland, and Sydney, Australia. Also, during the early part of the year, seven film subjects were loaned to the School of Forestry, Yale University, and the State universities of Connecticut and Maine.

A tabular statement on the stock and circulation of the film library appears on page 115 of this Report.

PHOTOGRAPHY.

Subsequent to the addition of a writer-photographer to the staff of the Division, a photographic dark-room was established in the late summer. Since that time an ever-increasing volume of developing, printing, and enlarging of photographs, taken by all headquarters divisions of the Service, has been channelled through this dark-room.

More than 300 new photographs have been taken by the photographer and added to the photographic library. Included in this total are sixty illustrations taken for inclusion in the Dominion Forest Service's new bulletin on the native trees of Canada and thirty photographs of tree species were taken and forwarded to commercial publishers. Specialized photography was also carried out for all divisions of the Service. In addition, the photographic dark-room and library has supplied quantities of illustrations to various publishing houses throughout the world.

Photography of an 850-foot motion-picture film of the Christmas-tree industry, in colour, was completed by the Division, and this will be sounded early in the new year. Six hundred feet of motion-picture film was taken of the spraying by helicopter of the hemlock-looper infestation, and some footage of the disastrous Fraser River floods was secured for future use.

PUBLICATIONS.

The Annual Report of the Forest Service for the year 1947 was edited and distributed. Assistance was given in the editing, producing, and distribution of the 1948 revised edition of Forest Service Publication B.37, *Forest Management Licences*. The Division also co-operated with the Operations Division in the production of their 1948 forest-protection bulletins and with the Economics Division in reintroducing a series of research notes and producing the first of a planned series of forest-resources bulletins. The Division produced a forest-protection booklet, B.39, *Sayward Forest—Forest Facts;* a pamphlet, B.38, *Forest Fire-Reforestation;* five personnel news-letters; and, with the assistance of the Reforestation Division, the 1948 Forest Service calendar. Supervision of the production of these and a number of other printing jobs was the responsibility of the Division.

EXHIBITS.

The two exhibits—one on reforestation and the other on forest fire-detection methods—which had been assembled the previous year were enlarged and circulated. During the late summer and early fall the reforestation exhibit was displayed, with a member of the Division in attendance, at the Alberni and District Fall Fair and then was shipped to the Interior for display at Rock Creek and Fruitvale. At these two locations the Forest Ranger and staff were in attendance.

The fire-detection display, accompanied by a member of this Division, was shown at the fall fairs held at Chase, Princeton, Armstrong, Kamloops, and Salmon Arm. At Kamloops a special radio broadcast from the display was arranged with the attending staff member taking part.

The policy of only constructing exhibits which can be crated and easily handled by three men again proved its worth this year.

During the meetings of the Western Forestry and Conservation Conference, held in Victoria in December, a special display featuring the Bennett-MacDonald fire-pump was arranged and installed by this Division outside the conference room.

PROTECTION AND DIRECTIONAL SIGNS.

Methods of design and prefabricating of the much-needed forest-protection signs reached another step closer to completion. Sufficient Scotchlite material, Masonite sheets, and pre-cut lumber were assembled to construct fifty 4- by 7-foot protection signs. Due to a lack of time, staff, and suitable working facilities, the Division was unable to complete this project prior to the commencement of the fire season. Arrangements have been made to have the assembling of these signs completed early in the new year.

As time allowed, study was given to a plan of producing large numbers of Forest Service directional signs.

ARTICLES, PAPERS, AND ADDRESSES.

A number of special articles were written for newspapers and trade journals, together with papers, addresses, and scripts for presentation to service clubs, schools, church groups, young people's gatherings, and other organizations or for radio-broadcasting.

CO-OPERATION.

A total of 781 honorary fire wardens were appointed in the five forest districts. A letter of appreciation for their co-operation, over the Minister's signature, was sent to each appointee and each was given a year's subscription to the conservation magazine, *Forest and Outdoors*.

Material, counsel, and assistance in editing manuscripts was furnished to a number of writers and artists preparing material, articles, and books on forestry or the forest industries for publication.

LIBRARY.

Work of the reference library continued to expand, and improvements were introduced in the circulation of periodicals and photographs. The work of indexing photographs and filing of clippings was brought up to date, thereby removing a backlog of work which had been accumulating for some years.

GRAZING.

GENERAL CONDITIONS.

The range live-stock industry experienced many difficulties during the year but emerged, on the whole, in a sound position. Prices reached record high figures during the year and the range crop was excellent. Hay production was drastically curtailed by adverse weather in some localities, and a sharp reduction in stock will undoubtedly result in those areas. The lifting of the embargo on the shipment of beef cattle and sheep to the United States and the continuing strong domestic demand indicate a good market during the coming year.

Weather was mild and snowfall light in most range areas during the early part of the winter of 1947–48. With the exception of the Cariboo and Chilcotin, feeding commenced a little later than usual, and the prospects of stock coming through the winter in good shape were bright. Although particularly low temperatures were not experienced, snowfall was considerably above normal throughout the range country during the latter part of the winter. Spring was extremely late, with grass growth commencing from three to four weeks later than usual. Hay-supplies were practically exhausted and serious shortages developed in the Cariboo and Chilcotin. Losses of mature stock were not great, but the poor condition of the cows and adverse weather conditions during the calving season resulted in a higher-than-normal loss of calves.

The abnormally high rainfall throughout the growing season resulted in the heaviest growth of range forage in memory. Stock grew rapidly and fleshed out well but in some cases lacked finish, probably due to a poor start in the spring and the soft nature of the grass. The June floods damaged hay land in some areas and disrupted range-management plans to some extent. Severe summer storms made stock difficult to handle at higher elevations and, in general, the animals came down on to the fall range earlier than usual. Feed was abundant at lower elevations.

A heavy crop of hay was produced, but weather and water conditions were such that harvesting was extremely difficult and much hay spoiled. Those ranches depending on cultivated meadows managed for the most part to put up sufficient hay to see them through the winter but, in cases where the chief source of hay is from natural meadows, the situation is much less favourable. These wild meadows remained flooded throughout the summer in some areas, making the harvesting of hay impossible. The Cariboo and Chilcotin were hardest hit in this respect, and many stockmen have been forced to drastically reduce their herds.

Damage by grasshoppers was negligible and egg-laying appeared to be light, indicating little trouble from this source next season.

Ranch labour seemed to be more plentiful this year but continues to be a big problem, particularly in some areas. Some materials are in better supply but others, such as wire, staples, and farm machinery, are still difficult to obtain. These factors have a distinct bearing on the rancher's ability to properly manage the range.

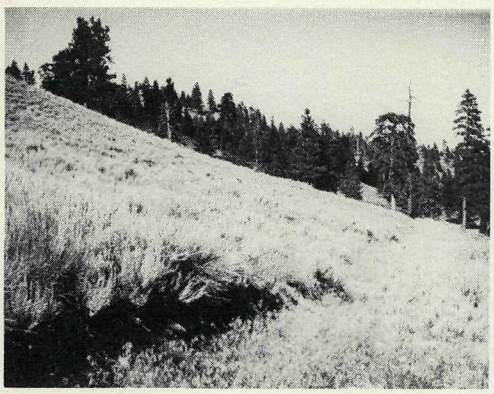
MARKETS AND PRICES.

Throughout the year, British Columbia live-stock producers received excellent returns, with prices reaching a peak immediately after the lifting of the embargo on shipments to the United States in August. Prices eased somewhat in the last two months but show signs of stabilizing at their year-end levels. The opening of the United States market counteracted the depressing effect of the heavy fall shipments of beef from the Cariboo and Chilcotin.

Some 95,000 head of cattle and 19,303 sheep and lambs were marketed from British Columbia ranches during 1948. The wool-clip from the range areas ran to 226,516 lb.

Grazing.

Stock-watering lake on the Springhouse and Chimney Creek range.



Side-hill of Woods Mountain on the Meadow Valley range.

Open timber range near Mamit Lake.

A bunch-grass side-hill in good condition in Mamit Lake area.

Prices for good steers ranged from a low of $15 in March to a high of $23.35 in September. Lamb prices averaged $19.23 and wool prices averaged 40 cents per pound. All prices showed a marked increase over 1947 levels.

There were seven major live-stock sales during 1948. At the Elko sale, sponsored by the Waldo Stockbreeders' Association, 671 head of cattle sold for $87,884.78. The Quesnel sale moved 1,112 head of cattle for a gross of $140,482.69. The Thirtieth Annual Provincial Bull Sale and Fat Stock Show held in Kamloops sold 110 bulls for $45,110, and in the Fat Stock Section 237 head were disposed of at good prices. The Southern Interior Stockmen's Association Sixth Annual Sale moved 1,127 head at an average of $177.75 per animal. The Cariboo Cattlemen's Association held two sales at Williams Lake, the first of which sold 2,488 feeders and fat stock for $352,672.45 and 32 bulls for $20,910. The second sale moved 2,462 head at slightly lower prices. The Christmas Fat Stock Show and Sale at Kamloops sold 245 head for $56,723.05.

LIVE-STOCK LOSSES.

Losses of stock on the range were about normal this year. Poisonous weeds were responsible for somewhat more than the usual number of deaths, apparently due to the soft, wet ground allowing such plants as larkspur and death camas to be pulled out by the roots and consumed in quantity. Numerous reports of stock lost through predatory animals were also received. Owing to the extremely high water, losses of stock in mudholes were negligible. Losses of stock due to highway and railway traffic and gunshot wounds were also reported. A serious outbreak of blackleg, a disease fatal to cattle, occurred on one range and necessitated a radical change in range-management plans to facilitate vaccination.

RANGE RECONNAISSANCE.

Our range-reconnaissance programme was stepped up considerably during the year. A total of 1,017,796 acres was covered by intensive range surveys. The following areas were mapped:—

	Acres.
Bridesville-Midway	109,800
Granby River-Christina Lake	133,700
Soda Creek	69,400
Meadow Valley Stock Range	202,444
Mamit Lake	63,200
Springhouse and Chimney Creek Stock Range	192,257
Lac la Hache Stock Range (west of Cariboo Road)	141,508
Lolo Mountain Stock Range	105,487

The information compiled as a result of these surveys will greatly facilitate the proper management of the range. The work was carried out by three field crews, each crew consisting of a permanent forest grazing officer assisted by two temporary grazing assistants selected from the School of Agriculture, University of British Columbia. It is proposed to continue this range-survey programme during 1949.

In addition to the major projects listed above, extensive examinations were carried out in the following areas: Upper Hat Creek, Cairn Mountain Alpine Range, sheep range in the vicinity of Spius Creek, and the Promontory Mountain areas.

CO-OPERATION.

There are now forty Livestock Associations in the Province, some being combined with Farmers' Institutes. In all, these associations reported 102 meetings, of which 92 were attended by forest officers. As usual, much benefit derived from the close

contact between the forest officers and range-users. Many problems were settled in open discussion and much lengthy correspondence avoided. Improved range-management plans were also discussed and agreed upon in many cases.

Early in the year a print of the motion-picture film " Richer Range Rewards " was obtained. This film, in colour with sound, outlines the principles of range management and was shown to stockmen's meetings throughout the range area. The film promoted much discussion and thought on range-management matters.

GRAZING AND HAY PERMITS.

The number of grazing permits issued and stock covered reached a record high in 1948. The increase is due largely to smaller operators increasing their stock to the point where the use of Crown range, in addition to their own holdings, is necessary. The tabulation on page 116 shows the volume of business for 1948 and the past ten years. Although the number of stock under permit was higher than in 1947, the fees billed and collected were down somewhat. This is due to the shorter grazing season experienced and the fact that outstanding fees increased slightly. The table on page 116 shows the grazing fees billed and collected for the past ten years.

During the year, 231 hay-cutting permits were issued, authorizing the cutting of 2,405 tons of hay and 261 tons of rushes from Crown lands.

RANGE IMPROVEMENTS.

An exceedingly wet year, together with a shortage of labour and materials, made it impossible to complete the programme of range improvements planned. The following is a list of those projects completed: Stock-bridges, 1; drift-fences, 6; cattle-guards, 4; experimental plots, 2; holding-grounds, 5; mud-holes, 2; stock-trails, 11; water-developments, 5; weed-control measures, 1. The total expenditure from the Range Improvement Fund on the above projects was $4,447.11.

The horse-disposal programme was continued, with the Vernon, Belt, Cariboo, and Cranbrook Grazing Districts being closed to horses during the winter of 1947–48. During the closure 188 horses were shot and 148 rounded up and sold for slaughter. The reduced number of horses disposed of, as compared with previous years, was due partly to the heavy snow conditions and partly to the fact that this problem is largely under control in the larger range areas. There are still considerable numbers of wild and useless horses at large in some localities, however, and the programme is continuing during the winter of 1948–49. A total of $906 was paid in bounties from the Range Improvement Fund on horses shot.

PERSONNEL DIRECTORY, 1949.

VICTORIA OFFICE.

C. D. Orchard	Deputy Minister and Chief Forester	Victoria.
R. C. St. Clair	Assistant Chief Forester.	
C. Cooper	Forest Counsel.	
R. G. McKee	Forester i/c Operation Division	Victoria.
P. Young	Assistant Forester.	
D. W. Perrie	Meteorologist.	
W. C. Spouse	Mechanical Superintendent.	
A. B. Crowe	Assistant Mechanical Superintendent.	
J. H. Taylor	Marine and Structural.	
G. A. Playfair	Radio Superintendent.	
H. E. Ferguson	Assistant Radio Superintendent.	
R. L. Fielder	Technical Forest Assistant (Fire Research).	
L. Lucas	Technical Forest Assistant (Fire Research).	
A. Stringer	Senior Clerk.	
E. B. Prowd	Forester i/c Management Division	Victoria.
S. E. Marling	Forester.	
G. M. Abernethy	Assistant Forester.	
A. E. Collins	Assistant Forester (Forest-cover Maps).	
R. C. Telford	Assistant Forester (Management Licences).	
E. H. Henshall	Chief Clerk.	
A. G. Mumford	Chief Clerk (Timber-sale Administration).	
S. F. Bankes	Senior Clerk (Timber-sale clearances).	
R. G. Gilchrist	Chief Draughtsman.	
F. S. McKinnon	Forester i/c Economics Division	Victoria.
J. L. Alexander	Forester (Mensuration).	
R. H. Spilsbury	Forester (Soils).	
H. M. Pogue	Assistant Forester (Surveys).	
D. M. Carey	Assistant Forester.	
H. N. Cliff	Assistant Forester.	
A. R. Fraser	Assistant Forester.	
E. H. Garman	Assistant Forester (Silviculture).	
L. A. deGrace	Assistant Forester	Aleza Lake.
W. G. Hughes	Assistant Forester.	
A. L. Orr-Ewing	Assistant Forester.	
G. Silburn	Assistant Forester.	
G. C. Warrack	Assistant Forester.	
J. M. Finnis	Forester-in-Training.	
R. M. Malcolm	Forester-in-Training.	
D. Macdougall	Technical Forest Assistant.	
C. J. T. Rhodes	Supervising Draughtsman.	
J. K. Frost	Senior Clerk.	
L. L. King	Ship's Captain.	
J. McCulloch	Ship's Captain.	
J. Nutt	Clerk.	
H. G. McWilliams	Forester i/c Reforestation Division	Victoria.
A. H. Bamford	Assistant Forester.	
E. G. Whiting	Assistant Forester.	
T. Wells	Superintendent, Green Timbers Nursery	New Westminster.
J. R. Long	Superintendent, Duncan Nursery	Duncan.
W. Turner	Superintendent, Quinsam Nursery	Campbell River.
N. G. Wharf	Clerk.	
E. G. Oldham	Forester i/c Parks Division	Victoria.
C. P. Lyons	Assistant Forester.	
D. M. Trew	Assistant Forester.	
R. H. Ahrens	Forester-in-Training.	
T. R. Broadland	Forester-in-Training.	
L. Brooks	Forester-in-Training.	
D. L. Macmurchie	Technical Forest Assistant.	
N. M. F. Pope	Technical Forest Assistant.	
J. M. M. Bailey	Engineer-in-Training.	

VICTORIA OFFICE—*Continued.*

R. G. Knight	Engineer-in-Training.	
E. A. McGowan	Engineer-in-Training.	
C. J. Velay	Engineer-in-Training.	
R. H. Boyd	Park Ranger	Manning Park.
L. E. Cook	Park Ranger	Wells Gray Park.
S. E. Park	Clerk.	
E. Druce	Forester i/c Public Relations Division	Victoria.
P. W. H. G. Johnson	Public Relations Officer (Photography).	
D. R. Monk	Public Relations Officer.	
(Miss) N. M. Hughes	Forest Service Library.	
W. C. Pendray	Forest Agrologist i/c Grazing Division	Victoria.
W. V. Hicks	Inspector, Forest Accounts Division	Victoria.
D. I. MacLeod	Assistant Inspector.	
W. C. Higgins	Chief Accountant.	
R. D. Greggor	Forester i/c Ranger School	New Westminster.
J. A. Pedley	Assistant Forester.	
J. G. MacDonald	Superintendent, Forest Service Marine Station	Vancouver.

DISTRICTS.

Vancouver.

E. W. Bassett	District Forester	Vancouver.
D. B. Taylor	Assistant District Forester.	
C. E. Bennett	Assistant Forester.	
C. F. Holmes	Assistant Forester (Operation).	
J. S. Stokes	Assistant Forester (Management).	
A. H. Waddington	Assistant Forester (Slash-disposal).	
W. E. L. Young	Assistant Forester.	
G. R. Johnston	Forester-in-Training.	
J. McNeill	Fire Inspector.	
C. S. Frampton	Supervisor.	
P. R. Neil	Technical Forest Assistant.	
C. L. Armstrong	Supervisor of Scalers.	
A. C. Heard	Assistant Supervisor of Scalers.	
H. A. D. Munn	Assistant Supervisor of Scalers.	
J. A. Fetherstonhaugh	Inspector of Licensed Scalers.	
J. H. Templeman	Inspector of Licensed Scalers.	
E. P. Fox	Chief Clerk.	

R.D. No.			
1.	J. A. Mahood	Forest Ranger	Chilliwack.
2.	J. H. Robinson	Forest Ranger	Mission.
3.	G. G. Armytage	Forest Ranger	North Vancouver.
4.	S. C. Frost	Forest Ranger	Squamish.
5.	R. W. Aylett	Forest Ranger	Sechelt.
6.	K. M. Bell	Forest Ranger	Pender Harbour.
7.	W. Black	Forest Ranger	Powell River.
8.	W. E. Jansen	Forest Ranger	Lund.
9.	L. C. Chamberlin	Forest Ranger	Thurston Bay.
10.	H. Barker	Forest Ranger	Thurston Bay.
11.	A. C. C. Langstroth	Forest Ranger	Alert Bay.
12.	J. O. Little	Forest Ranger	Port Hardy.
13.	C. D. S. Haddon	Forest Ranger	Campbell River.
14.	S. Silke	Forest Ranger	Courtenay.
15.	R. H. Morrison	Forest Ranger	Nanaimo.
16.	P. E. Sweatman	Forest Ranger	Duncan.
17.	J. P. Greenhouse	Forest Ranger	Langford.
18.	H. Stevenson	Forest Ranger	Alberni.
19.	F. Tannock	Forest Ranger	Zeballos.
20.	K. A. McKenzie	Forest Ranger	Cowichan Lake.
21.	R. Little	Forest Ranger	Harrison Lake.
22.	R. J. Glassford	Forest Ranger	Parksville.
23.	M. H. Mudge	Forest Ranger	Alert Bay.

DISTRICTS—*Continued.*

PRINCE RUPERT.

M. W. GORMELY	DISTRICT FORESTER	PRINCE RUPERT.
M. O. Kullander	Assistant District Forester.	
L. B. B. Boulton	Assistant Forester (Management).	
J. P. MacDonald	Assistant Forester (Operation).	
J. A. K. Reid	Assistant Forester (Management).	
J. B. Scott	Inspector of Licensed Scalers.	
W. H. Murray	Chief Clerk.	

R.D. No.			
1.	S. T. Strimbold	Forest Ranger	Burns Lake.
2.	L. G. Taft	Forest Ranger	Hazelton.
3.	S. G. Cooper	Forest Ranger	Terrace.
3.	W. H. Campbell	Forest Ranger	Terrace.
4/7.	J. A. Willan	Forest Ranger	Prince Rupert.
5/6.	H. B. Hammer	Forest Ranger	Queen Charlotte City.
8.	A. A. Antilla	Forest Ranger	Ocean Falls.
9.	W. A. Antilla	Forest Ranger	Southbank.
10.	C. L. Gibson	Forest Ranger	Smithers.
11.	D. R. Smith	Forest Ranger	Houston.
12.	J. Mould	Forest Ranger	Topley.

FORT GEORGE.

L. F. SWANNELL	DISTRICT FORESTER	PRINCE GEORGE.
A. H. Dixon	Assistant District Forester.	
W. G. Henning	Assistant Forester (Operation).	
E. W. Robinson	Assistant Forester (Management).	
F. H. Nelson	Supervisor.	
A. H. McCabe	Inspector of Licensed Scalers.	
R. B. Carter	Chief Clerk.	

R.D. No.			
1.	J. S. McAlister	Forest Ranger	McBride.
2.	G. G. Jones	Forest Ranger	Penny.
3.	A. F. Specht	Forest Ranger	Prince George (S.).
4.	C. L. French	Forest Ranger	Prince George (N.).
5.	A. V. O'Meara	Forest Ranger	Vanderhoof.
6.	L. A. Willington	Forest Ranger	Quesnel.
7.	H. T. Barbour	Forest Ranger	Pouce Coupe.
8.	W. V. McCabe	Forest Ranger	Giscome.
9.	N. Threatful	Forest Ranger	Fort Fraser (Vanderhoof P.O.).
10.	R. Angly	Forest Ranger	Fort St. John.
	W. N. Campbell	Forest Ranger (Spare)	Prince George.

KAMLOOPS.

A. E. PARLOW	DISTRICT FORESTER	KAMLOOPS.
W. C. Phillips	Assistant District Forester.	
C. D. Grove-White	Assistant Forester (Management).	
D. H. Ross	Assistant Forester (Operation).	
W. W. Stevens	Assistant Forester (Management).	
H. K. DeBeck	Assistant Forest Agrologist.	
A. Paulsen	Assistant Forest Agrologist.	
M. T. Wallace	Assistant Forest Agrologist.	
J. B. Bruce	Forester-in-Training.	
R. Pringle	Forest Agrologist-in-Training.	
A. J. Kirk	Fire Inspector.	
W. P. Cowan	Technical Forest Assistant.	
C. R. Downing	Technical Forest Assistant.	
E. A. Charlesworth	Inspector of Licensed Scalers.	
C. Williams	Inspector of Licensed Scalers.	
H. J. Parker	Chief Clerk.	

DISTRICTS—*Continued.*

KAMLOOPS—*Continued.*

R.D. No.			
1.	M. A. Johnson	Forest Ranger	Vernon.
2.	H. W. Campbell	Forest Ranger	Birch Island.
3.	D. P. Fraser	Forest Ranger	Barriere.
4.	H. A. Ferguson	Forest Ranger	Kamloops.
5.	H. G. Mayson	Forest Ranger	Chase.
6.	J. Boydell	Forest Ranger	Salmon Arm.
7.	J. A. Sim	Forest Ranger	Sicamous.
8.	E. L. Scott	Forest Ranger	Revelstoke.
9.	J. W. Hayhurst	Forest Ranger	Vernon.
10.	C. Perrin	Forest Ranger	Penticton.
11.	J. H. Dearing	Forest Ranger	Princeton.
12.	C. E. Robertson	Forest Ranger	Clinton.
13.	H. S. Noakes	Forest Ranger	Williams Lake.
14.	T. L. Gibbs	Forest Ranger	Alexis Creek.
15.	R. B. W. Eden	Forest Ranger	Kelowna.
17.	R. C. Hewlett	Forest Ranger	Merritt.
18.	C. M. Yingling	Forest Ranger	Blue River.
19.	H. C. Hewlett	Forest Ranger	Enderby.
	R. V. Williams	Forest Ranger	Forest Grove.

NELSON.

H. B. FORSE	DISTRICT FORESTER	NELSON.
I. T. Cameron	Assistant District Forester.	
L. S. Hope	Forester (Silviculture).	
J. R. Johnston	Assistant Forester (Operation).	
G. W. Minns	Assistant Forester (Management).	
J. E. Milroy	Assistant Forest Agrologist.	
J. C. Payne	Forester-in-Training.	
E. R. Smith	Forest Agrologist-in-Training.	
J. H. Holmberg	Fire Inspector.	
I. B. Johnson	Fire Inspector.	
L. A. Chase	Supervisor.	
R. G. Gill	Technical Forest Assistant.	
S. S. Simpson	Chief Clerk.	

R.D. No.			
1.	J. L. Johnson	Forest Ranger	Invermere.
2.	R. A. Damstrom	Forest Ranger	Fernie.
3.	H. J. Coles	Forest Ranger	Golden.
4.	R. O. Christie	Forest Ranger	Cranbrook.
5.	A. I. Ross	Forest Ranger	Creston.
6.	F. R. Hill	Forest Ranger	Kaslo.
7.	L. E. Stilwell	Forest Ranger	Lardo.
8.	G. C. Palethorpe	Forest Ranger	Nelson.
9.	C. R. Tippie	Forest Ranger	New Denver.
10.	H. L. Couling	Forest Ranger	Nakusp.
11.	H. C. Nichols	Forest Ranger	Rossland.
12.	E. W. Reid	Forest Ranger	Grand Forks.
13.	J. F. Killough	Forest Ranger	Kettle Valley.
14.	C. J. McGuire	Forest Ranger	Canal Flats.
15.	F. G. Hesketh	Forest Ranger	Arrowhead.
16.	W. D. Haggart	Forest Ranger	Edgewood.
17.	L. M. Quance	Forest Ranger	Elko.
	J. H. A. Applewhaite	Forest Ranger (Spare)	Nelson.

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(1) DISTRIBUTION OF PERSONNEL, 1948.

Personnel.	Forest District.						
	Vancouver.	Prince Rupert.	Fort George.	Kamloops.	Nelson.	Victoria.	Total.
Continuously employed.							
Chief Forester, Assistant Chief Forester, and Division Foresters	....	....	....	....	....	8	8
District Foresters and Assistant District Foresters	2	2	2	2	3	....	11
Foresters and Assistant Foresters	5	3	2	3	2	21	36
Agrologists and Assistants	....	....	....	3	2	1	6
Supervisor of Rangers and Fire Inspectors	2	....	1	2	3	....	8
Rangers	24	9	11	20	18	1	83
Supervisor of Scalers and Assistants	5	....	1	1	2	....	9
Scalers, Official	65	....	....	....	....	....	65
Scalers, Licensed	....	....	....	1	....	....	1
Scalers, Student	10	....	....	....	....	....	10
Inspectors, Royalty and Export	2	....	....	....	....	2	4
Mechanical—Radio and Engineering Supervisors	1	1	1	1	1	10	15
Technical Forest and Public Relations Assistants	....	....	....	....	....	26	26
Nursery, Reforestation, Parks, and Research Assistants	....	....	....	....	....	89	89
Nursery Superintendents	....	....	....	....	....	3	3
Draughtsmen	4	2	1	3	3	19	32
Clerks, stenographers, and messengers	60	13	11	16	16	84	200
Superintendent and foremen, Forest Service Marine Station	....	....	....	....	....	4	4
Mechanics, carpenters, and technicians	....	....	....	....	....	18	18
Launch crewmen	11	3	....	....	....	....	14
Miscellaneous	2	....	....	4	3	15	24
Total, continuous personnel	193	33	30	56	53	301	666
Seasonally employed.							
Assistant and Acting Rangers	34	14	21	23	29	....	121
Patrol-men	13	5	10	27	19	....	74
Lookout-men	18	10	12	20	34	....	94
Dispatchers and radio operators	20	5	4	16	19	....	64
Fire-suppression crewmen	41	....	....	48	50	....	139
Reforestation—snag-fallers, planters, etc.	6	....	....	....	....	400*	406
Cruisers and compass-men	3	....	2	2	1	37	45
Truck and tractor operators	4	2	2	4	4	1	17
Student assistants	4	1	1	4	5	....	15
Miscellaneous	....	2	3	2	10	100	117
Total, seasonal personnel	143	39	55	146	171	538	1,092
Total, all personnel	336	72	85	202	224	839	1,758

* Peak employment.

(2)

SUMMARY OF PLANTING DURING THE YEARS 1939–48.

Year.	EXPERIMENTAL.		FOREST SERVICE ON CROWN LAND.		PRIVATE COMPANIES.		COMMUNITY FORESTS.		PRIVATE PLANTING AND FARM WOOD-LOTS.		TOTAL.	
	Trees in Thousands.	Acres.	Trees in Thousands.	Acres.	Trees in Thousands.	Acres.	Trees in Thousands.	Acres.	Trees in Thousands.	Acres.	Trees in Thousands.	Acres
1948	3.4	4.0	9,123.3	10,560.0	1,402.0	2,140.0	5.0	5.0	18.4	20.0	10,552.1	12,729.0
1947	.....	.....	3,466.5	4,380.0	473.5	490.0	.....	.....	34.0	20.0	3,974.0	4,890.0
1946	.....	.....	3,670.2	6,000.0	3,854.2	4,700.0	.....	.....	6.7	7.0	7,531.1	10,707.0
1945	.....	.....	160.0	180.0	1,035.0	1,215.0	.....	.....	8.4	10.0	1,203.4	1,405.0
1944	68.0	70.0	7,108.2	9,175.0	600.0	914.0	102.0	132.0	11.4	11.0	7,889.6	10,302.0
1943	22.4	25.0	8,535.0	10,804.0	556.9	510.0	70.5	70.0	12.4	12.0	9,197.2	11,421.0
1942	5.3	5.0	6,673.8	7,908.0	.....	.....	2.5	3.0	12.5	12.0	6,694.1	7,928.0
1941	7.3	7.0	8,267.7	10,188.0	460.0	550.0	15.0	15.0	2.2	2.0	8,752.2	10,762.0
1940	6.1	6.0	1,156.7	1,293.0	118.0	135.0	67.0	55.0	8.1	8.0	1,355.9	1,497.0
1939	72.6	28.6	816.8	948.0	99.4	116.0	5.0	5.0	20.8	20.0	1,014.3	1,117.6
Previously planted	528.3	476.1	366.8	709.0	108.8	136.3	37.0	37.0	.....	.....	1,041.2	1,358.4
Totals to date	713.4	621.7	49,345.0	62,145.0	8,707.8	10,906.3	304.0	322.0	134.9	122.0	59,205.1	74,117.0

(3) ESTIMATED VALUE OF PRODUCTION, INCLUDING LOADING AND FREIGHT WITHIN THE PROVINCE.

Product.	1939.	1940.	1941.	1942.	1943.	1944.	1945.	1946.	1947.	1948.	Ten-year Average, 1939–48.
Lumber	$50,379,000	$55,514,000	$64,596,000	$67,150,000	$66,520,000	$81,495,000	$78,244,000	$87,013,502	$155,761,222	$219,289,000	$92,596,172
Pulp and paper	16,191,000	22,971,000	27,723,000	27,457,000	25,597,000	30,391,000	33,782,000	41,800,555	57,145,678	73,989,000	35,704,723
Shingles	8,560,000	9,620,000	11,550,000	12,822,000	8,332,000	10,006,000	10,544,000	12,946,506	23,625,946	25,094,000	13,310,046
Boxes	2,039,000	4,779,000	4,707,000	5,397,000	4,697,000	7,218,000	7,855,000	8,288,491	10,430,608	6,129,000	6,154,010
Doors	737,000	740,000	*	*	*	*	*	*	*	*	147,700
Plywood	.....	.....	.....	.....	.....	6,100,000	6,000,000	9,120,000	20,830,000	22,430,000	12,896,000†
Piles, poles, and mine-props	1,556,000	1,759,000	1,723,000	2,576,000	2,387,000	2,088,000	2,986,000	5,125,762	5,225,000	4,158,000	2,958,376
Cordwood, fence-posts, and lagging	1,495,000	1,399,000	1,522,000	2,165,000	4,485,000	3,303,000	2,621,000	2,647,488	2,200,000	1,671,000	2,350,849
Ties, railway	360,000	258,000	204,000	221,000	268,000	484,000	507,000	478,519	580,000	671,000	403,152
Additional value contributed by the wood-using industry	1,500,000	1,600,000	2,000,000	2,500,000	2,800,000	1,600,000	1,500,000	1,700,000	1,600,000	1,800,000	1,860,000
Laths and other miscellaneous products	1,400,000	1,400,000	1,500,000	1,500,000	1,400,000	1,500,000	1,500,000	1,400,000	1,200,000	1,598,000	1,439,800
Logs exported	3,852,000	2,684,000	4,212,000	2,618,000	1,555,000	2,065,000	1,766,000	2,349,280	3,313,672	6,435,000	3,084,995
Pulp-wood exported	11,000	8,000	7,000	2,000	16,000	35,000	25,000	6,787	32,610	29,000	17,240
Christmas trees	141,000	72,000	176,000	162,000	227,000	236,000	271,000	402,056	293,652	470,000	245,071
Cascara bark	.....	.....	.....	150,000	150,000	90,000	54,000	192,421	50,000	23,000	101,346‡
Totals	$88,221,000	$102,804,000	$119,920,000	$124,720,000	$118,434,000	$146,611,000	$147,655,000	$173,471,370	$282,288,388	$363,786,000	.....

* Included in wood-using industry value. † Average for five-year period only. ‡ Average for seven-year period only.

(4) PAPER PRODUCTION (IN TONS).

Product.	1939.	1940.	1941.	1942.	1943.	1944.	1945.	1946.	1947.	1948.	Ten-year Average, 1939–48.
Newsprint	216,542	262,144	275,788	252,559	211,696	236,696	253,671	259,921	338,239	327,764	263,503
Other papers	50,870	68,428	75,453	74,915	63,026	74,038	80,691	82,833	72,755	79,446	72,246

In addition to 393,254 tons of pulp manufactured into paper in the Province, 244,052 tons were shipped out of the Province during the year.

(5)

WATER-BORNE LUMBER TRADE (IN M B.M.).

Destination.	1939.	1940.	1941.	1942.	1943.	1944.	1945.	1946.	1947.	1948.	Ten-year Average, 1939–48.
Australia	144,534	72,797	49,614	13,819	45,452	55,332	68,600	67,269	71,313	54,376	64,310
New Zealand	5,142	2,584	2,517	2,199	.....	3,150	5,637	5,892	15,362	6,768	4,926
South America	5,560	1,795	28,091	4,244	2,433	.....	.....	11,794	5,519	5,486	6,493
China	34,775	6,347	9,663	.....	.....	.....	229	58,632	48,426	34,390	19,247
Japan	6,116	835	.....	.....	.....	.....	.....	.....	.....	.....	695
United Kingdom and Continent	364,693	971,594	479,861	466,902	653,847	618,517	595,473	418,960	744,804	470,445	638,509
South Africa	80,120	84,708	68,142	20,878	24,924	44,214	46,732	95,588	69,136	108,384	64,282
India and Straits Settlements	7,225	139	2,292	846	.....	50	51	161	8,783	2,497	2,204
United States and Atlantic Coast	123,733†	70,726†	68,383†	6,368†	3,301†	†	9,587†	2,905	205	104,636	38,984
Philippine and Hawaiian Islands	862	.....	.....	.....	83	.....	.....	1,084	73	13,901	1,600
West Indies and Cuba	12,828	15,309	19,056	4,683	3,930	8,240	10,412	16,832	18,934	4,328	11,456
South Sea Islands	11,523	7,187	5,074	5,060	1,402	5,350	2,370	3,565	6,388	5,930	5,385
Mexico and Central America	2,024	5	2,975	229	.....	.....	4	5,812	7	435	1,150
Egypt, Palestine, and Arabia	1,828	17,326	88	146	237	1,278	1,241	19,185	28,451	10,291	8,007
*Belgium	1,976	.....	.....	.....	.....	.....	2,243	897	180	1,203	650
*Denmark	210	120	.....	.....	.....	.....	.....	420	.....	.....	75
*France	592	4,938	.....	.....	.....	.....	2,109	16,229	26,107	30	5,001
*Germany	3,090	.....	.....	.....	.....	.....	.....	.....	.....	.....	309
*Holland	1,098	.....	.....	.....	.....	.....	.....	17,387	52,813	7,883	7,917
*Italy	703	686	.....	.....	.....	581	313	.....	80	47	240
*Norway and Sweden	5	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
Spain	3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Foreign, unclassified	402†	821†	279†	29†	250†	2,086†	2,031†	2,603	12,597	10,568	3,166
Totals	1,409,042	1,257,917	736,035	525,403	735,859	738,798	747,032	745,215	1,109,178	841,598	884,607

* Previously included with United Kingdom.

† Includes a considerable volume with destination unknown due to cloaking of war shipments.

TOTAL AMOUNT OF TIMBER SCALED IN BRITISH COLUMBIA DURING THE YEARS 1947–48 (IN F.B.M.).

(6)

Forest District.	1947.	1948.	Gain.	Loss.	Net Gain.
Vancouver	3,098,865,842	3,091,275,786	.....	7,590,056	.....
Prince Rupert	187,121,710	175,108,525	.....	12,013,185	.....
Totals, Coast	3,285,987,552	3,266,384,311	.....	19,603,241	.....
Prince Rupert (I.)	84,585,211	100,372,636	15,787,425	.....	.....
Fort George	234,806,453	297,219,261	62,412,808	.....	.....
Kamloops	316,602,732	334,671,933	18,069,201	.....	.....
Nelson	265,834,251	294,816,878	28,982,627	.....	.....
Totals, Interior	901,828,647	1,027,080,708	125,252,061	.....	.....
Grand totals	4,187,816,199	4,293,465,019	125,252,061	19,603,241	105,648,820

(7)

SPECIES CUT, ALL PRODUCTS (IN F.B.M.).

Forest District.	Fir.	Cedar.	Spruce.	Lodge-pole Pine.	Hemlock.	Balsam.	White Pine.	Yellow Pine.	Cypress.	Larch.	Hard-woods.	Cotton-wood.	Totals.
Vancouver	1,331,106,626	683,142,504	45,390,311	.....	788,808,701	196,789,417	23,194,807	804,033	6,961,549	.....	9,060,982	6,016,856	3,091,275,786
Prince Rupert	13,910,774	42,523,615	54,382,510	87,311	56,994,335	6,573,180	.....	.....	338,457	.....	22,518	275,825	175,108,525
Totals, Coast	1,345,017,400	725,666,119	99,772,821	87,311	845,803,036	203,362,597	23,194,807	804,033	7,300,006	.....	9,083,500	6,292,681	3,266,384,311
Prince Rupert (I.)	143,497	10,552,283	55,110,349	21,085,178	7,535,388	4,136,164	.....	.....	.....	.....	198,126	1,611,651	100,372,636
Fort George	58,557,887	1,949,125	202,792,075	26,660,752	4,299	6,157,451	.....	.....	.....	.....	139,765	957,907	297,219,261
Kamloops	191,494,071	30,590,084	34,456,488	7,115,769	2,465,910	2,202,581	6,014,020	34,893,903	.....	21,055,267	606,988	3,776,852	334,671,933
Nelson	76,650,948	35,721,269	40,803,832	6,654,919	18,706,611	2,297,280	12,376,467	19,396,567	.....	81,196,901	214,709	797,375	294,816,878
Totals, Interior	326,846,403	78,812,761	333,162,744	61,516,618	28,712,208	14,793,476	18,390,487	54,290,470	.....	102,252,168	1,159,588	7,143,785	1,027,080,708
Grand totals, 1948	1,671,863,803	804,478,880	432,935,565	61,603,929	874,515,244	218,156,073	41,585,294	55,094,503	7,300,006	102,252,168	10,243,088	13,436,466	4,293,465,019

Material cut and scaled in Cubic Feet included above.

(Conversion factor: 1 cubic foot = 5.7 board-feet.)

Vancouver	152,070	76,443	533,309	.....	13,060,598	545,427	.....	.....	.....	.....	97	.....	14,367,944

TOTAL SCALE (IN F.B.M.) SEGREGATED, SHOWING LAND STATUS, ALL PRODUCTS.

(8)

	Forest District.						Totals, 1948.
	Vancouver.	Prince Rupert, Coast.	Prince Rupert, Interior.	Fort George.	Kamloops.	Nelson.	
Timber licences	706,011,944	14,315,504	334,647	6,408,361	8,067,739	15,248,141	750,386,336
Timber berths	123,143,289	.....	.....	.....	13,824,290	2,737,312	139,704,891
Timber leases	154,588,462	.....	.....	.....	.....	.....	154,588,462
Pulp leases	24,019,971	20,019,528	.....	.....	.....	.....	44,039,499
Pulp licences	35,956,659	45,407,000	.....	.....	.....	.....	81,363,659
Hand-loggers' licences	11,499	337,719	.....	.....	.....	.....	349,218
Dominion lands	26,384,093	688,398	1,771,395	.....	4,654,211	7,287,468	40,785,565
Timber sales	660,660,884	68,518,721	82,783,645	232,368,816	204,532,582	190,238,746	1,439,103,394
Pulp-timber sales	6,651,376	10,408,880	.....	.....	.....	.....	17,060,256
Pre-emptions, S.R., and miscellaneous	81,811,258	859,581	2,121,295	20,824,593	7,515,212	4,417,128	117,549,067
Crown Grants—							
To 1887	1,027,917,395	.....	.....	30,819	29,210,550	2,594,153	1,059,752,917
1887 to 1906	134,018,234	1,299,543	210,397	92,889	9,761,686	39,130,757	184,513,506
1906 to 1914	42,306,395	10,085,720	6,879,623	6,852,007	24,719,055	13,313,467	104,156,267
1914 to date	67,794,327	3,167,931	6,271,634	30,641,776	32,386,608	19,849,706	160,111,982
Totals	3,091,275,786	175,108,525	100,372,636	297,219,261	334,671,933	294,816,878	4,293,465,019

Timber from lands in the former Dominion Government Railway Belt which has passed over to the jurisdiction of this Province is included under the various land-status headings shown above.

Only timber from Indian reserves and other lands still under the jurisdiction of the Dominion Government is shown under the heading "Dominion lands."

Total Scale of Material in Cubic Feet included above segregated, showing Land Status, all Products.

(Conversion factor: 1 cubic foot=5.7 board-feet.)

Forest District.	Timber Licences.	Pulp Leases.	Dominion Lands.	Pre-emptions, S.R., and Miscellaneous.	Crown Grants.				
					To 1887.	1887–1906.	1906–14.	1914 to Date.	Total.
Vancouver	1,301,686	2,364,326	17,744	1,967,537	7,926,460	565,628	4,891	219,672	14,367,944

TIMBER SCALED IN BRITISH COLUMBIA IN 1948 (BY MONTHS AND DISTRICTS).

Month.	Vancouver.	Prince Rupert (Coast).	Prince Rupert (Interior).	Fort George.	Kamloops.	Nelson.	Total F.B.M.	Total Lineal Feet.	Total Cords.	Total Hewn Ties.	Total Cubic Feet.
January.....F.B.M.	179,517,949	7,467,618	5,582,895	27,646,235	21,960,001	16,058,568	258,233,266	.....	.....	.....	.....
,, ...cu. ft.	70,335.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	70,335.00
,, ...lin. ft.	471,663	9,328	740,180	131,655	1,058,981	605,564	.....	3,017,371	.....	.....	.....
,, ...cords	4,926	.....	134	1,087	1,142	2,435	.....	.....	9,724	.....	.....
,, ...hewn ties	4,249	.....	4,127	31,048	.....	4,775	.....	.....	.....	44,199	.....
February.....F.B.M.	142,688,891	3,972,028	8,206,518	36,916,617	17,756,327	21,341,165	230,881,546	.....	.....	.....	.....
,, ...cu. ft.	94,244.50	.....	.....	.....	.....	.....	.....	.....	.....	.....	94,244.50
,, ...lin. ft.	334,734	.....	249,335	31,110	895,646	615,578	.....	2,126,403	.....	.....	.....
,, ...cords	3,269	.....	102	375	1,950	3,255	.....	.....	8,951	.....	.....
,, ...hewn ties	2,325	.....	15,442	3,576	3,866	7,665	.....	.....	.....	32,874	.....
March.....F.B.M.	182,192,673	2,124,104	8,189,700	33,461,664	29,467,364	17,933,857	273,369,362	.....	.....	.....	.....
,, ...cu. ft.	53,447.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	53,447.00
,, ...lin. ft.	165,750	.....	145,069	.....	1,228,673	111,273	.....	1,650,765	.....	.....	.....
,, ...cords	2,941	.....	357	.....	5,711	1,518	.....	.....	10,527	.....	.....
,, ...hewn ties	5,498	.....	8,391	.....	7,198	9,210	.....	.....	.....	30,297	.....
April.....F.B.M.	280,811,918	11,204,526	12,382,781	41,161,168	20,346,558	16,601,068	382,508,019	.....	.....	.....	.....
,, ...cu. ft.	234,356.15	.....	.....	.....	.....	.....	.....	.....	.....	.....	234,356.15
,, ...lin. ft.	435,587	1,011	130,725	43,665	401,028	133,997	.....	1,146,013	.....	.....	.....
,, ...cords	4,156	.....	405	1,120	1,359	1,792	.....	.....	8,832	.....	.....
,, ...hewn ties	111	.....	973	18,407	7,848	6,415	.....	.....	.....	33,754	.....
May.....F.B.M.	280,923,279	14,997,378	6,662,857	16,527,847	20,836,175	23,628,010	363,575,546	.....	.....	.....	.....
,, ...cu. ft.	37,769.55	.....	.....	.....	.....	.....	.....	.....	.....	.....	37,769.55
,, ...lin. ft.	423,426	3,532	37,130	18,373	186,891	120,424	.....	789,776	.....	.....	.....
,, ...cords	2,095	.....	37	462	3,170	1,720	.....	.....	7,484	.....	.....
,, ...hewn ties	14,130	.....	8,877	29,126	11,584	6,582	.....	.....	.....	70,299	.....
June.....F.B.M.	293,832,390	14,836,871	4,796,311	7,642,530	15,950,423	12,921,080	349,979,605	.....	.....	.....	.....
,, ...cu. ft.	191,671.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	191,671.00
,, ...lin. ft.	842,358	6,088	296,919	32,085	427,657	383,243	.....	1,988,350	.....	.....	.....
,, ...cords	3,754	.....	66	1,033	612	2,087	.....	7,552	.....	.....	.....
,, ...hewn ties	5,175	.....	12,766	27,709	9,415	1,711	.....	.....	.....	56,776	.....
July.....F.B.M.	255,525,292	25,844,539	6,278,712	18,761,239	24,790,466	20,192,703	351,392,951	.....	.....	.....	.....
,, ...cu. ft.	437,900.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	437,900.00
,, ...lin. ft.	1,148,858	32,707	66,258	202,561	831,509	571,599	.....	2,853,492	.....	.....	.....
,, ...cords	1,878	15	390	1,750	1,540	2,706	.....	.....	8,279	.....	.....
,, ...hewn ties	6,153	.....	.....	14,515	11,233	7,480	.....	.....	.....	39,381	.....
August.....F.B.M.	284,814,783	19,602,802	5,946,910	19,732,112	31,373,143	26,251,273	387,721,023	.....	.....	.....	.....
,, ...cu. ft.	308,103.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	308,103.00
,, ...lin. ft.	786,821	7,671	244,651	106,651	697,528	539,790	.....	2,383,052	.....	.....	.....
,, ...cords	4,122	176	273	1,804	3,529	2,973	.....	.....	12,877	.....	.....
,, ...hewn ties	14,071	.....	36,420	34,179	4,904	10,793	.....	.....	.....	100,367	.....

September	F.B.M.	348,562,404	16,803,160	6,600,525	21,754,313	28,501,761	24,123,285	446,345,448	.....	.....	.....	.....
,,	cu. ft.	347,847.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	347,847.00
,,	lin. ft.	855,232	.....	73,270	55,381	569,173	621,946	.....	2,175,002	.....	.....	.....
,,	cords	4,503	20	181	617	814	2,913	.....	.....	9,048	.....	.....
,,	hewn ties	4,167	.....	19,071	830	3,554	16,473	.....	.....	.....	44,095	.....
October	F.B.M.	312,539,483	27,062,605	6,168,711	18,796,768	30,514,867	24,095,993	419,178,427	.....	.....	.....	.....
,,	cu. ft.	350,172.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	350,172.00
,,	lin. ft.	893,938	2,750	157,355	2,635	498,194	507,574	.....	2,062,446	.....	.....	.....
,,	cords	3,693	32	92	215	1,908	2,406	.....	.....	8,346	.....	.....
,,	hewn ties	16,066	.....	29,872	8,068	6,180	7,244	.....	.....	.....	67,430	.....
November	F.B.M.	295,481,058	21,926,568	5,070,601	22,286,259	25,192,679	35,273,902	405,231,067	.....	.....	.....	.....
,,	cu. ft.	274,009.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	274,009.00
,,	lin. ft.	753,765	.....	728,860	65,501	2,505,943	883,472	.....	4,937,541	.....	.....	.....
,,	cords	3,760	.....	67	11,127	2,262	4,089	.....	.....	11,305	.....	.....
,,	hewn ties	5,589	.....	12,631	5,372	11,887	13,823	.....	.....	.....	49,302	.....
December	F.B.M.	173,568,131	8,957,277	8,374,288	18,863,946	22,293,730	22,992,379	255,049,751	.....	.....	.....	.....
,,	cu. ft.	120,837.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	120,837.00
,,	lin. ft.	343,270	185	167,780	12,230	1,186,274	803,356	.....	2,513,095	.....	.....	.....
,,	cords	4,819	.....	64	600	2,962	2,276	.....	.....	10,721	.....	.....
,,	hewn ties	1,394	.....	.....	550	7,482	5,498	.....	.....	.....	.....	.....
Totals	F.B.M.	3,030,458,251	174,799,476	84,260,809	283,550,698	288,983,494	261,413,283	4,123,466,011	.....	.....	.....	.....
,,	cu. ft.	2,520,691.20	.....	.....	.....	.....	.....	.....	.....	.....	.....	2,520,691.20
,,	lin. ft.	7,455,402	63,272	3,037,532	701,787	10,487,497	5,897,816	.....	27,643,306	.....	.....	.....
,,	cords	43,916	243	2,168	10,190	26,959	30,170	.....	.....	113,646	.....	.....
,,	hewn ties	78,928	.....	148,570	173,380	85,151	97,669	.....	.....	.....	583,698	.....

Total scale in F.B.M., 4,293,465,019.

(10)

Logging Inspection, 1948.

Forest District.	Type of Tenure operated.				No. of Inspections.
	Timber Sales.	Hand-loggers' Licences.	Leases, Licences, Crown Grants, and Pre-emptions.	Totals.	
Vancouver	1,237	....	1,754	2,991	5,702
Prince Rupert	1,109	5	607	1,721	2,453
Fort George	650	....	114	764	1,081
Kamloops	1,130	....	1,000	2,130	3,568
Nelson	721	....	507	1,228	2,628
Totals, 1948	4,847	5	3,982	8,834	15,432
Totals, 1947	4,428	5	3,190	7,623	13,876
Totals, 1946	3,627	6	3,021	6,654	12,974
Totals, 1945	3,492	9	2,852	6,353	11,901
Totals, 1944	3,373	4	2,540	5,917	11,648
Totals, 1943	3,259	11	2,519	5,789	12,110
Totals, 1942	3,086	18	2,569	5,673	13,753
Totals, 1941	3,207	18	2,833	6,058	11,438
Totals, 1940	2,864	12	2,272	5,148	10,968
Totals, 1939	2,770	10	2,068	4,848	11,295
Ten-year average, 1939–48	3,494	10	2,785	6,289	12,539

(11) TRESPASSES, 1948.

Forest District.	No. of Cases.	Areas cut over (Acres).	Quantity cut.							No. of Resulting Seizures.	Amount charged.
			Feet B.M.	Lineal Feet.	Cords.	Ties.	Christmas Trees.	Cedar Shakes, Car-stakes.	Posts.		
Vancouver	80	330	3,745,896	47,632	116	.....	190	10,985	.....	2	$23,690.25
Prince Rupert	37	140	1,832,843	20,962	429	618	.....	.....	.....	....	5,278.72
Fort George	26	244	1,365,044	.....	157	2,127	.....	.....	1,600	1	5,299.33
Kamloops	102	1,455	3,347,750	316,450	2,752	1,116	1,097	150	641	1	15,858.06
Nelson	67	893	1,447,322	85,630	115	14,350	2,424	.....	1,859	4	9,528.01
Totals, 1948	312	3,062	11,738,855	470,674	3,569	18,211	3,711	11,135	4,100	8	$59,654.37
Totals, 1947	316	5,132	17,234,601	659,621	5,599	5,235	15,416	439,554	17,506	15	$74,761.43
Totals, 1946	226	2,568	7,084,343	1,760,574	1,469	2,900	10,148	41,377	35,997	8	$27,530.68
Totals, 1945	267	3,313	24,322,556	516,960	1,910	9,902	2,438	.....	.....	10	$37,877.12
Totals, 1944	210	2,467	12,317,066	179,219	3,369	4,231	3,781	.....	.....	5	$29,193.16
Totals, 1943	167	3,058	9,744,957	129,409	6,873	552	7,923	.....	.....	7	$23,725.29
Totals, 1942	180	1,159	4,413,906	365,861	4,757	490	1,512	.....	.....	15	$14,391.61
Totals, 1941	236	1,788	7,627,990	526,391	2,887	1,365	4,150	.....	.....	17	$24,253.10
Totals, 1940	194	877	5,206,829	94,444	1,573	4,279	9,854	.....	.....	13	$14,088.24
Totals, 1939	209	571	6,905,268	94,818	3,147	5,206	46,729	.....	.....	26	$17,725.00
Ten-year average, 1939–48	231	2,399	10,659,637	479,797	3,516	5,237	10,566	.....	.....	13	$32,319.99

(12) PRE-EMPTION INSPECTION, 1948.

Pre-emption Records examined by District.

Vancouver	22
Prince Rupert	10
Fort George	62
Kamloops	170
Nelson	44
Total	308

(13) AREAS EXAMINED FOR MISCELLANEOUS PURPOSES OF THE "LAND ACT," 1948.

Forest District.	Applications for Hay and Grazing Leases.		Applications for Pre-emption Records.		Applications to Purchase.		Miscellaneous.		Totals.	
	No.	Acres.	No.	Acres.	No.	Acres.	No.	Acres.	No.	Acres.
Vancouver	1	160	7	397	274	12,644	136	1,732	418	14,933
Prince Rupert	6	1,823	13	1,824	34	3,250	23	1,209	76	8,106
Fort George	9	1,030	29	4,218	154	14,086	24	2,055	216	21,389
Kamloops	84	77,447	31	4,253	235	14,865	32	2,058	382	98,623
Nelson	6	1,604	5	720	134	9,429	14	617	159	12,370
Totals	106	82,064	85	11,412	831	54,274	229	7,671	1,251	155,421

(14) CLASSIFICATION OF AREAS EXAMINED, 1948.

Forest District.	Total Area.	Agricultural Land.	Non-agricultural Land.	Merchantable Timber Land.	Estimated Timber on Merchantable Timber Land.
	Acres.	Acres.	Acres.	Acres.	M B.M.
Vancouver	14,933	3,066	11,867	2,686	63,492
Prince Rupert	8,106	1,545	6,561	142	2,296
Fort George	21,389	10,698	10,691	962	9,160
Kamloops	98,623	7,893	90,730	463	3,506
Nelson	12,370	2,653	9,717	.....	.....
Totals	155,421	25,855	129,566	4,253	78,454

(15) AREAS CRUISED FOR TIMBER SALES, 1948.

Forest District.	Number cruised.	Acreage.	Saw-timber (M B.M.).	Pit-props, Poles, and Piles (Lineal Ft.).	Shingle-bolts and Cordwood (Cords).	Railway-ties (No.).	Car-stakes, Posts, Shakes, etc. (No.).
Vancouver	508	71,120	777,437	220,028	4,225	14,500	1,242,000
Prince Rupert	275	38,650	129,148	744,810	4,450	59,988	2,000
Fort George	390	65,176	329,490	330,450	14,235	67,084	121,000
Kamloops	413	89,691	311,627	2,538,613	16,684	21,840	.....
Nelson	265	82,011	270,035	3,769,740	5,132	17,190	582,010
Totals, 1948	1,851	346,648	1,817,737	7,603,641	44,726	180,602	1,947,010
Totals, 1947	1,960	361,834	1,481,715	23,015,436	50,346	299,501	1,064,125
Totals, 1946	**2,059**	**362,587**	**1,230,716**	**40,760,769**	**90,078**	**216,892**	**2,718,706**
Totals, 1945	**1,488**	**261,150**	**948,673**	**48,743,325**	**95,774**	**301,276**	**1,802,468**
Totals, 1944	**1,476**	**334,729**	**1,205,308**	**8,166,829**	**137,737**	**483,363**	**1,345,439**
Totals, 1943	**1,771**	**590,953**	**907,768**	**10,720,729**	**259,741**	**454,767**	**816,544**
Totals, 1942	**1,469**	**305,222**	**794,676**	**8,562,739**	**100,232**	**381,106**	**743,500**
Totals, 1941	**1,611**	**321,220**	**689,595**	**15,794,246**	**126,463**	**199,174**	**263,480**
Totals, 1940	**1,620**	**300,480**	**572,562**	**11,309,288**	**72,157**	**314,644**	**512,042**
Totals, 1939	**1,324**	**212,594**	**470,660**	**5,016,945**	**68,078**	**339,866**	**261,100**
Ten-year average, 1939–48	1,664	339,742	1,011,941	17,969,396	104,534	317,114	1,147,442

(16) TIMBER-SALE RECORD, 1948.

District.	Sales made.	Sales closed.	Total existing.	Total Area (Acres).	Acreage paying Forest Protection Tax.	Total 10-per-cent. Deposits.
Vancouver	604	582	1,694	374,448	257,982	$1,028,513.38
Prince Rupert	341	290	1,125	254,515	174,259	233,649.82
Fort George	325	262	812	198,025	129,693	242,353.86
Kamloops	546	395	1,736	428,741	351,104	328,880.88
Nelson	348	309	1,154	347,185	268,845	278,501.95
Totals	2,164	1,838	6,521	1,602,914	1,181,793	$2,111,899.89
Including cash sales	448	.....	.....	.....	.....	.....
Total sales	2,612	.....	.....	.....	.....	.....

TIMBER SALES AWARDED BY DISTRICTS, 1948.

Forest District.	No. of Sales.	Acreage.	Saw-timber (F.B.M.).	Poles and Piling (Lin. Ft.).	No. of Posts.	No. of Cords.	No. of Ties.	No. of Christmas Trees.	No. of Hop-poles.	No. of Car-stakes.	No. of Blasting-sticks.	No. of Fence-rails.	No. of Bean-poles.	No. of Cedar Shakes.	Estimated Revenue.
Vancouver	626	111,618	897,056,000	578,245	21,300	14,124	600	.....	.....	.....	.....	.....	.....	1,247,800	$4,286,843.93
Prince Rupert	344	49,126	134,447,000	1,333,130	4,800	2,985	65,406	.....	.....	.....	.....	.....	.....	.....	544,664.20
Nelson	401	101,144	225,509,000	5,846,265	453,467	11,219	24,040	.....	.....	.....	.....	.....	.....	.....	1,169,061.53
Fort George	521	57,376	278,702,000	209,158	108,300	10,845	78,665	.....	.....	.....	.....	.....	.....	.....	1,231,780.55
Kamloops	719	120,934	288,901,000	4,085,278	378,400	26,426	66,872	.....	.....	.....	117,000	.....	.....	.....	1,311,771.63
Totals, 1948	2,611	440,198	1,824,615,000	12,052,076	966,267	65,599	235,583	.....	.....	.....	117,000	.....	.....	1,247,800	$8,544,121.84
Totals, 1947	2,469	375,781	1,469,890,000	27,185,542	1,291,482	64,576	236,851	.....	3,000	1,800	.....	.....	.....	636,385	$7,097,435.12
Totals, 1946	**2,637**	**443,505**	**1,262,948,000**	**55,461,304**	**2,982,443**	**87,322**	**266,338**	.....	**600**	**5,350**	.....	.....	**1,000**	**2,072,726**	**$5,036,148.66**
Totals, 1945	**1,898**	**330,190**	**949,614,000**	**39,645,792**	**2,325,117**	**76,221**	**255,242**	.....	**2,500**	**2,450**	.....	.....	.....	.....	**$3,475,676.91**
Totals, 1944	**1,893**	**345,132**	**855,187,000**	**6,866,301**	**1,665,783**	**93,058**	**381,571**	.....	.....	**620**	**60,000**	.....	**10,000**	.....	**$2,879,952.84**
Totals, 1943*	2,016	394,981	888,580,000	10,875,063	943,827	214,317	336,251	.....	20,000	3,970	150,000	1,000	.....	.....	$3,064,953.20
Totals, 1942	**1,710**	**363,193**	**751,591,000**	**11,944,558**	**746,345**	**100,812**	**299,905**	.....	.....	**4,420**	.....	.....	.....	.....	**$2,339,521.06**
Totals, 1941	**1,853**	**362,997**	**623,121,000**	**14,763,144**	**639,015**	**103,422**	**198,549**	.....	**2,500**	**5,300**	.....	**100**	.....	.....	**$1,953,469.79**
Totals, 1940	**1,734**	**314,659**	**548,898,000**	**10,073,574**	**447,909**	**105,185**	**309,618**	**219,450**	**2,000**	**5,750**	.....	**940**	.....	.....	**$1,599,106.33**
Totals, 1939	**1,520**	**355,958**	**442,776,000**	**4,931,607**	**499,130**	**104,778**	**370,673**	**217,965**	**3,500**	**7,200**	**50,000**	.....	.....	.....	**$1,233,235.71**
Ten-year average, 1939–48	2,034	372,659	961,722,000	19,379,896	1,250,732	101,529	289,058	.....	.....	.....	.....	.....	.....	.....	$3,722,362.15

* Revised figures.

AVERAGE STUMPAGE PRICES AS BID PER M B.F. LOG-SCALE, BY SPECIES AND FOREST DISTRICTS, ON SAW-TIMBER CRUISED ON TIMBER SALES, 1948.

Forest District.	DOUGLAS FIR.			CEDAR.			SPRUCE.			HEMLOCK.			BALSAM.		
	M B.F.	Price per M.	Price Range per M.	M B.F.	Price per M.	Price Range per M.	M B.F.	Price per M.	Price Range per M.	M B.F.	Price per M.	Price Range per M.	M B.F.	Price per M.	Price Range per M.
Vancouver	287,012	$6.11	$3.00–15.00	245,219	$5.29	$2.25–40.00	19,186	$3.48	$2.50– 7.05	259,894	$3.09	$1.00–11.00	117,367	$3.20	$1.10–7.05
Prince Rupert (Coast)	600	3.25	3.25–	14,967	3.72	3.00– 5.50	14,235	3.56	3.00–10.50	19,813	2.97	2.00– 4.50	2,019	3.13	2.50–4.14
Prince Rupert (Interior)	3	3.50	3.50–	6,467	3.33	2.25– 4.00	43,950	3.64	2.75– 4.75	13,555	3.18	2.25– 4.30	5,738	3.39	2.00–4.55
Fort George	49,949	4.25	2.00– 9.55	.....	.....	.....	211,309	4.33	2.55–10.60	.....	.....	.....	1,854	3.26	2.50–4.75
Kamloops	156,544	3.38	2.00– 9.40	3,551	2.66	1.50– 3.00	65,904	4.00	3.00– 8.10	2,596	2.38	1.04– 2.75	5,359	2.83	1.50–3.05
Nelson	54,568	4.07	1.50–10.75	14,663	3.43	1.75– 5.40	29,453	5.01	1.75– 7.30	17,844	3.54	1.75– 5.40	2,336	3.70	2.00–5.10
Totals for Province	548,676	$4.96	.....	284,867	$5.03	.....	384,037	$4.18	.....	313,702	$3.11	.....	134,673	$3.20	.....

Forest District.	WHITE PINE.			WESTERN YELLOW PINE.			LARCH (TAMARACK).			OTHER SPECIES.			ALL SPECIES.		
	M B.F.	Price per M.	Price Range per M.	M B.F.	Price per M.	Price Range per M.	M B.F.	Price per M.	Price Range per M.	M B.F.	Price per M.	Price Range per M.	M B.F.	Price per M.	Price Range per M.
Vancouver	8,335	$6.81	$4.95–20.00	.....	.....	.....	.....	.....	.....	24,856	$6.51	$2.00–8.00	961,869	$4.70	.....
Prince Rupert (Coast)	.....	.....	.....	.....	.....	.....	.....	.....	.....	299	3.39	3.00–4.50	51,933	3.36	.....
Prince Rupert (Interior)	.....	.....	.....	.....	.....	.....	.....	.....	.....	18,356	3.49	2.50–4.75	88,069	3.50	.....
Fort George	.....	.....	.....	.....	.....	.....	.....	.....	.....	22,147	3.60	2.00–7.00	285,259	4.25	.....
Kamloops	5,852	7.35	7.00–10.00	26,148	$4.80	$3.50–10.40	15,637	$3.97	$2.75– 6.75	3,229	3.35	2.00–9.40	284,820	3.74	.....
Nelson	10,888	8.76	3.50–10.05	10,816	5.48	2.25–12.50	76,096	4.11	1.50–10.75	3,234	3.88	1.50–8.25	219,898	4.42	.....
Totals for Province	25,075	$7.78	.....	36,964	$5.00	.....	91,733	$4.08	.....	72,121	$4.71	.....	1,891,848	$4.36	.....

NOTE.—Stumpage inclusive of royalty.

AVERAGE STUMPAGE PRICES RECEIVED FOR M B.F. LOG-SCALE, BY SPECIES AND FOREST DISTRICTS, ON SAW-TIMBER SCALED FROM TIMBER SALES, 1948.

Forest District.	DOUGLAS FIR.		CEDAR.		SPRUCE.		HEMLOCK.		BALSAM.		WHITE PINE.		WESTERN YELLOW PINE.		LARCH (TAMARACK).		OTHER SPECIES.		ALL SPECIES.	
	M B.F.	Price per M.	M B.F.	Price per M.	M B.F.	Price per M.	M B.F.	Price per M.	M B.F.	Price per M.	M B.F.	Price per M.	M B.F.	Price per M.	M B.F.	Price per M.	M B.F.	Price per M.	M B.F.	Price per M.
Vancouver	252,659	$4.24	182,595	$3.69	15,832	$2.78	159,810	$2.36	46,481	$2.57	4,451	$5.93	480	$3.98	.....	.....	5,735	$3.43	668,043	$3.49
Prince Rupert (Coast)	5,365	3.27	17,263	3.03	25,116	2.91	18,082	2.44	2,315	2.41	.....	.....	.....	.....	.....	.....	129	3.61	68,270	2.83
Prince Rupert (Interior)	139	3.42	966	2.77	44,941	3.61	5,847	2.62	4,020	3.28	.....	.....	.....	.....	.....	.....	13,043	3.27	68,956	3.43
Fort George	19,968	3.90	16	2.10	81,270	4.10	1	2.00	1,792	3.07	.....	.....	.....	.....	.....	.....	6,449	3.29	109,496	4.00
Kamloops	110,803	2.92	3,031	2.61	26,636	3.58	1,718	2.19	2,135	2.24	2,827	6.68	15,664	3.97	12,391	$2.83	1,950	2.40	177,155	3.14
Nelson	39,844	3.47	8,587	2.94	23,452	4.44	13,517	2.79	1,195	3.05	5,858	7.37	8,215	4.91	61,414	3.56	1,923	3.18	164,005	3.82
Totals for Province	428,778	$3.79	212,458	$3.58	217,247	$3.73	198,975	$2.40	57,938	$2.62	13,136	$6.73	24,359	$4.31	73,805	$3.43	29,229	$3.24	1,255,925	$3.49

NOTE.—Vancouver District figures in this table do not include royalty in many cases. In all other districts, stumpage rates given include royalty.

TIMBER CUT FROM TIMBER SALES DURING 1948.

District.	Board-feet.	Lineal Feet.	Cords.	Ties.	Posts.	Christmas Trees.	Hop-poles.	Stakes and Sticks.	Car-stakes.	Stubs.	Blasting-sticks.	Anchor-blocks.	Shingle-shakes.	Shake Blanks.
Vancouver	648,071,363	874,352	6,909.00	1,095	29,600	.....	4,072	939,925	.....	.....	.....	.....	4,585,000	286,750
Prince Rupert	137,226,265	2,668,687	1,715.00	128,801	7,600	.....	.....	.....	1,850	.....	.....	.....	.....	.....
Fort George	221,271,119	605,995	8,216.00	136,390	100,800	.....	.....	.....	825	.....	.....	.....	.....	.....
Kamloops	177,154,877	5,850,608	18,968.00	33,593	224,800	.....	.....	.....	.....	.....	.....	.....	.....	.....
Nelson	172,263,203	3,330,141	6,294.00	57,739	1,040,900	157,944	.....	92,000	300	.....	.....	.....	.....	.....
Totals, 1948	1,355,986,827	13,329,783	42,102.00	357,618	1,403,700	157,944	4,072	1,031,925	2,975	.....	.....	.....	4,585,000	286,750
Totals, 1947	1,263,834,114	24,205,192	42,463.62	391,343	2,140,769	408,239	21,336	.....	3,252	.....	75	.....	.....	.....
Totals, 1946	792,163,118	35,854,520	56,123.50	311,596	1,696,068	224,712	63,974	.....	15,218	.....	75,675	100	2,210,919	.....
Totals, 1945	696,065,196	16,823,506	49,028.79	413,093	1,335,191	415,093	15,596	13,596	21,249	.....	.....	.....	5,763	.....
Totals, 1944	643,497,149	8,354,765	79,080.74	435,862	1,356,253	368,410	39,124	363,880	1,989	373	.....	.....	6,000	.....
Totals, 1943	526,361,074	8,881,017	80,313.62	288,140	594,164	341,277	250,342	.....	15,111	.....	36,125	.....	.....	.....
Totals, 1942	499,861,024	9,169,501	43,891.18	189,953	461,231	322,153	96,335	.....	920	.....	.....	.....	.....	.....
Totals, 1941	499,155,819	8,886,147	49,941.85	324,835	311,360	159,968	2,075	.....	2,850	.....	.....	1,900	.....	.....
Totals, 1940	478,965,174	8,262,287	52,642.99	274,918	295,022	1,000	1,000	.....	1,794	410	12,000	.....	.....	.....
Totals, 1939	386,997,288	7,639,565	62,506.12	435,611	215,457	39,662	585	.....	681	.....	.....	.....	.....	.....
Ten-year average, 1939–48	714,288,678	14,140,628	55,809.00	342,351	977,328	273,248	49,444	.....	6,604	.....	.....	.....	.....	.....

(21) SAW AND SHINGLE MILLS OF THE PROVINCE, 1948.

Forest District.	Operating.				Shut Down.			
	Sawmills.		Shingle-mills.		Sawmills.		Shingle-mills.	
	No.	Estimated Eight-hour Daily Capacity, M B.M.	No.	Estimated Eight-hour Daily Capacity, Shingles, M.	No.	Estimated Eight-hour Daily Capacity, M B.M.	No.	Estimated Eight-hour Daily Capacity, Shingles, M.
Vancouver	448	8,417	60	8,371	49	236	4	340
Prince Rupert	237	1,672	1	5	12	68	2	10
Fort George	345	3,040	.....	.....	39	188	.....	.....
Kamloops	349	2,615	2	28	58	163	4	.....
Nelson	292	2,826	5	60	21	185	1	10
Totals, 1948	1,671	18,570	68	8,464	179	840	11	360
Totals, 1947	1,634	17,546	73	8,609	143	754	6	100
Totals, 1946	1,228	15,256	59	8,656	115	741	8	165
Totals, 1945	931	13,590	51	7,054	137	808	7	150
Totals, 1944	807	14,974	51	6,695	110	702	16	581
Totals, 1943	614	13,623	54	7,411	120	646	19	829
Totals, 1942	551	13,197	70	8,874	149	1,206	11	135
Totals, 1941	557	13,820	76	8,835	129	1,083	5	63
Totals, 1940	542	12,691	77	8,585	141	1,432	18	307
Totals, 1939	461	11,698	84	7,926	147	1,907	24	537
Ten-year average, 1939–48	900	14,496	66	8,111	136	1,012	12	323

(22) EXPORT OF LOGS (IN F.B.M.), 1948.

Species.	Grade No. 1.	Grade No. 2.	Grade No. 3.	Ungraded.	Totals.
Fir	41,703	4,586,838	18,057,381	.....	22,685,922
Cedar	8,142,621	17,216,568	21,329,118	.....	46,688,307
Spruce	.....	22,793	628,052	.....	650,845
Hemlock	1,176,002	9,144,174	66,381,370	.....	76,701,546
Balsam	.....	.....	.....	16,367,096	16,367,096
White pine	15,504	97,220	63,609	.....	176,333
Cypress	398	44,950	270,664	.....	316,012
Hardwoods	.....	.....	.....	.....	.....
Cottonwood	3,864	15,262	9,102	.....	28,228
Totals, 1948	9,380,092	31,127,805	106,739,296	16,367,096	163,614,289*
Totals, 1947	7,156,095	21,100,803	52,368,152	7,552,386	88,177,436
Totals, 1946	6,843,046	17,485,065	28,308,163	33,898,926	86,535,200
Totals, 1945	3,852,321	20,696,800	24,903,105	32,624,170	82,076,396
Totals, 1944	6,724,297	29,051,958	33,851,519	32,027,805	101,655,579
Totals, 1943	2,809,744	17,720,743	28,863,804	29,261,754	78,656,045
Totals, 1942	2,639,167	18,960,886	27,618,347	106,793,550	156,011,950
Totals, 1941	8,549,320	63,485,278	43,165,973	191,879,335	307,079,906
Totals, 1940	4,697,188	37,567,582	24,865,886	150,396,702	217,527,358
Totals, 1939	6,383,398	111,155,799	66,870,882	128,323,383	312,733,462
Ten-year average, 1939–48	5,903,467	36,835,273	43,755,511	72,912,511	159,406,762

* Of this total, 138,160,402 F.B.M. were exported from Crown grants carrying the export privilege; 25,453,887 F.B.M. were exported under permit from other areas.

(23) SHIPMENTS OF POLES, PILING, MINE-PROPS, FENCE-POSTS, RAILWAY-TIES, ETC., 1948.

Forest District.	Quantity exported.	Approximate Value, F.O.B.	Where marketed.			
			United States.	Canada.	United Kingdom.	Other Countries.
Vancouver—						
Poles ....lin. ft.	3,818,043	$992,691.00	3,162,228	650,355	5,460	.....
Piling ....lin. ft.	824,774	164,955.00	324,315	391,605	26,442	82,412
Fence-posts ....pieces	45,358	11,340.00	12,710	32,648	.....	.....
Pulpwood ....cords.	14,429	209,220.00	14,429	.....	.....	.....
Stakes and sticks ....lin. ft.	431,000	15,085.00	431,000	.....	.....	.....
Shakes ....pieces	6,382,003	319,100.00	6,382,003	.....	.....	.....
Christmas trees ....trees	81,175	20,293.75	81,175	.....	.....	.....
Prince Rupert—						
Poles and piling ....lin. ft.	2,038,379	272,384.82	433,215	1,605,164	.....	.....
Posts ....cords	60	1,033.00	.....	60	.....	.....
Fort George—						
Poles ....lin. ft.	380,185	60,406.45	35,345	344,840	.....	.....
Hewn ties ....ties	131,797	130,863.60	.....	131,797	.....	.....
Posts (fence) ....cords	1,474	14,740.00	.....	1,474	.....	.....
Kamloops—						
Poles and piling ....lin. ft.	6,167,168	997,798.95	3,762,984	2,404,184	.....	.....
Hewn ties ....ties	62,855	71,788.47	.....	62,855	.....	.....
Fence-posts ....cords	1,869	46,828.00	4	1,865	.....	.....
Mine-timbers ....lin. ft.	1,641,477	63,344.54	.....	388,543	1,252,904	.....
Stubs ....lin. ft.	8,330	833.00	.....	8,330	.....	.....
Christmas trees ....trees	885,903	199,333.00	885,903	.....	.....	.....
Nelson—						
Poles ....lin. ft.	3,539,513	707,903.00	2,634,497	905,106	.....	.....
Piling ....lin. ft.	304,223	48,675.00	71,927	232,296	.....	.....
Sticks and stakes ....lin. ft.	124,000	620.00	124,000	.....	.....	.....
Mine-props ....cords	2,449	48,980.00	.....	.....	.....	.....
Fence-posts ....cords	16,553	248,295.00	6,818	9,735	.....	.....
Cordwood ....cords	42	378.00	.....	42	.....	.....
Hewn ties ....ties	83,613	112,041.00	.....	83,613	.....	.....
Christmas trees ....trees	1,162,091	232,418.00	1,052,564	109,527	.....	.....
Total value, 1948	.....	$4,991,338.58	.....	.....	.....	.....
Total value, 1947	.....	$5,842,491.33	.....	.....	.....	.....

(24) SUMMARY FOR PROVINCE, 1948.

Product.	Volume.	Value.	Per Cent. of Total Value.
Poles and piling ....lin. ft.	17,072,285	$3,244,814.22	65.01
Hewn ties ....ties	278,265	314,693.07	6.30
Cordwood ....cords	42	378.00	0.01
Pulp-wood ....cords	14,429	209,220.00	4.19
Fence-posts ....posts	45,358	11,340.00	0.23
Fence-posts ....cords	19,956	310,896.00	6.23
Mine-timbers ....lin. ft.	1,641,447	63,344.54	1.27
Mine-props ....cords	2,449	48,980.00	0.98
Stubs ....lin ft.	8,330	833.00	0.02
Sticks and stakes ....lin ft.	555,000	15,705.00	0.31
Shakes ....pieces	6,382,003	319,100.00	6.39
Christmas trees ....trees	2,129,169	452,044.75	9.06
Totals	28,148,733	$4,991,348.58	100.00

(25) TIMBER MARKS ISSUED.

	1940.	1941.	1942.	1943.	1944.	1945.	1946.	1947.	1948.
Old Crown grants	272	211	160	190	280	329	631	738	791
Crown grants, 1887–1906	101	85	85	98	89	115	200	191	156
Crown grants, 1906–1914	99	101	92	104	81	106	176	176	150
Section 57, "Forest Act"	275	282	250	283	234	337	473	489	439
Stumpage reservations	58	64	79	72	51	53	70	75	82
Pre-emptions under sections 28 and 29, "Land Act"	1	1	2	2	1	2	3	8	5
Timber berths	16	16	9	5	9	3	8	9	4
Indian reserves	13	5	4	11	10	16	15	18	20
Timber Sales	1,724	1,853	1,709	2,017	1,893	1,898	2,637	2,469	2,612
Hand-loggers	4	11	19	9	8	6	.....	.....	.....
Special marks	3	6	6	5	6	15	35	32	40
Pulp leases	2	2	2	1	1	.....	.....	.....	.....
Pulp licences	20	17	1	4	1	2	.....	1	2
Totals	2,588	2,654	2,418	2,801	2,664	2,882	4,248	4,206	4,301
Transfers and changes of marks	315	307	224	237	251	327	486	655	745

(26) FOREST SERVICE DRAUGHTING OFFICE, 1948.

Month.	Number of Drawings prepared or Tracings made.						Number of Blue-prints or Ditto-prints made from Draughting Office Drawings.		
	Timber Sales.	Timber Marks.	Examination Sketches.	Miscellaneous Matters.	Constructional Works, etc.	Totals.	Blue-prints.	Ditto-prints.	Totals.
January	61	252	117	41	5	276	1,341	1,015	2,356
February	54	201	100	19	2	376	1,394	971	2,365
March	59	255	65	26	3	408	1,011	1,125	2,136
April	54	309	87	24	1	475	1,168	1,052	2,220
May	58	181	136	24	2	401	1,393	1,065	2,458
June	36	191	150	15	5	397	1,362	641	2,003
July	46	155	72	15	7	295	935	820	1,755
August	68	190	101	18	4	381	1,120	1,495	2,615
September	47	152	95	18	6	318	768	1,075	1,843
October	61	158	110	12	9	350	953	1,180	2,133
November	68	135	122	13	7	345	1,156	1,220	2,193
December	69	121	92	16	7	305	1,024	1,300	2,324
Totals, 1948	681	2,300	1,247	241	58	4,327	13,625	12,959	26,401
Totals, 1947	500	2,223	1,238	290	55	4,306	12,026	9,844	21,870
Totals, 1946	604	1,931	1,028	525	48	4,136	9,113	7,300	16,413
Totals, 1945	569	1,193	693	684	75	3,214	6,495	6,701	13,196
Totals, 1944	442	889	459	544	46	2,380	4,159	4,983	9,142
Totals, 1943	356	937	396	293	93	2,075	4,009	3,448	7,457
Totals, 1942	329	868	359	111	73	1,740	†	†	†
Totals, 1941	247	1,087	468	150	70	2,022	†	†	†
Totals, 1940	224	1,151	434	282	*	2,091	†	†	†
Totals, 1939	231	943	408	269	*	1,851	†	†	†
Totals for ten-year period	4,183	13,522	6,730	3,389	518	28,142	49,427	45,235	94,479
Average for ten-year period	418	1,352	673	339	65‡	2,814	8,238§	7,539§	15,747§

* Prior to 1941, Constructional Works, etc., included in Miscellaneous Matters. † No record kept prior to 1943. ‡ Average for eight-year period only. § Average for six-year period only.

(27) CROWN-GRANTED TIMBER LANDS PAYING FOREST PROTECTION TAX.

Year.	Area (Acres).	Year.	Area (Acres).
1921	845,111	1935	535,918
1922	887,980	1936	515,924
1923	883,344	1937	743,109
1924	654,668	1938	754,348
1925	654,016	1939	719,112
1926	688,372	1940	549,250
1927	690,438	1941	543,632
1928	671,131	1942	527,995
1929	644,011	1943	543,044
1930	629,156	1944	571,308
1931	602,086	1945	591,082
1932	552,007	1946	601,148
1933	567,731	1947	596,900
1934	557,481	1948	571,439

(28) EXTENT OF TIMBER LAND BY ASSESSMENT DISTRICTS.

	Acres.		Acres.
Alberni	79,870	Nelson	1,998
Comox	109,630	Omineca	160
Cowichan	95,491	Prince George	1,193
Fort Steele	12,049	Prince Rupert	21,164
Gulf Islands	240	Revelstoke	33,202
Kettle River	315	Slocan	37,842
Nanaimo	133,487	Victoria	44,795

(29) ACREAGE OF CROWN-GRANTED TIMBER LANDS PAYING FOREST PROTECTION TAX AS COMPILED FROM TAXATION RECORDS.

Year.	Acreage assessed as Timber Land.	Coast.		Interior.	
		Logged.	Timber.	Logged.	Timber.
		Acres.	Acres.	Acres.	Acres.
1936	766,186	92,892	352,582	152,846	167,866
1937	766,413	96,598	363,693	153,566	152,556
1938	756,328	106,833	344,858	157,508	147,129
1939	719,111	89,209	338,794	153,032	138,075
1940	549,250	103,486	338,419	24,852	82,493
1941	543,633	105,541	335,468	26,016	76,608
1942	527,995	112,834	322,306	20,072	72,781
1943	543,044	125,313	325,996	20,205	71,529
1944	571,308	134,194	345,378	20,816	70,920
1945	591,082	142,504	357,037	21,536	70,005
1946	601,148	146,331	364,556	23,125	67,136
1947	596,900	153,072	354,207	26,591	63,030
1948	571,439	158,120	326,738	25,485	61,096

FOREST REVENUE.

	12 Months to Dec. 31, 1948.	12 Months to Dec. 31, 1947.	12 Months to Dec. 31, 1946.	12 Months to Dec. 31, 1945.	12 Months to Dec. 31, 1944.	10-Year Average, 1939–48.
Timber-licence rentals	$384,617.93	$385,167.77	$400,523.71	$395,819.33	$397,031.83	$408,796.71
Timber-licence transfer fees	1,855.00	2,635.00	4,205.00	1,265.00	2,200.00	1,794.00
Timber-licence penalty fees	2,915.66	3,682.77	4,357.94	10,812.89	8,141.37	10,156.28
Hand-loggers' licence fees	100.00	150.00	75.00	150.00	175.00	190.50
Timber-lease rentals	49,955.78	51,113.07	51,079.41	50,326.77	55,511.92	51,320.50
Timber-lease penalty fees	33.52	119.48	60.73	9.28	29.63	103.51
Timber-sale rentals	95,180.53	77,234.35	62,881.12	61,643.16	44,268.30	51,370.52
Timber-sale stumpage	4,191,699.20	3,064,011.37	1,892,216.67	1,557,196.83	1,361,735.77	1,628,382.15
Timber-sale cruising	38,233.16	27,444.06	24,571.66	16,004.71	15,783.31	18,581.43
Timber-sale advertising	7,652.90	5,988.95	5,297.25	3,723.25	3,224.00	3,609.35
Timber royalty and tax	3,190,078.92	2,834,159.55	2,198,637.87	1,999,997.71	2,006,184.27	2,271,457.46
Scaling expenses (not Scaling Fund)	2,588.03	1,713.19	1,161.05	1,504.34	3,426.51	1,488.64
Trespass stumpage	.....	100,710.23	48,405.37	48,168.41	34,938.49	33,383.60
Scalers' examination fees	.....	1,095.00	985.00	.....	275.00	457.12
Exchange	78.77	65.40	42.93	69.36	56.82	113.37
Seizure expenses	726.18	1,046.24	1,779.06	889.97	825.43	661.93
General miscellaneous	26,140.16	18,269.63	14,588.67	11,027.32	9,539.08	10,770.45
Timber-berth rentals	20,043.13	20,154.36	20,823.00	21,551.73	20,776.78	21,177.79
Interest on timber-berth rentals	14.35	7.53	18.73	39.76	45.83	72.86
Transfer fees on timber-berth rentals	35.66	133.11	131.00	200.04	72.00	90.00
Grazing fees and interest	27,106.19	29,293.74	31,412.24	31,465.23	31,000.34	30,159.48
Totals	$8,039,055.07	$6,624,104.80	$4,763,253.41	$4,211,865.09	$3,995,241.68	$4,544,137.65

AMOUNTS CHARGED AGAINST LOGGING OPERATIONS, 1948.

District.	Royalty.	Tax.	Trespass Stumpage.	Seizure Expenses.	Government Scaling Expenses.	Scaling Fund.		Stumpage.	Rentals, Cruising, Advertising, Transfer Fees.	Stumpage Reservations.	Silviculture Fund.	Total.
						Expenses.	Fees.					
Vancouver	$2,240,280.97	$28,530.58	.....	$374.86	$742.73	$74,328.01	$290,495.23	$2,419,950.12	$60,500.67	$322.80	.....	$5,115,525.97
Prince Rupert	257,988.52	2,752.17	.....	12.00	442.98	4,518.91	15,466.39	365,838.69	73,374.87	271.05	$28,698.44	749,364.02
Fort George	200,692.22	.....	.....	20.00	610.46	.....	.....	648,303.40	25,363.27	614.01	136,889.71	1,012,493.07
Kamloops	238,861.08	3,096.20	.....	112.00	1,192.00	.....	.....	519,551.31	50,539.34	141.81	61,677.74	875,171.48
Nelson	199,237.30	2,458.37	.....	92.50	448.96	.....	.....	522,767.12	36,564.74	732.29	87,395.01	849,666.29
Totals, 1948	$3,137,060.09	$36,807.32	.....	$611.36	$3,437.13	$78,846.92	$305,961.62	$4,476,410.64	$246,342.89	$2,681.96	$314,660.90	$8,602,220.83
Totals, 1947	$2,984,978.60	$20,944.06	$123,345.94	$1,227.84	$2,717.46	$63,361.93	$308,652.88	$3,331,244.16	$163,659.81	.....	.....	$7,000,132.68
Totals, 1946	$2,162,183.55	$15,829.93	$51,050.81	$1,815.77	$1,179.85	$43,796.85	$167,064.09	$1,855,151.90	$99,687.89	.....	.....	$4,397,760.64
Totals, 1945	$1,955,757.26	$10,986.85	$48,943.70	$904.56	$1,523.77	$40,280.68	$125,088.36	$1,577,898.98	$73,927.60	.....	.....	$3,835,311.76
Totals, 1944	$1,959,140.27	$11,668.31	$54,647.11	$785.43	$4,450.77	$40,029.30	$128,880.33	$1,395,646.55	$96,626.44	.....	.....	$3,691,874.51
Totals, 1943	$1,860,127.27	$9,283.99	$36,769.22	$353.96	$3,274.72	$33,369.74	$118,265.63	$1,082,866.31	$85,858.24	.....	.....	$3,230,169.08
Totals, 1942	$1,975,067.18	$57,125.20	$19,489.98	$331.56	$1,017.17	$36,944.89	$122,731.57	$949,463.02	$71,684.25	Gov't Scaling Fees. $268.50		$3,234,123.32
Totals, 1941	$2,368,592.99	$100,732.39	$22,424.64	$481.18	$588.26	$38,359.49	$147,441.90	$843,116.13	$64,178.18	$392.44		$3,586,307.60
Totals, 1940	$2,104,949.92	$83,147.74	$15,844.80	$491.70	$295.34	$36,024.08	$145,435.20	$734,472.57	$36,020.04	$549.54		$3,157,230.93
Totals, 1939	$1,734,599.75	$67,280.72	$16,155.25	$823.53	$369.75	$30,526.84	$127,366.46	$604,222.28	$33,720.82	$364.01		$2,615,429.41
Ten-year average, 1939–48	$2,224,245.68	$41,381.62	$38,867.11	$782.64	$1,889.07	$44,154.06	$169,688.99	$1,685,049.25	$97,170.61	.....		$4,335,056.08

AMOUNTS CHARGED AGAINST LOGGING OPERATIONS, FISCAL YEAR 1947–48.

District.	Royalty.	Tax.	Trespass Stumpage.	Seizure Expenses.	Government Scaling Expenses.	Scaling Fund.		Stumpage.	Rentals, Cruising, Advertising, Transfer Fees.	Stumpage Reservations.	Silviculture Fund.	Total.
						Expenses.	Fees.					
Vancouver	$2,019,301.88	$10,167.67	$59,833.55	$846.60	$1,021.38	$67,977.47	$299,979.37	$1,873,079.29	$50,332.12	$849.31	.....	$4,383,388.64
Prince Rupert	231,990.83	3,493.80	8,785.40	57.00	437.98	2,096.29	20,458.67	290,809.89	22,721.44	332.24	.....	581,183.54
Fort George	227,127.15	.....	5,937.37	73.57	100.20	.....	.....	325,031.18	51,987.37	1,120.00	$31,945.12	643,321.96
Kamloops	243,217.15	4,549.45	7,416.47	124.50	421.65	.....	.....	325,850.35	35,737.78	862.16	9,353.28	627,532.79
Nelson	210,647.41	4,239.15	10,723.19	158.83	713.80	.....	.....	308,968.22	35,563.04	623.30	11,961.91	583,598.85
Totals, 1947–48	$2,932,284.42	$22,450.07	$92,695.98	$1,260.50	$2,695.01	$70,073.76	$320,438.04	$3,123,738.93	$196,341.75	$3,787.01	$53,260.31	$6,819,025.78
Totals, 1946–47	$2,509,322.95	$18,176.08	$85,269.80	$1,425.15	$2,265.58	$44,310.81	$190,607.89	$1,999,259.67	$142,390.02	.....	.....	$4,993,027.95
Totals, 1945–46	$2,029,589.74	$11,512.06	$56,860.04	$1,082.57	$1,058.56	$49,358.67	$123,522.07	$1,687,500.72	$80,116.11	.....	.....	$4,040,600.54
Totals, 1944–45	$1,935,830.66	$11,705.96	$50,718.61	$878.73	$4,036.46	$40,496.75	$126,724.56	$1,421,693.72	$73,308.83	.....	.....	$3,665,394.28
Totals, 1943–44	$1,952,728.39	$8,425.35	$42,192.20	$361.46	$3,675.98	$35,758.31	$127,794.46	$1,155,680.34	$92,080.19	Gov't Scaling Fees.		$3,418,696.68
Totals, 1942–43	$1,839,621.14	$55,929.45	$21,752.85	$343.56	$1,392.68	$34,517.65	$113,543.55	$955,483.46	$75,037.47	$231.63		$3,097,853.44
Totals, 1941–42	$2,310,473.38	$92,980.09	$22,970.78	$421.18	$756.06	$37,798.34	$142,180.70	$879,697.43	$65,137.56	$420.20		$3,552,835.72
Totals, 1940–41	$2,170,897.94	$84,995.42	$14,452.13	$460.20	$305.75	$35,777.90	$144,686.32	$728,543.90	$54,942.02	$459.47		$3,235,521.05
Totals, 1939–40	$1,883,779.34	$74,498.27	$17,516.51	$787.63	$394.61	$33,769.03	$140,435.44	$654,869.07	$31,026.46	$472.86		$2,837,549.22
Nine-year average, 1939–40 to 1947–48	$2,173,836.44	$42,296.97	$44,936.54	$780.11	$1,842.39	$42,429.02	$158,881.45	$1,400,441.58	$90,042.26	.....		$3,962,278.33

(33)

Forest Revenue, Fiscal Year 1947–48.

		Ten-year Average.
Timber-licence rentals	$384,337.09	$424,921.40
Timber-licence transfer fees	2,995.00	1,826.50
Timber-licence penalty fees	4,449.42	16,646.71
Hand-loggers' licence fees	100.00	100.00
Timber-lease rentals	47,933.65	56,848.06
Timber-lease penalty fees and interest	150.34	266.93
Timber-sale rentals	78,826.62	21,648.09
Timber-sale stumpage	3,359,351.61	1,310,733.89
Timber-sale cruising	30,943.17	15,596.49
Timber-sale advertising	6,816.45	3,124.59
Timber royalty	2,924,074.30	2,113,381.19
Timber tax	24,230.15	37,291.04
Scaling fees (not Scaling Fund)	----------	231.80
Scaling expenses (not Scaling Fund)	1,918.27	1,327.29
Trespass stumpage	74,697.66	31,108.77
Scalers' examination fees	1,000.00	1,094.00
Exchange	70.41	27.31
Seizure expenses	976.74	897.93
General miscellaneous	17,453.55	7,289.68
Timber-berth rentals, bonus, and fees	21,019.10	24,825.96
Interest on timber-berth rentals	132.45	138.70
Transfer fees on timber berths	368.00	108.90
Grazing fees and interest	28,194.79	28,085.91
	$7,010,038.77	----------
Taxation from Crown-granted timber lands	253,345.02	$239,397.90
	$7,263,383.79	----------

PROVINCIAL LIBRARY VICTORIA

(34) FOREST EXPENDITURE, FISCAL YEAR 1947–48.

Forest District.	Salaries.	Expenses.	Temporary Assistance.	Totals.
Forest Service Marine Station	.....	$46,440.80	.....	$46,440.80
Vancouver	$80,497.11	46,122.62	.....	126,619.73
Prince Rupert	47,225.69	15,313.12	$225.00	62,763.81
Fort George	45,168.68	23,792.88	.....	68,961.56
Kamloops	81,573.02	33,800.79	.....	115,373.81
Nelson	75,781.73	38,148.34	.....	113,930.07
Victoria	155,722.39	63,677.55	192.18	219,592.12
Totals	$485,968.62	$267,296.10	$417.18	$753,681.90
Canadian Forestry Association				3,000.00
Forest management				48,416.20
Forest research				13,893.89
Reforestation				350,531.22
Public relations				18,186.30
Provincial parks				74,907.74
Ranger school				86,182.08
Refund to United Kingdom				40,000.00
Insect-control				1,894.28
Grazing Range Improvement Fund*				9,398.26
Forest Protection Fund*				1,250,000.00
Forest Reserve Account*				191,018.33
Grand total				$2,841,110.20

* Contributions from Treasury to special funds detailed elsewhere.

N.B.—The above figures do not include amounts paid as cost-of-living bonus, totalling $118,954.46, made up as follows:—

Salaries	$83,556.88
Temporary assistance	33.05
Expense	6,849.71
Forest management	3,769.28
Forest research	1,679.54
Reforestation	16,599.90
Provincial parks	4,427.57
Ranger school	1,991.44
Insect-control	47.09
	$118,954.46

(35) SCALING FUND.

Balance, April 1st, 1947 (debit)	$97,594.21
Collections, fiscal year 1947–48	375,125.53
	$277,531.32
Expenditures, fiscal year 1947–48	340,276.90
Balance, March 31st, 1948 (debit)	$62,745.58
Balance, April 1st, 1948 (debit)	$62,745.58
Collections, nine months, April–December, 1948	310,265.50
	$247,519.92
Expenditures, nine months, April–December, 1948	282,113.91
Balance, December 31st, 1948 (debit)	$34,593.99

(36) SILVICULTURE FUND.

Balance forward, April 1st, 1947	$6,013.53
Collections, fiscal year 1947–48	106,618.37
	$112,631.90
Expenditures, fiscal year 1947–48	*Nil*
Balance, March 31st, 1948	$112,631.90
Balance, April 1st, 1948	$112,631.90
Collection, nine months to December 31st, 1948	220,646.10
	$333,278.00
Expenditures, nine months to December 31st, 1948	24,264.72
Balance, December 31st, 1948 (credit)	$309,013.28

(37) FOREST RESERVE ACCOUNT, DECEMBER 31ST, 1948.

Credit balance brought forward, April 1st, 1947	$482,354.31
Amount received from Treasury, March 31st, 1948 (under subsection (2), section 32, "Forest Act")	191,018.33
	$673,372.64
Moneys received under subsection (4), section 32, "Forest Act"	
Expenditures, April 1st, 1947, to March 31st, 1948	219,244.41
Credit balance, March 31st, 1948	$454,128.23
Expenditures, nine months to December 31st, 1948	68,165.87
Balance, December 31st, 1948 (credit)	$385,962.36

(38) GRAZING RANGE IMPROVEMENT FUND.

Balance, April 1st, 1947 (credit)	$33,922.69
Government contribution (section 14, "Grazing Act")	10,351.87
Other collections	206.33
	$44,480.89
Expenditures, April 1st, 1947, to March 31st, 1948	9,456.18
Balance, March 31st, 1948 (credit)	$35,024.71
Government contribution (section 14, "Grazing Act")	9,398.26
Other collections	6.50
	$44,429.47
Expenditures, April 1st, 1948, to December 31st, 1948	15,777.77
Balance, December 31st, 1948 (credit)	$28,651.70

(39) FOREST PROTECTION FUND, DECEMBER 31ST, 1948.

Balance (deficit), April 1st, 1947		$215,013.71
Expenditures	$1,362,189.74	
Less refunds	43,821.75	
		1,318,367.99
		$1,533,381.70
(*See* detailed summary of net expenditure on page 105.)		
Government contribution	$1,250,000.00	
Collections, tax	277,474.26	
Collections, slash and snags $14,596.02		
Less refunds 11,217.37		
	3,378.65	
		1,530,852.91
Balance (deficit), March 31st, 1948		$2,528.79
Balance (deficit), April 1st, 1948		$2,528.79
Expenditures, nine months, April–December, 1948 $877,388.76		
Less refunds 22,443.11		
	$854,945.65	
Repayable to votes (approximately)	275,622.62	
		1,130,568.27
		$1,133,097.06
Collections, tax	$271,506.11	
Collections, miscellaneous	18,654.96	
Government contribution	1,237,500.00	
		1,527,661.07
Estimated credit balance, December 31st, 1948		$394,564.01

FOREST-PROTECTION EXPENDITURE FOR TWELVE MONTHS ENDED MARCH 31ST, 1948, BY THE FOREST SERVICE.

District.	SALARIES AND EXPENSES.		TOOLS AND EQUIPMENT.		Fires.	Improvements.	Hazard Reduction.	Aircraft.	Planning and Research.	Miscellaneous.	Total.
	Permanent.	Temporary.	Purchase.	Maintenance and Operation.							
Vancouver	$69,272.42	$108,283.31	$38,523.27	$56,134.46	$6,462.93	$15,348.62	$21,553.81	.....	.....	$6,613.74	$322,192.56
Forest Service Marine Station	7,462.19	.....	8,313.23	8,847.34	.....	2,407.91	.....	.....	.....	1,380.70	28,411.37
Prince Rupert	13,914.79	32,444.03	12,088.69	18,212.81	724.53	1,922.78	.....	$278.63	.....	1,680.33	81,266.59
Fort George	33,322.51	40,379.11	19,854.94	24,052.52	17,615.58	13,583.75	.....	8,135.30	.....	3,872.75	160,816.46
Kamloops	53,612.77	82,916.29	50,640.95	34,585.55	7,838.66	27,897.00	.....	6,702.72	.....	3,181.88	267,375.82
Nelson	49,469.80	89,322.12	45,488.35	45,594.14	29,648.61	27,343.97	.....	5,918.54	.....	7,453.88	300,239.41
Victoria	68,158.34	4,356.65	22,428.52	13,729.66	.....	15,523.97	.....	9,478.44	$16,959.73	7,430.47	158,065.78
Totals	$295,212.82	$357,701.51	$197,337.95	$201,156.48	$62,290.31	$104,028.00	$21,553.81	$30,513.63	$16,959.73	$31,613.75	$1,318,367.99

(41) REPORTED APPROXIMATE EXPENDITURE IN FOREST PROTECTION BY OTHER AGENCIES, 1948.

Forest District.	Expenditures.				
	Patrols and Fire-prevention.	Tools and Equipment.	Fires.	Improvements.	Total.
Vancouver	$163,166.67	$169,250.86	$43,191.54	$20,002.00	$395,611.07
Prince Rupert	3,149.00	9,300.00	31,092.12	2,025.00	45,566.12
Fort George	.....	.....	3,010.45	.....	3,010.45
Kamloops	.....	.....	2,694.45	.....	2,694.45
Nelson	500.00	24,000.00	883.15	1,200.00	26,583.15
Totals	$166,815.67	$202,550.86	$80,871.71	$23,227.00	$473,465.24
Ten-year average, 1939–48	$60,086.00	$101,761.00	$141,785.00	$5,677.00	$309,309.00

(42) SUMMARY OF ACREAGE LOGGED, 1948, AND DEALT WITH UNDER SECTION 113A, "FOREST ACT."

	Acres.	Acres.
Total area logged, Vancouver Forest District	.....	76,667
1948 slash covered by hazard reports	56,778	
1948 slash logged after September 1st and carried over to 1949	19,889	
	———	76,667
1948 slash covered by hazard reports		56,778
1948 slash burned intentionally	17,309	
1948 slash burned accidentally	1,066	
1948 slash on which no burning was required	19,845	
1948 slash on which additional time for burning has been granted	1,037	
1948 slash awaiting decision *re* compensation or additional time for disposal	13,599	
1948 slash on which compensation has been assessed	23	
1948 slash abated by lopping, land-clearing, etc.	68	
1948 slash in zone liable for snag-falling only	3,831	
	———	56,778

(43) SUMMARY OF 1948 OPERATIONS, VANCOUVER FOREST DISTRICT.

Total operations, Vancouver Forest District		1,535
Number of intentional slash-burns	320	
Number of operations on which slash was disposed of by lopping or land-clearing, etc.	20	
Number of operations on which slash was accidentally burned	14	
Number of operations not required to burn	448	
Number of operations given further time for disposal	3	
Number of operations not considered necessary to deal with under section 113A	401	
Number of operations on which compensation has been assessed for 1948 slash	3	
Number of operations pending decision *re* assessment or further time for slash-disposal	296	
Number of operations inactive in 1948	50	
Number of operations snag-falling area only	37	
Number of operations not advanced to a point requiring slash-disposal	7	
Number of operations on which security deposit has been posted	*Nil*	
	1,599*	1,535

* Difference noted above is accounted for by slash on some operations being disposed of by both accidental and intentional means and some operators conducting both spring and fall burns.

SUMMARY OF SLASH-HAZARD BEING CARRIED FOR DISPOSAL IN 1949.

	Acres.
Slash accumulated prior to 1948*	13,212
Slash accumulated in 1948 (exclusive of 3,831 acres on which snag-falling only requirement)*	34,525
	47,737

* Areas covered by assessment not included in this acreage.

(44) SUMMARY CHART A—INTENTIONAL SLASH-BURN.

Operations conducting slash-burn		320
Acres slash-burned in 1948—		
Created prior to 1946	153	
Created 1946	2,586	
Created 1947	10,604	
Created 1948	17,309	
Total		30,652
Acres of forest-cover burned		62
Total acres burned		30,714
Net damage to forest-cover	$37.00	
Net damage to property on operations and cut products	440.00	
Total damage		$477.00
Cost of slash-disposal—		
Operators		$44,960.00
Forest Service		*Nil*
Cost to operator based on stand of 40 M per acre		3.6c. per M
Cost to operator per acre		$1.46

(45) RECAPITULATION SLASH-DISPOSAL, 1934–48.

Year.	Acres of Slash burned. Accidentally.	Intentionally.
1934	4,927	15,935
1935	11,783	13,239
1936	1,340	7,691
1937	3,015	27,516
1938	35,071	50,033
1939	1,930	51,603
1940	2,265	33,034
1941	3,385	5,524
1942	4,504	80,226
1943	2,046	40,013
1944	5,121	27,278
1945	3,897	46,467
1946	2,174	25,498
1947	2,663	34,414
1948	2,215	30,652

(46) FIRE OCCURRENCES BY MONTHS, 1948.

Forest District.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Total.	Per Cent.
Vancouver	1	2	13	80	71	30	5	.....	202	25.28
Prince Rupert	.....	3	12	21	8	10	2	.....	56	7.01
Fort George	.....	5	32	81	36	13	2	.....	169	21.15
Kamloops	.....	1	25	50	43	56	17	.....	192	24.03
Nelson	.....	8	10	12	61	72	17	.....	180	22.53
Totals	1	19	92	244	219	181	43	.....	799	100.00
Per cent	0.13	2.38	11.51	30.54	27.41	22.65	5.38	.....	100.00	.....
Ten-year average, 1939–48	1	57	179	151	552	454	152	9	1,555	.....
Per cent	0.06	3.67	11.51	9.71	35.50	29.20	9.77	0.58	100.00	.....

(47) NUMBER AND CAUSES OF FOREST FIRES, 1948.

Forest District.	Lightning.	Campers.	Railways operating.	Smokers.	Brush-burning (not Railway-clearing).	Road and Power- and Telephone-line Construction.	Industrial Operation.	Incendiarism.	Miscellaneous (Known Causes).	Unknown Causes.	Total.	Per Cent. of Total Fires in Province.
Vancouver	17	10	77	56	8	4	16	.....	12	2	202	25.28
Prince Rupert	9	11	2	10	6	1	11	2	3	1	56	7.01
Fort George	54	36	2	24	21	.....	10	3	14	5	169	21.15
Kamloops	77	33	14	28	2	.....	3	.....	20	15	192	24.03
Nelson	109	15	18	22	2	.....	5	.....	9	.....	180	22.53
Totals	266	105	113	140	39	5	45	5	58	23	799	100.00
Per cent	33.29	13.14	14.14	17.52	4.88	0.63	5.63	0.63	7.26	2.88	100.00	.....
Ten-year average, 1939–48	567	195	194	289	68	10	38	23	143	28	1,555	.....
Per cent	36.46	12.54	12.48	18.59	4.37	0.64	2.44	1.48	9.20	1.80	100.00	.....

(48) NUMBER AND CAUSES OF FOREST FIRES FOR THE LAST TEN YEARS.

Causes.	1948.	1947.	1946.	1945.	1944.	1943.	1942.	1941.	1940.	1939.	Total.
Lightning	266	326	515	541	408	256	704	871	1,265	515	5,667
Campers	105	193	263	183	203	157	158	142	236	305	1,945
Railways operating	113	270	231	426	329	216	114	73	90	77	1,939
Smokers	140	245	326	356	342	304	220	184	400	374	2,891
Brush-burning (not railway-clearing)	39	51	117	69	51	58	30	81	74	111	681
Road and power- and telephone-line construction	5	8	16	5	10	8	31	4	5	11	103
Industrial operations	45	53	38	32	51	20	38	33	41	32	383
Incendiarism	5	13	10	32	13	7	5	20	38	88	231
Miscellaneous (known causes)	58	144	159	155	210	136	90	134	171	175	1,432
Unknown causes	23	29	32	39	50	23	24	19	18	16	273
Totals	799	1,332	1,707	1,838	1,667	1,185	1,414	1,561	2,338	1,704	15,545

(49) FIRES CLASSIFIED BY SIZE AND DAMAGE, 1948.

Forest District.	Total Fires.		Under ¼ Acre.			¼ to 10 Acres.			Over 10 to 500 Acres.			Over 500 Acres in Extent.			Damage.		
	Number.	Per Cent. of Total Fires in Province.	Number.	Per Cent. of Total Fires in District.	Per Cent. of Total Fires in this Class.	Number.	Per Cent. of Total Fires in District.	Per Cent. of Total Fires in this Class.	Number.	Per Cent. of Total Fires in District.	Per Cent. of Total Fires in this Class.	Number.	Per Cent. of Total Fires in District.	Per Cent. of Total Fires in this Class.	Under $100.	Between $100 and $1,000.	Over $1,000.
Vancouver	202	25.28	169	83.66	30.07	27	13.37	18.24	4	1.98	6.90	2	0.99	6.45	195	.....	7
Prince Rupert	56	7.01	29	51.78	5.16	17	30.36	11.49	3	5.36	5.17	7	12.50	22.58	49	.....	7
Fort George	169	21.15	83	49.11	14.77	35	20.71	23.65	33	19.53	56.90	18	10.65	58.07	146	15	8
Kamloops	192	24.03	115	59.89	20.46	58	30.21	39.19	15	7.80	25.86	4	2.10	12.90	186	5	1
Nelson	180	22.53	166	92.22	29.54	11	6.11	7.43	3	1.67	5.17	.....	.....	.....	178	1	1
Totals	799	100.00	562	.....	100.00	148	.....	100.00	58	.....	100.00	31	.....	100.00	754	21	24
Per cent.	100.00	.....	70.34	.....	.....	18.52	.....	.....	7.26	.....	.....	3.88	.....	.....	94.37	2.63	3.00
Ten-year average, 1939–48	1,555	.....	853	.....	.....	458	.....	.....	193	.....	.....	51	.....	.....	1,443	74	38
Per cent.	100.00	.....	54.86	.....	.....	29.45	.....	.....	12.41	.....	.....	3.28	.....	.....	92.80	4.76	2.44

(50) DAMAGE TO PROPERTY OTHER THAN FORESTS, 1948.*

Forest District.	Forest Products in Process of Manufacture.	Buildings.	Railway and Logging Equipment.	Miscellaneous.	Total.	Per Cent. of Total.
Vancouver	$38,891.00	.....	$38,712.53	$4,000.00	$81,603.53	28.71
Prince Rupert	117,489.00	.....	63,631.00	520.00	181,640.00	63.90
Fort George	6.30	$13,545.00	2,500.00	2,609.00	18,660.30	6.56
Kamloops	18.00	50.00	.....	.....	68.00	0.02
Nelson	.....	875.00	1,000.00	425.00	2,300.00	0.81
Totals	$156,404.30	$14,470.00	$105,843.53	$7,554.00	$284,271.83	100.00
Per cent.	55.02	5.09	37.23	2.66	100.00	.....
Ten-year average, 1939–48	$85,382.00	$23,213.00	$89,436.00	$29,346.00	$227,377.00	.....
Per cent.	37.55	10.21	39.33	12.91	100.00	.....

* Does not include intentional slash-burns. For this item *see* page 108.

(51) DAMAGE TO FOREST-COVER CAUSED BY FOREST FIRES, 1948—PART I.*

Forest District.	Accessible Merchantable Timber.				Inaccessible Merchantable Timber.			Immature Timber.	
	Net Area killed.	Total Volume killed.	Salvable Volume of Timber killed.	Net Stumpage Loss.	Net Area killed.	Total Volume killed.	Damage.	Net Area killed.	Present Value.
	Acres.	M B.M.	M B.M.	$	Acres	M B.M.	$	Acres.	$
Vancouver	13	295	40	780	.....	.....	.....	435	5,370
Prince Rupert	437	26,010	13,000	10,032	.....	2	4	2,022	12,536
Fort George	3,335	4,180	638	34,359	30	240	720	60,175	147,119
Kamloops	226	528	.....	1,106	1	.....	4	327	697
Nelson	.....	.....	.....	.....	1	10	.....	3	3
Totals	4,011	31,013	13,678	46,277	32	252	728	62,962	165,725
Per cent.	1.04	99.19	44.10	16.11	0.01	0.81	0.25	16.38	57.71
Ten-year average, 1939–48	27,055	141,079	21,606	190,653	4,862	12,059	6,533	52,388	158,691
Per cent.	8.81	92.13	15.31	45.73	1.58	7.87	1.57	17.07	38.06

* Does not include intentional slash-burns. For this item *see* page 108.

(51) DAMAGE TO FOREST-COVER CAUSED BY FOREST FIRES, 1948—PART II.*

Forest District.	Not satisfactorily restocked.				Non-commercial Cover.		Grazing or Pasture Land.		Non-productive Sites.		Grand Totals.		
	Logged unburned.	Logged and burned.	Burned, not logged.	Damage.	Area burned.	Damage.	Area burned.	Damage.	Area burned.	Damage.	Area.	Quantity.	Damage.
	Acres.	Acres.	Acres.	$	Acres.	$	Acres.	$	Acres.	$	Acres.	M B.M.	$
Vancouver	2,215	11	1	266	326	86	.....	.....	7	2	3,008	295	6,504
Prince Rupert	726	67	760	654	818	205	.....	.....	33	8	4,863	26,012	23,439
Fort George	523	156	8,090	2,220	103,734	25,767	23,303	1,165	172,155	43,002	371,501	4,420	254,352
Kamloops	.....	.....	1,112	278	2,696	674	73	4	327	81	4,762	528	2,844
Nelson	.....	1	.....	.....	193	49	20	1	4	.....	222	10	53
Totals	3,464	235	9,963	3,418	107,767	26,781	23,396	1,170	172,526	43,093	384,356	31,265	287,192
Per cent.	0.90	0.06	2.59	1.19	28.04	9.33	6.09	0.41	44.89	15.00	100.00	100.00	100.00
Ten-year average, 1939–48	10,725	4,287	29,451	14,980	88,728	28,507	18,071	1,437	71,363	16,143	306,930	153,138	416,944
Per cent.	3.49	1.40	9.60	3.59	28.91	6.84	5.89	0.34	23.25	3.87	100.00	100.00	100.00

* Does not include intentional slash-burns. For this item *see* page 108.

(52) FIRE CAUSES, FOREST SERVICE COST, AND TOTAL DAMAGE, 1948.

Causes.	No.	Per Cent.	Cost.	Per Cent.	Damage.	Per Cent.
Lightning	266	33.29	$12,572.29	34.87	$24,846.33	4.35
Campers	105	13.14	2,984.16	8.28	3,311.08	0.58
Railways operating	113	14.14	81.02	0.22	11.30	.....
Smokers	140	17.52	7,611.52	21.11	181,931.41	31.84
Brush-burning (not railway-clearing)	39	4.88	547.15	1.52	633.50	0.11
Road and power- and telephone-line construction	5	0.63	22.79	0.06	1,869.00	0.33
Industrial operations	45	5.63	1,819.53	5.05	113,182.41	19.80
Incendiarism	5	0.63	13.60	0.04	14.00	.....
Miscellaneous (known causes)	58	7.26	10,273.37	28.50	87,817.80	15.37
Unknown causes	23	2.88	124.45	0.35	157,847.20	27.62
Totals	799	100.00	$36,049.88	100.00	$571,463.83	100.00

(53) COMPARISON OF DAMAGE CAUSED BY FOREST FIRES IN LAST TEN YEARS.

	1948.	1947.	1946.	1945.	1944.	1943.	1942.	1941.	1940.	1939.	Total, 10 Years.
Total number of fires	799	1,332	1,707	1,838	1,667	1,185	1,414	1,561	2,338	1,704	15,545
Area burned (acres)	384,356	142,765	303,395	352,892	506,148	94,842	446,544	154,888	490,003	193,468	3,069,301
Standing timber destroyed or damaged (M ft. B.M.)	31,265	11,017	69,119	534,502	98,075	15,612	128,890	341,636	252,512	48,755	1,531,383
Amount salvable (M ft. B.M.)	13,678	3,846	16,150	120,021	10,937	719	4,341	3,123	37,092	6,154	216,061
Damage to forests	$287,192	$62,497	$191,669	$1,092,537	$448,180	$63,731	$859,037	$483,002	$486,577	$195,018	$4,169,440
Damage to other forms of property	284,271	246,737	166,315	350,516	204,345	69,196	477,459	65,303	231,919	177,706	2,273,767
Total damage	$571,463	$309,234	$357,984	$1,443,053	$652,525	$132,927	$1,336,496	$548,305	$718,496	$372,724	$6,443,207

(54) FIRES CLASSIFIED BY FOREST DISTRICT, PLACE OF ORIGIN, AND COST PER FIRE OF FIRE-FIGHTING, 1948.

Forest District.	Total Fires.	Originated on Vacant Crown Lands and Lands contributing to Forest Protection Fund.	Originated on Lands not contributing to Forest Protection Fund.	Total Forest Service Cost.			Extinguished without Cost.			Cost Money to extinguish.							
				Dollars.	Per Cent.	Average Expenditure per Cost Fire (Dollars).	Number.	Per Cent. of Total Fires in District.	Per Cent. of Total Fires in Province.	Number.	Per Cent. of Total Fires in District.	Per Cent. of Total Fires in Province.	Cost less than $100 per Fire.	Cost $100 to $1,000 per Fire.	Cost over $1,000 to $5,000 per Fire.	Cost over $5,000 to $10,000 per Fire.	Cost over $10,000 per Fire.
Vancouver	202	39	163	748.92	2.08	14.68	151	74.75	29.84	51	25.25	17.41	31	13	4	3	.....
Prince Rupert	56	33	23	1,704.50	4.73	68.18	31	55.36	6.13	25	44.64	8.53	13	9	1	.....	2
Fort George	169	131	38	24,791.23	68.77	298.69	86	50.89	17.00	83	49.11	28.33	47	34	.....	2	.....
Kamloops	192	165	27	5,190.07	14.39	73.10	121	63.02	23.91	71	36.98	24.23	60	10	1	.....	.....
Nelson	180	149	31	3,615.16	10.03	57.38	117	65.00	23.12	63	35.00	21.50	61	1	1	.....	.....
Totals	799	517	282	36,049.88*	100.00	123.04	506	.....	100.00	293	.....	100.00	212	67	7	5	2
Per cent	100.00	64.71	35.29	.....	.....	.....	63.33	.....	.....	36.67	.....	.....	26.53	8.39	0.88	0.62	0.25
Ten-year average, 1939–48	1,555	1,002	553	156,646.00	.....	.....	736	.....	.....	819	.....	.....	629	148	32	6	4
Per cent	100.00	64.44	35.56	.....	.....	.....	47.33	.....	.....	52.67	.....	.....	40.45	9.52	2.06	0.38	0.26

* Cost correct to date. Subject to later revision.

Cost to other parties (115 cost fires), $80,871.71; cost to Forest Service (293 cost fires), $36,049.88.

Detailed final costs are published one year in arrears in the table "Expenditure by Districts" in each Annual Report.

(55)

PROSECUTIONS, 1948.

Forest District.	Information laid.	Burning without Permit.	Refusing to render Assistance in Fire-fighting.	Failure to maintain Proper Fire-protection Equipment.	Failure to remove Inflammable Material from around Donkey-engine.	Fines.		Served Sentence in Gaol.	Suspended Sentence.	Cases dismissed.	Cases withdrawn.
						Number.	Amount.				
Vancouver	11	4	1	5	1	7	$200.00	.....	2	.....	2
Prince Rupert	1	1	.....	.....	.....	1	25.00	.....	.....	.....	.....
Fort George	1	1	.....	.....	.....	1	25.00	.....	.....	.....	.....
Kamloops	3	2	1	.....	.....	2	56.00	.....	1	.....	.....
Nelson	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Totals	16	8	2	5	1	11	$306.00	.....	3	.....	2
Ten-year average, 1939–48	29	.....	.....	.....	.....	24	$589.88	.....	.....	.....	.....

Burning Permits, 1948.

Forest District.	Clearing Agricultural Land.				Clearing Logging-slash.				Clearing Railway Right-of-way.				Clearing Public Roads.				Grand Totals.			
	Permits issued.	Area burned over.	Fires escaped Control.	Fires set without Permit.	Permits issued.	Area burned over.	Fires escaped Control.	Fires set without Permit.	Permits issued.	Area burned over.	Fires escaped Control.	Fires set without Permit.	Permits issued.	Area burned over.	Fires escaped Control.	Fires set without Permit.	Permits issued.	Area burned over.	Fires escaped Control.	Fires set without Permit.
	No.	Acres.	No.	No.	No.	Acres.	No.	No.	No.	Acres.	No.	No.	No.	Acres.	No.	No.	No.	Acres.	No.	No.
Vancouver	3,610	1,793	3	2	186	20,805	3	1	3	.....	.....	.....	30	973	2	.....	3,829	23,571	8	3
Prince Rupert	985	3,664	6	1	60	132	.....	.....	11	10	.....	.....	4	50	.....	.....	1,060	3,856	6	1
Fort George	1,853	7,571	11	5	383	436	6	.....	6	101	.....	.....	24	36	.....	.....	2,266	8,144	17	5
Kamloops	1,928	5,364	.....	.....	123	322	.....	.....	5	88	.....	.....	26	79	.....	.....	2,082	5,853	.....	.....
Nelson	63	4,079	.....	.....	.....	.....	.....	.....	14	28	.....	.....	.....	.....	.....	.....	77	4,107	.....	.....
Totals	8,439	22,471	20	8	752	21,695	9	1	39	227	.....	.....	84	1,138	2	.....	9,314	45,531	31	9
Per cent	90.61	49.35	64.52	88.89	8.07	47.65	29.03	11.11	0.42	0.50	.....	.....	0.90	2.50	6.45	.....	100.00	100.00	100.00	100.00
Ten-year average, 1939–48	6,682	16,837	31	12	466	25,751	9	1	85	456	4	.....	144	1,938	6	.....	7,377	44,982	50	13
Per cent	90.58	37.43	62.00	92.31	6.32	57.25	18.00	7.69	1.15	1.01	8.00	.....	1.95	4.31	12.00	.....	100.00	100.00	100.00	100.00

(57) ENROLMENT AT RANGER SCHOOL, BY YEARS AND DISTRICTS.

District.	Rangers.	Acting Rangers.	Assistant Rangers.	Clerks.	Total.
1946.					
Vancouver	1	1	3	....	5
Kamloops	....	3	1	....	4
Nelson	....	2	2	....	4
Prince Rupert	1	1	1	....	3
Fort George	....	2	2	....	4
Totals	2	9	9	....	20
1947.					
Vancouver	1	....	3	....	4
Kamloops	....	....	5	....	5
Nelson	2	....	4	....	6
Prince Rupert	2	....	....	....	2
Fort George	3	....	....	....	3
Totals	8	....	12	....	20
1948.					
Vancouver	2	....	3	....	5
Kamloops	1	....	4	....	5
Nelson	1	2	2	....	5
Prince Rupert	....	....	3	1	4
Fort George	....	....	....	1	1
Totals	4	2	12	2	20

(58) MOTION PICTURE LIBRARY.

Stock Records.

	Year.				Totals, 1945–48.
	1945.*	1946.	1947.	1948.	
Films in library at January 1st	74	75	75	74	.....
Films withdrawn during year	4	2	8	2	16
New films added during year	5	2	7	5	19
Films in library at December 31st	75	75	74	77	.....
Films used during year	†	61	77	77	.....

Circulation Records.

Number of loans made during year	56	164	235	436	891
Number of film loans during year (one film loaned one time)	85	328	632	1,122	2,167
Number of showings during year	76	371	812	1,293	2,552
Number in audiences—					
Adults	2,341	11,940	8,009	21,633	43,923
Children	6,676	10,408	25,362	20,455	62,901
Mixed	8,730	10,285	24,351	42,930	86,296
Totals	17,747	32,633	57,722	85,018	193,120

* Recording of film circulation only commenced in 1945. † No record.

(59)

FOREST SERVICE LIBRARY.

Classification.	ITEMS RECEIVED AND CATALOGUED.										
	1939.	1940.	1941.	1942.	1943.	1944.	1945.	1946.	1947.	1948.	Ten-year Average, 1939–48.
Bound volumes	28	15	5	9	10	12	13	12	14	39	16
Government reports and bulletins	218	283	153	120	85	49	80	126	231	123	147
Other reports and bulletins	83	95	36	29	32	63	61	79	90	140	71
Totals	329	393	194	158	127	124	154	217	335	302	234
Periodicals and trade journals	56	47	55	43	45	50	48	51	72	72	54
References indexed	3,343	4,278	5,259	1,962	1,170	1,175	1,294	1,523	1,798	3,543	2,535

(60)

GRAZING PERMITS ISSUED.

District.	Number of Permits issued.	NUMBER OF STOCK UNDER PERMIT.		
		Cattle.	Horses.	Sheep.
Kamloops	969	105,923	4,193	29,599
Nelson	325	9,503	1,217	1,945
Fort George	34	1,707	116	120
Totals, 1948	1,328	117,133	5,526	31,664
Totals, 1947	1,322	105,723	5,513	26,189
Totals, 1946	1,379	106,273	5,035	31,274
Totals, 1945	1,378	109,201	5,064	39,235
Totals, 1944	1,320	101,696	4,862	40,858
Totals, 1943	1,221	93,497	4,844	39,921
Totals, 1942	1,130	84,788	4,797	36,962
Totals, 1941	881	77,774	4,180	39,552
Totals, 1940	790	74,404	3,958	37,132
Totals, 1939	738	69,447	2,758	38,357
Ten-year average, 1939–48	1,180	93,985	4,654	36,115

(61)

GRAZING FEES BILLED AND COLLECTED.

Year.	Fees billed.	Fees collected.	Outstanding.
1939	$21,348.41	$22,027.05	$42,012.10
1940	23,338.28	38,146.48	27,203.90
1941	23,781.19	29,348.82	21,636.87
1942	25,116.02	30,802.23	15,950.56
1943	24,680.37	31,148.36	9,482.57
1944	28,554.02	31,000.34	7,036.25
1945	30,066.34	31,465.28	5,637.36
1946	30,120.38	31,412.24	4,345.50
1947	28,584.74	29,203.74	3,726.50
1948	28,960.42	27,089.74	5,597.18

VICTORIA, B.C.:
Printed by DON MCDIARMID, Printer to the King's Most Excellent Majesty.
1949.

1,295-549-9730