PROVINCE OF BRITISH COLUMBIA

REPORT

OF

THE FOREST BRANCH

OF THE

DEPARTMENT OF LANDS

HON. T. D. PATTULLO, *Minister*

P. Z. CAVERHILL, *Chief Forester*

FOR THE YEAR ENDING DECEMBER 31ST

1922

PRINTED BY
AUTHORITY OF THE LEGISLATIVE ASSEMBLY.

VICTORIA, B.C.:
Printed by WILLIAM H. CULLIN, Printer to the King's Most Excellent Majesty.
1923.

VICTORIA, B.C., March 27th, 1923.

To His Honour WALTER CAMERON NICHOL,

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 Branch of the Department of Lands for the year 1922.

T. D. PATTULLO,

Minister of Lands.

The Hon. T. D. Pattullo,

Minister of Lands, Victoria, B.C.

SIR,—There are submitted herewith statistical tables with a brief comment thereon, covering the main activities of the Branch during the calendar year 1922.

P. Z. CAVERHILL,

Chief Forester.

The future of the industry depends on stands like this.

REPORT OF THE FOREST BRANCH,

DEPARTMENT OF LANDS.

The fire season, with its outstanding hazards, risk, losses, and efforts at control, is the most notable occurrence of the year. The whole Pacific Coast region was visited by the driest and most hazardous season on record. We have had bad seasons before; 1914, 1919, and 1920 all stand out as above normal in risk and loss, but in these seasons the area of high hazard was more or less circumscribed as shown by the fire statistics. The year just passed produced a crop of fires 25 per cent. greater than our previous record and 180 per cent. over the average of the past ten years.

Fire occurrence in previous outstanding years was:—

Year.	Southern Interior.	Coast.	Northern Interior.
	Per Cent.	Per Cent.	Per Cent.
1914	56	14	30
1919	45	49	6
1920	45	39	16
1922	38	34	28

Cost of fire-fighting is similarly divided:—

Year.	Southern Interior.	Coast.	Northern Interior.
	Per Cent.	Per Cent.	Per Cent.
1914	79	14	7
1919	76	23	1
1920	65	33	2
1922	39	33	28

These figures disclose the general distribution of the hazard and wider area covered as compared with previous years.

The expenditure and losses are also greatly increased, as might be expected, but it is a matter for congratulation that increase in expenditure over 1921 is less than in adjoining regions, whereas our records of losses compare very favourably indeed. The more specific details on the season will be found in the forest-protection section of this report.

The lessons of the year are:—

In forest fires it is the unexpected that happens. It is necessary to always be prepared.

We will not have conquered the fire situation until forest-protection is a national slogan.

Every citizen has an individual responsibility in this question. This responsibility is now laid down in the "Forest Act."

That given weather conditions favourable to the spread of fire it is almost impossible for human agencies to control a fire once well started. Every effort should be made for prevention.

That the seriousness of the forest-fire situation is justification for the most drastic action for control.

PERSONNEL.

No work undertaken by the Forest Branch is of greater importance to the safeguarding and building-up of our forest properties than that of building up the personnel of the organization. The vast distances in the Province, the great mountains, barriers to direct and rapid communication, and the need of extreme economy in all Government enterprises means that much of the work must be done apart and alone by the Ranger or Supervisor. The men must have the integrity, the knowledge not only of wood technique, but Government policy, to be able to act as responsible agents of the Government in any emergency that may crop up in relation to forest matters.

The duties imposed on a forest officer are many and varied. He must consider the forest, not as a mine to be worked, but as a field to be harvested, tilled, and replanted. Often without

time to consult a superior he must in cases of forest fire organize large crews; he must appraise stumpage values of a tract of Crown timber at the request of logging companies, settle a grazing dispute, examine and report on a pre-emption, or prevent a trespass. Much depends on his own loyalty and integrity, as the work cannot be closely checked without doing it all over. The only means to efficient administration is to build up an organization which can carry the responsibility with credit to themselves and the country.

The Branch is attempting this work by a careful selection on a competitive basis of personnel, and subsequent training through conferences of Rangers and District Foresters, where policy is explained, common problems discussed, and solutions arrived at; by correspondence and reading courses on forestry subjects for fieldmen; by requiring field officers to plan their work in advance; by organizing the headquarters staff as a mobile force for field inspection and support for field officers; by personal contact of superior and subordinate officers on the ground to carry policy into the field and at the same time, from observation of field conditions, to so mould our policy that the best is obtained. Results so far have been marked and the work cannot help but gather momentum as it goes along.

The staff now consists of 218 on the permanent rolls. This is increased during the fire season by approximately 200 temporary Assistant Rangers and patrolmen. The direct organization for the year is given below.

DISTRIBUTION OF TOTAL FORCE, BRITISH COLUMBIA FOREST BRANCH.

Forest District.	Permanent.															Temporary.					
	Chief Forester and Foresters.	Grazing Commissioner and Assistant.	Lumber Commissioners and Assistant.	District Foresters.	Supervisor of Scalers and Assistants.	Scalers and Assistant Scalers.	Asst. Foresters, Asst. Dist. Foresters, and Junior Foresters.	Railway Inspector.	Royalty Inspector and Assistant.	Mechanical Inspector.	Supervisors of Rangers and Fire Inspector.	Rangers.	Draughtsmen.	Export Patrolman.	Clerks, Stenographers, and Messengers.	Telephone-men and Others.	Assistant Rangers.	Patrolmen.	Launch Crews and Repairmen.	Lookout-men, Canoe-men, Packers, and Compass-men.	Totals.
Cariboo	....	....	....	1	....	....	....	....	....	....	....	3	...	....	1	....	6	4	....	....	15
Cranbrook	...	....	...	1	....	...	1	....	....	...	....	5	1	....	1	....	4	14	....	7	34
Kamloops	....	....	....	1	....	....	1	....	....	....	....	3	...	....	2	...	6	12	....	....	25
Nelson	....	....	....	1	....	....	1	....	....	....	1	6	....	....	3	...	9	13	...	....	34
Prince George	1	....	....	....	...	....	....	....	....	....	2	5	1	....	2	...	8	9	....	1	29
Prince Rupert	1	...	....	....	....	3	2	....	....	...	1	6	....	....	8	1	3	9	6	...	40
Vancouver	1	....	....	....	....	27	3	....	....	....	5	19	1	1	24	4	24	20	16	....	145
Vernon	....	....	...	1	....	....	1	....	....	....	....	4	....	..	2	....	5	9	....	1	23
Victoria	3	2	3	....	3	....	6	1	2	1	....	....	7	....	36	....	....	...	....	19	83
Totals	6	2	3	5	3	30	15	1	2	1	9	51	10	1	79	5	65	90	22	28	428

In addition to this organization, the Branch, through co-operation with the public, enrolled honorary Fire Wardens, who in case of need pledged themselves to take that initial action to control any forest fire. The work done and the spirit in which these men undertook their responsibility for the public good is greatly appreciated by the Branch, and I have great pleasure in bringing to the attention of the public that in a number of cases the action taken by the honorary Fire Wardens has stopped what might have developed into a dangerous conflagration.

CONDITIONS OF THE INDUSTRY.

The industry during the year has given fresh indications of strength and has more than fulfilled the predictions of a year ago. Being largely deprived of its former local markets, it has again demonstrated the ability to go out and secure a larger percentage of the world's timber trade. The off-shore business increased 45 per cent. over 1921 and is now over six times the volume of 1917. Much of the increase went directly to the United States markets, especially California and Atlantic seaboard, in direct competition with material secured nearer home.

As predicted a year ago, the period of deflation had been passed and the year has shown a steady increase in volume of business. The cut, 1,899,000,000 board-feet, is only second to the boom-year of 1920. Prices on an average were somewhat lower than in 1921, but this has been

offset somewhat by the cleaning-up and reduction of lower grades held in yards from previous years' business. Yard stocks have also been reduced, especially in mountain districts.

The year 1923 would appear to offer more promise than ever before. The demand remains strong, price is strengthening, and money is more readily available for development. The grain-crop, while not removing all the difficulties of the Prairie farmer, has materially helped the situation, and with the promise of a good harvest for 1923 the Prairie market should recover later in the year. The manufacturer, if he has not made a profit, has been able to readjust his operation, so that he is now running without loss and is able to meet competition in the markets of the world.

It might be well at this point to sound a warning. It should be remembered that this trade will not stand any great inflation in prices. In the foreign markets now open British Columbia lumber will come into keen competition with substitutes and lumber from other regions and be replaced by them, or the cost of building will be pushed so high that average incomes will not be able to pay a rent sufficient to yield returns on the investment. Either will immediately kill the business, and we must needs go through another 1920 and a long slow building-up process to regain the lost ground. What our lumber trade now needs is tranquility and steady growth—not booms and periods of depression.

ESTIMATED VALUE OF PRODUCTION.

Product.	1919.	1920.	1921.	1922.
Lumber	$31,000,000	$46,952,500	$33,533,000	$26,400, 000
Pulp and paper	12,554,257	21,611,681	13,500,000	12,590,000
Shingles	12,801,564	12,081,476	7,032,000	9,750,000
Boxes	2,142,000	2,650,000	2,000,000	1,726,000
Piles, poles, and mine-props	1,532,448	1,543,087	1,479,000	959,000
Cordwood, fence-posts, and mine-ties	5,256,520	1,495,729	1,180,000	1,187,000
Ties, railway	2,091,346	2,250,682	2,314,000	1,526,000
Additional value contributed by the wood-using industry	1,720,000	2,580,000	2,034,000	2,000,000
Laths and other miscellaneous products	195,594	847,920	250,000	400,000
Logs exported	991,365	615,732	1,648,000	2,939,000
Totals	$70,285,094	$92,628,807	$64,970,000	$59,477,000

WATER-BORNE TRADE.

The year witnessed a still further growth of our water-borne business, especially with California and the Atlantic seaboard. The total of this trade reached 273,000,000 feet, or an increase of 45 per cent. Noteworthy increases were recorded in trade with Japan—72,000,000 feet, or 40 per cent. over the previous year; Australia, 56,000,000 feet, or more than double 1921; and the United States, 83,000,000 feet, or over three times that of the previous year.

This trade now equals 25 per cent. of the lumber produced, and at the present rate should soon rise to 40 per cent., which, if it can be maintained, will have a material effect on stabilizing conditions in the industry. The greatest care, however, must be exercised to retain our existing markets and not to drive these customers into other fields or to adopt substitutes.

WATER-BORNE LUMBER TRADE, 1919, 1920, 1921, AND 1922.

Destination.	1919.	1920.	1921.	1922.
	Feet B.M.	Feet B.M.	Feet B.M.	Feet B.M.
Australia	8,515,600	32,218,155	27,275,928	55,949,129
New Zealand	.....	4,159,099	4,553,603	4,516,862
South America	1,551,574	5,523,102	1,317,825	3,244,776
China	17,183,430	14,911,232	41,944,011	24,640,268
Japan	4,675,730	5,990,266	52,447,160	72,339,531
United Kingdom and Continent	65,381,100	61,217,805	13,592,562	12,698,383
South Africa	5,044,672	7,330,531	2,931,969	2,415,500
India and Straits Settlements	475,088	5,619,747	8,429,403	7,249,487
United States	5,259,346	4,162,845	25,553,543	83,856,504
Philippine and Hawaiian Islands	785,726	2,996,123	1,158,805	94,764
West Indies and Cuba	.....	1,479,950	20,668	30,065
South Sea Islands	.....	.....	941,422	1,841,578
Mexico	.....	1,015,414	.....	.....
Egypt	.....	.....	8,566,400	4,269,953
Totals	108,872,266	146,624,269	188,733,299	273,146,800

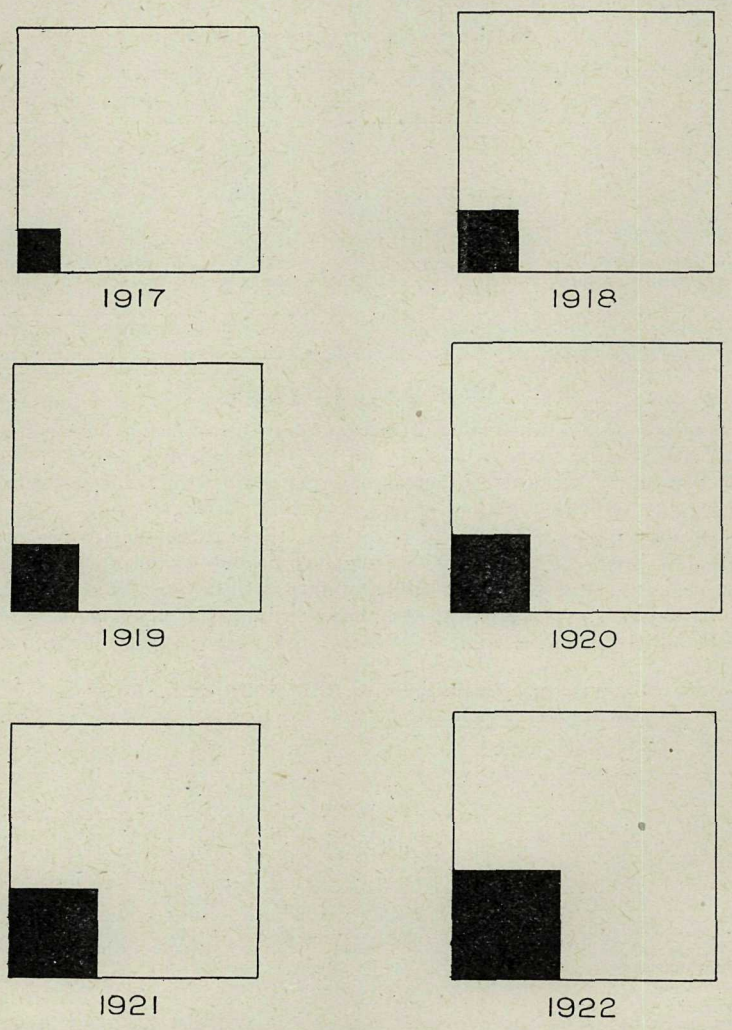
WATER BORNE SHIPMENTS

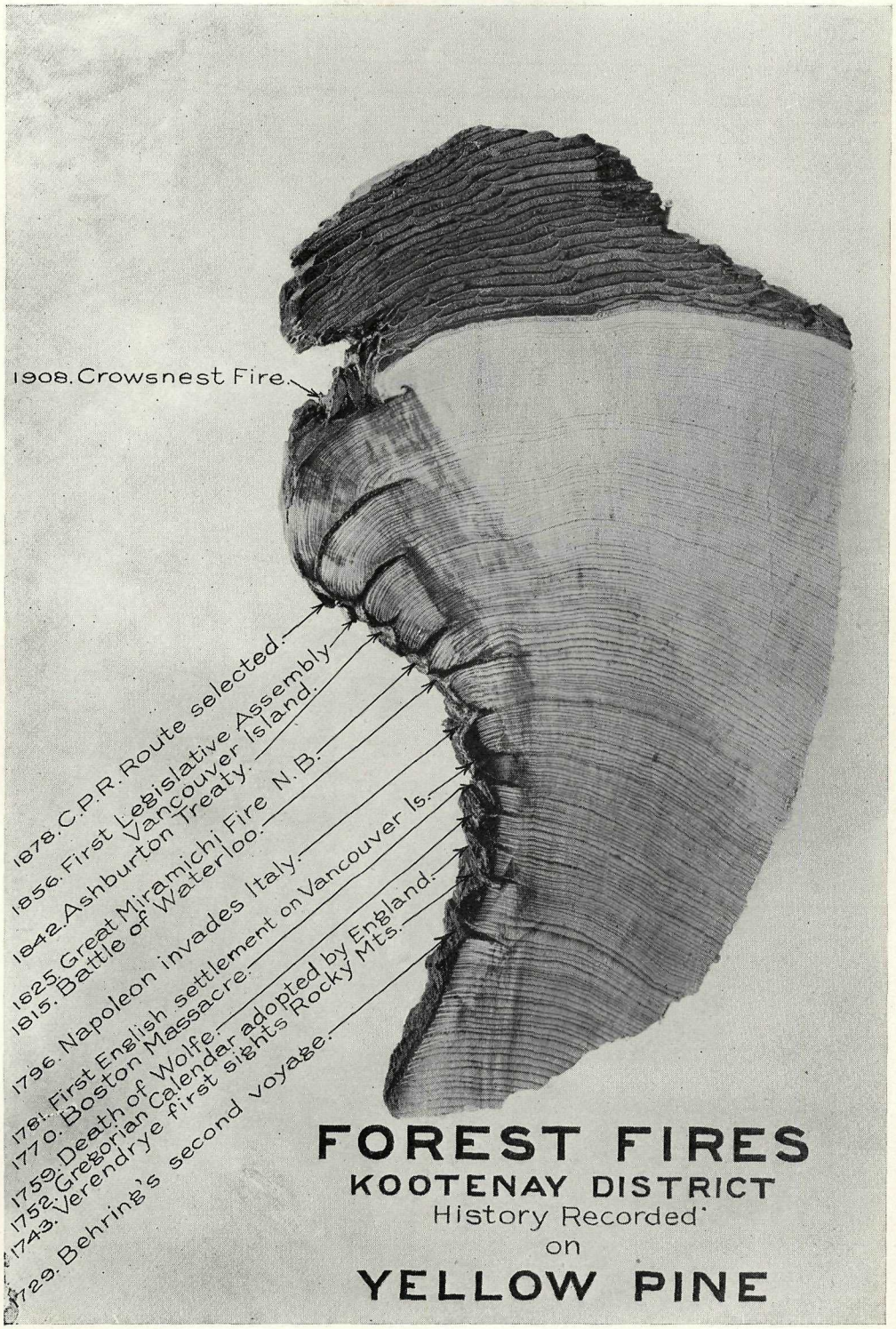
FROM

B.C.

AS COMPARED WITH

TOTAL LOG SCALE





FOREST FIRES

KOOTENAY DISTRICT

History Recorded

on

YELLOW PINE

PULP AND PAPER.

Pulp and paper has shown a remarkable recovery, especially in demand for newsprint, the production of this paper being 14,500 tons greater than in 1921, or an increase of 13 per cent. Sulphite production was 18,000 tons, or an increase of 20 per cent. The beginning of 1923 saw not only a strong demand but increasing prices. Production figures in British Columbia for the past four years are:—

Pulp and Paper.

Pulp.	1919.	1920.	1921.	1922.
	Tons.	Tons.	Tons.	Tons.
Sulphite	80,347	92,299	68,502	86,894
Sulphate	9,473	16,380	6,519	9,674
Ground wood	99,769	108,665	89,725	100,759

All the ground wood and 35,000 tons of sulphite were manufactured into newsprint, the product being:—

Product.	1919.	1920.	1921.	1922.
	Tons.	Tons.	Tons.	Tons.
Newsprint	123,607	136,832	110,176	124,639
Other papers	7,202	9,792	6,934	7,945

FOREST INVESTIGATION.

Yellow Pine.

Owing to the relatively high commercial importance of yellow pine (*pinus ponderosa*) and the rapidly diminishing supply, the Forest Branch undertook during the year a study to determine the principal characteristics shown by the species throughout its range, the rate of growth, and the effect of fire, logging, and insects on the crop prospects of the future.

The species ranges from Chinook Cove on the North Thompson River to the International Boundary, and from the Cascades to the main Rocky Range, being confined more particularly to the valleys and lower slopes in what is known as the Dry Belt, where lack of moisture prevents too keen a competition with the more persistent fir, with which it associates.

The open nature of our pineries is largely due to fire. Thirteen fires occurred in one area in 193 years (*see* plate). The reproduction between successive fires did not reach a sufficient size to survive the succeeding conflagrations. Since reproduction grows more rapidly and attains fire-resistance earlier on the better sites, it may establish itself there when it would not survive on the poorer. Two per cent. of the pine in merchantable stands are badly fire-scarred. This lessens the vigour and seeding capacity, decreasing the normal reproduction. In many pole stands over half the trees show fire-damage. The fertility of our pine lands varies with the moisture content, which largely depends on the water-holding capacity of the soil. When the duff is removed by fire and the winds sweep through the open stands there is excess evaporation, resulting in less favourable conditions for germination and growth.

Pine is not a frequent seeder. The seeds germinate in the fall, resulting in a large mortality from winter-killing. The combination of a good seed year, a favourable seed-bed and conditions for germination, and sufficient time between successive fires to attain resistance is necessary for successful establishment of a new crop. In the past these conditions have only occurred at long intervals.

It is desirable in the Dry Belt to perpetuate pine rather than its main associate, Douglas fir. The latter species when associated with pine, on sites adapted to the pine, is subject to shake and the product is wholly inferior to the more valuable pine. On the moister sites and on the margins of the pine-belt fir is encroaching. Fir is a more frequent seeder, disseminates its seed farther, and can endure more shade than pine. The more frequent concurrence of conditions for establishment accounts for the preponderance of fir reproduction in the virgin pine-fir type.

The general opinion that ground fires do little damage to our pineries is an economic misfortune. The prevention of burns is necessary for the improvement of these stands.

The leaving of slash in early logging operations for yellow pine has been responsible for large areas of potential forest lands bearing no returns. The leaving of slash upset the balance of nature, in that beetles found in this half-green slash ideal conditions for breeding, multiplied more rapidly than their parasites, until at present they are depleting the stands to a greater extent than operators and fire combined. Seven per cent. of the trees on plots studied were killed by insects. Broadcast burning, on account of the small spread between operating cost and the selling-price of lumber seemed the only practical method of getting rid of slash, and in an effort to stop the infestation large areas were broadcast-burned. In most cases only defective, deformed trees remained, all young growth being killed by fire. Regeneration strips showed the following proportions of seedlings:—

Areas not burned, 83 per cent. pine, 17 per cent. fir.

Areas burned, 21 per cent. pine. 79 per cent. fir.

Sufficient trees were left to seed the burned areas. The seedlings existing on these areas were found to be only one to ten as on areas not burned, this being mostly due to advanced reproduction on the unburned areas which had been destroyed with the burning. The increase in the value of pine and the subsequent increase in returns from our timber lands makes it now financially possible to pile and burn the slash, removing the danger from insects with least damage to young growth and soil.

Yield tables give the fundamental data required for the determination of the value of forest lands, the appraisal of damages to forest property, the choice of rotations, the choice of species, and the relative profit from expenditures for all forestry operations on different sites. The following yield tables, prepared from data secured during the investigation, are based on even-aged fully stocked stands and form a basis of comparison of permanent value under the present changing conditions:—

NORMAL YIELD TABLE, WESTERN YELLOW PINE (PINUS PONDEROSA).

Based on 129 plots (average ½ acre) scattered through commercial range in British Columbia. Site determined from height growth. Merchantable volume of trees over 9.5 inches D.B.H. compiled from standard volume table based on D.B.H. and total height.

Site 1.

Age.	Average Maximum Height.	Average D.B.H.	No. Trees over 9.5″ D.B.H. per Acre.	Volume B.F. per Acre.
80	80	13.3	80	12,500
100	92	16.0	68	20,750
120	102	18.6	61	28,500
140	109	20.9	56	32,500
160	114	22.4	52	35,500
180	119	23.3	49	38,000
200	122	23.8	46	40,000
220	125	24.0	44	41,600

Site 2.

Age.	Average Maximum Height.	Average D.B.H.	No. Trees over 9.5″ D.B.H. per Acre.	Volume B.F. per Acre.
80	62	10.4	119	6,000
100	74	12.6	91	10,750
120	82	14.9	79	15,500
140	89	17.0	71	20,500
160	93	8.8	65	24,300
180	96	19.9	60	27,200
200	99	20.5	58	29,700
220	101	20.9	56	31,200

Site 3.

Age.	Average Maximum Height.	Average D.B.H.	No. Trees over 9.5″ D.B.H. per Acre.	Volume B.F. per Acre.
80	48	....	....	....
100	57	9.7	135	5,000
120	64	11.3	101	7,200
140	68	12.9	89	9,750
160	71	14.1	80	12,150
180	73	15.3	77	14,400
200	75	16.1	75	16,300
220	76	16.6	73	17,800

To check up on the yield tables and other data gathered during the past summer, eight experimental plots, which can be re-examined at periodic intervals, were established. Certain of these plots will be cut over under different systems to determine the effect of various plans of management.

The combined factors which influence growth determine the site quality. The average maximum height of a stand at any age was found to be an expression of the productive capacity of an area. There is almost cessation of height growth at maturity, so the height of mature dominant trees can also be used as an indication of site. Strips run through average stands show that our pine areas are only yielding one-quarter of their producing capacity.

Just as good yellow pine exists 50 miles north of Kamloops at the limit of commercial stands as any place within the region. On an operation at Chinook Cove cutting-trees run four 16-foot logs to the thousand; one specimen measured 14 inches D.B.H. and 153 feet in height. It was a surprise to find this class of material so far north; however, the best pine is found in the valley-bottoms and moist places. The indications are that the northern limit of pine is due to its inability to compete with the more shade-enduring prolific species.

Since our virgin stands consist mainly of mature timber and advance reproduction, we will be faced in the near future with large areas of young growth and very little saw material. The Vernon District contains the main reserve, one mill cutting about half of the total output for the Province. There is probably thirty-five years' supply of yellow pine of all grades, and only ten to fifteen years' supply of merchantable timber of the quality being cut at the present time. There is still considerable waste, mainly due to cutting standard-length logs and the use of sound pine for logging improvements where inferior material is available.

In order that another crop may be assured from natural reproduction, the following should act as a guide in the management of our pineries:—

All young growth should be guarded in logging operations.

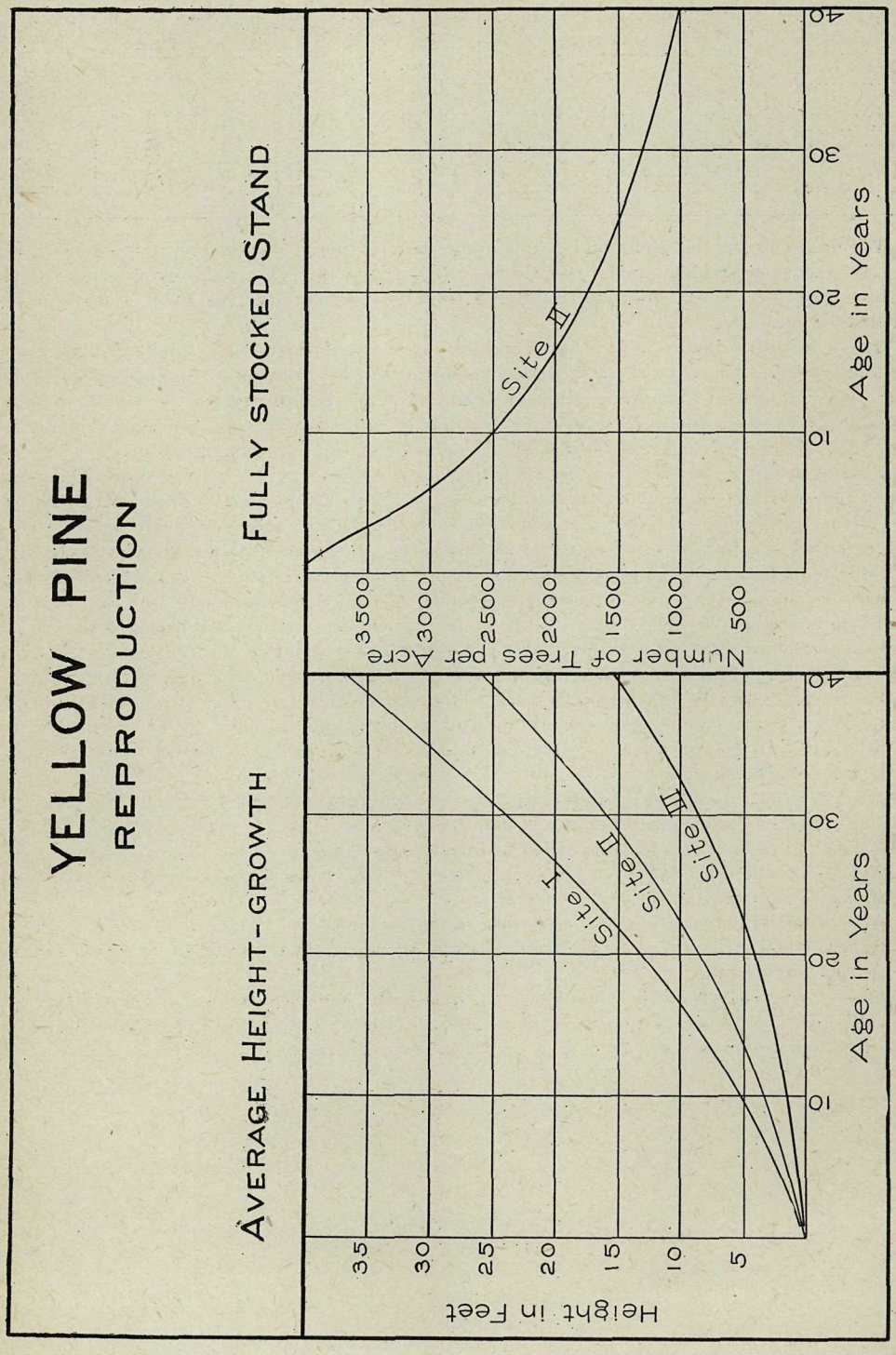
Where advanced reproduction is not of sufficient size to resist a ground fire, seed-trees should be left as an assurance of natural reproduction in case of fire.

Where no reproduction exists, seed-trees should be left.

Where the area is a pine-fir mixture, as many fir as practical should be removed, favouring the more valuable pine.

Trees to be cut should be blazed below stump-height and branded with a distinctive mark.

All slash should be piled on the stumps and tops away from young growth and burned at a time when least damage will be done to advanced reproduction.


YELLOW PINE
REPRODUCTION
AVERAGE HEIGHT-GROWTH
FULLY STOCKED STAND
Height in Feet
35
30
25
20
15
10
5
Site I
Site II
Site III
Age in Years
10
20
30
40
Number of Trees per Acre
3500
3000
2500
2000
1500
1000
500
Site II
Age in Years
10
20
30
40

Volume Table, Western Yellow Pine (Pinus ponderosa).

Basic trees scaled in 16.4-foot logs to nearest one-tenth inch and top diameter shown, in cubic feet. Compiled from taper curves. Based on data collected throughout the commercial range of yellow pine in British Columbia. Values within heavy lines based on reliable data. Check against basic trees, 0.3 per cent.

D.B.H.	Total Height (Feet).												Trees.	Top D.I.B.
	40.	50.	60.	70.	80.	90	100.	110.	120.	130.	140.	150.		
	Volume (Cubic Feet).													
10	6	8	10	12	.....	.....	.....	.....	.....	.....	.....	.....	6	7.5
12	11	14	16	19	22	25	.....	.....	.....	.....	.....	.....	35	7.3
14	17	19	23	26	30	34	38	.....	.....	.....	.....	.....	56	8.2
16	.....	24	29	34	39	44	48	53	.....	.....	.....	.....	130	8.5
18	.....	33	40	46	53	60	66	73	79	.....	.....	.....	116	8.8
20	.....	42	50	58	67	76	84	93	101	110	.....	.....	101	9.2
22	.....	51	61	71	82	92	102	112	122	133	143	.....	108	9.5
24	.....	.....	74	86	98	111	123	135	148	160	172	184	72	9.9
26	.....	.....	87	102	116	130	144	159	173	188	202	216	68	10.2
28	.....	.....	102	119	136	153	170	187	204	221	238	255	51	10.6
30	.....	.....	117	137	156	176	196	216	235	255	276	294	39	11.0
32	.....	.....	.....	155	177	200	222	245	267	289	312	334	25	11.3
34	.....	.....	.....	175	200	225	250	275	300	325	349	374	14	11.6
36	.....	.....	.....	.....	226	255	283	311	338	367	395	423	8	12.0
38	.....	.....	.....	.....	252	285	316	347	376	409	441	472	2	12.3
40	.....	.....	.....	.....	279	316	350	384	416	452	487	522	1	12.6
Trees..	4	16	45	173	188	145	131	72	43	113	4	.....	832	.....

VOLUME TABLE, WESTERN YELLOW PINE (PINUS PONDEROSA).

Basic trees scaled in 16.4-foot logs to top diameter shown. B.C. Log Rule. Stump-height, 18 inches. Compiled from taper curves. Based on data collected throughout the commercial range of yellow pine in British Columbia. Values within heavy lines based on largest number of trees. Check against basic data, 0.35 per cent.

D.B.H.	Total Height (Feet).												Trees.	Top D.I.B.
	40.	50.	60.	70.	80.	90.	100.	110.	120.	130.	140.	150.		
10	30	35	40	50	60	.....	.....	.....	.....	.....	.....	.....	6	7.5
12	50	60	80	95	110	125	.....	.....	.....	.....	.....	.....	35	7.8
14	70	90	120	150	170	190	210	.....	.....	.....	.....	.....	56	8.2
16	100	130	165	195	225	245	265	300	.....	.....	.....	.....	130	8.5
18	.....	175	210	245	280	320	350	390	420	.....	.....	.....	116	8.8
20	.....	240	290	335	380	435	480	530	580	630	.....	.....	101	9.2
22	.....	310	370	430	500	560	620	680	750	810	870	.....	108	9.5
24	.....	.....	460	530	610	690	760	840	920	1,000	1,070	1,170	72	9.9
26	.....	.....	540	630	720	810	900	1,000	1,090	1,180	1,270	1,360	68	10.2
28	.....	.....	640	740	850	950	1,060	1,160	1,260	1,370	1,480	1,580	51	10.6
30	.....	.....	750	860	980	1,100	1,220	1,340	1,470	1,590	1,710	1,880	59	11.0
32	.....	.....	.....	990	1,130	1,270	1,400	1,540	1,690	1,830	1,970	2,110	25	11.3
34	.....	.....	.....	1,120	1,290	1,450	1,610	1,770	1,930	2,090	2,250	2,410	14	11.6
36	.....	.....	.....	.....	1,450	1,630	1,820	2,000	2,180	2,360	2,540	2,710	8	12.0
38	.....	.....	.....	.....	1,630	1,830	2,030	2,230	2,430	2,630	2,930	3,030	2	12.3
40	.....	.....	.....	.....	.....	2,030	2,250	2,470	2,690	2,910	3,130	3,350	1	12.6
42	.....	.....	.....	.....	.....	.....	.....	2.710	.....	.....	.....	.....	.....	.....
Trees..	4	16	45	173	188	145	131	72	43	13	4	.....	832	.....

LOWER COAST.

The forest-investigation programme on the Lower Coast consisted of the establishment of a number of permanent and temporary sample plots on cut-over lands in the district for the purpose of studying:—

(1.) The rate of growth of the different species on representative sites at various ages for individual trees and for stands.

(2.) Natural regeneration on logged-over lands.

(3.) Stem analysis for height, diameter, and volume tables.

(4.) Seed dissemination from fir seed-trees.

(5.) Hemlock utilization.

Nineteen permanent plots were located, surveyed, and all young growth recorded and tagged with metal tags during 1921 and 1922. A wide range of age classes was selected, running from 1 to 100 years, of the principal species—fir, cedar, and hemlock. The plots varied in area from one-tenth to one acre, according to the objects for which they were established. Permanent scribed posts were placed at the four corners of each plot, the lines blazed between, and the plot tied into the nearest surveyed lot.

Each tree 4 inches diameter and over on the plot was accurately measured to the nearest tenth of an inch and a numbered metal tag affixed to the trees at the point of measurement. In addition to these measurements, the species, height, crown class, and any peculiarities were recorded for each tree opposite the number corresponding to that on the metal tag.

A number of reproduction plots of one square rod in area were located within the sample plots and each corner was marked by a post. Accurate count of all seedlings and saplings under 4 inches in diameter was made on these sub-plots and recorded according to species and height.

The fire-line. A fire has cleaned out reproduction to centre of picture.

Good reproduction under seed-trees.

A careful sylvicultural description of the area on which the plot is established was made and the history of the stand described as fully as possible.

These plots will be measured periodically, probably every five years, and actual increment worked out for ten-year periods, together with the rate of height growth, diameter growth, and rate of mortality from suppression of the various species in pure and mixed stands.

It is intended to extend and develop a systematic chain of these permanent sample plots, covering the main species on various classes of absolute forest lands throughout the Province.

Natural Regeneration after Logging.—A number of permanent plots were also established for the study of regeneration conditions resulting after the cutting of the original stand. Permanent plots are located on: (1) Areas cut over and followed by spring or fall burning; (2) areas cut over and not burned; (3) areas burned immediately after logging operation; (4) areas burned over some time after reproduction had commenced following logging; (5) areas in virgin stands where openings have been made due to the large blow-down of January, 1921.

In conjunction with this intensive study on specially selected plots, instructions were sent out in 1922 for a reconnaissance by ranger districts on an intensive scale of all areas of reproduction in the district.

Maps of the district on the scale of 2 inches to the mile were supplied each Ranger and a legend drawn up for uniform notation of reproduction. All logged areas were grouped and denoted by distinctive hatching as:—

(*a.*) Logged, unburned: (1) No reproduction; (2) scattered reproduction; (3) good reproduction.

(*b.*) Logged, burned: (1) No reproduction; (2) scattered reproduction; (3) good reproduction.

Species, age, and size of reproduction were noted.

A study of conditions on permanent sample plots applied to these areas of reproduction will supply information of considerable accuracy as to the amount and age of second growth and the annual increment on logged-off lands in this district. This will enable calculations affecting rate of cutting and rate of replacement to be made.

Stem Analysis.—A number of temporary sample plots were laid out for the purpose of securing material for stem analysis. Growth figures indicating a financial rotation of seventy years on certain sites yielding from 60 to 70 M. feet B.M. per acre were worked out in one instance for use as a rough guide for future expectation.

The following tables show the increase in growth in height, D.B.H. (diameter at breast-height), and volume in ten-year periods for the average tree of the three most common Coast species on a quality 2 site at Wellbore Channel. This area is situated near sea-level and has a gentle slope with a south-eastern exposure. The type is mixed hemlock, fir, and cedar in the following proportions: Hemlock, 49 per cent.; fir, 35 per cent.; and cedar, 18 per cent. While the data from which these tables were compiled are based on too scanty a number of tree-measurements to be applicable to the whole southern coastal region, nevertheless the tables may be taken as giving a fair indication of growth for these species on a quality 2 site similarly situated.

FIR (BASED ON 129 TREES).

Age in Years.	Height in Feet.	Diameter B.H. in Inches.	Volume in Cubic Feet.
10	12.0	0.8	....
20	28.0	8.3	0.8
30	45.5	4.2	2.0
40	63.0	6.2	5.0
50	80.0	8.4	11.1
60	92.0	10.1	17.0
70	102.0	11.6	24.0
80	110.0	12.9	32.0
90	117.0	14.1	41.0
100	124.0	15.4	52.0

CEDAR (BASED ON 71 TREES).

Age in Years.	Height in Feet.	Diameter B.H. in Inches.	Volume in Cubic Feet.
10	5	0.4	....
20	13	1.2	0.90
30	23	2.3	1.60
40	33	3.7	2.80
50	37	4.4	3.60
60	41	5.0	4.20
70	47	6.1	6.50
80	53	7.3	9.75
90	59	9.0	14.20
100	63	10.5	18.50
110	67	13.0	28.20

HEMLOCK (BASED ON 190 TREES).

Age in Years.	Height in Feet.	Diameter B.H. in Inches.	Volume in Cubic Feet.
10	8.2	0.5	....
20	20.0	1.3	0.50
30	32.0	2.5	1.25
40	46.0	4.1	2.70
50	61.0	6.1	6.00
60	71.0	7.5	9.40
70	79.0	8.8	14.00
80	86.0	10.0	19.30
90	90.0	10.7	23.20
100	95.0	11.5	28.30
110	99.0	12.3	35.00
120	103.0	13.0	40.70

Seed Dissemination.—Two permanent plots were laid out during 1922 for the study of seed dissemination. Areas were selected where it was considered that the soil had been so heavily burned that all seed in the litter was destroyed. On these areas Douglas fir seed-trees had been left standing and the reproduction resulting must come from the seed-trees.

It was found that the maximum radius of seed dissemination from a fir-tree 175 feet high was 325 feet against the prevailing wind, 525 feet with the wind, and 400 feet to right and left. This covered an oval area of about 13 acres on practically level land. The percentage of seed on each of six consecutive zones was as follows:—

Mean radius in direction of wind: (Feet) 71; 142; 213; 284; 355; 426.

Percentage of total seed disseminated: 29.3; 23.2; 19.5; 2.2; 9.7; 6.1.

The effective radius of seeding was 300 feet; beyond this distance the seedlings were too sparse to ensure a fully stocked stand.

Utilization.—Investigations were conducted during 1922 into the utilization of hemlock on the Lower Coast. Results appeared to indicate that from 40,000,000 to 50,000,000 feet of this species suitable for pulp and lumber, in addition to small trees of other species, were being wasted annually in this district.

Modern methods of logging break down and destroy all standing trees not taken out. The prevailing price for hemlock has not made close utilization of this species attractive; consequently only the choicest in size and quality ever reached the market. As this species is found in mixture in practically all stands being operated to-day, and as the percentage admixture is increasing as the centre of logging moves north, the waste in hemlock, which should be utilized in our pulp, box, and lumber mills, will increase from year to year unless active steps are taken to bring about a closer utilization. One of the operations studied gave the following figures for material wasted in logging and left in the woods:—

Material.	Quantity wasted per Acre.
Hemlock, 12 to 20 inches D.B.H.	2,000 F.B.M.
Hemlock piling	400 lineal feet.
Fir piling	600 „
Cedar poles	400 „
Mine-timbers	400 „

The value of these products now left on the ground in this district would probably total upwards of $5,000,000 per year if harvested and a satisfactory market found for the product. In addition to this loss an additional fire hazard is created on logged-over lands owing to the existence of this material, which makes control of operation fires expensive and difficult and adds to the general cost of operations.

VOLUME TABLES.

During the year the following volume tables were compiled from the general data available in the Department, and for the time being can be taken as the most accurate tables available within the range of the species. As general tables these will now supersede those previously published. In the table for Sitka spruce the diameter of trees over 50 inches was taken at top of root swelling to avoid the excessive taper found in large trees of this species.

SOUTH COAST VOLUME TABLE, DOUGLAS FIR (PSEUDOTSUGA TAXIFOLIA).

Based on measurements of mature trees felled during logging operations on Lower Coast and Vancouver Island. Stump-height, 2.5 to 6 feet according to diameter; 32-foot logs and B.C. Rule. Compiled by frustum form factor method. Check against basic trees, 0.3 per cent. Not applicable to young stands.

D.B.H.	Number of 32-foot Logs.											Top D.I.B.	Basis.
	1.	1½.	2.	2½.	3.	3½.	4.	4½.	5.	5½.	6.		
16	75	130	190	245	.....	.....	.....	.....	.....	.....	.....	8.5	5
18	80	150	225	295	375	.....	.....	.....	.....	.....	.....	8.8	5
20	85	165	265	355	450	545	640	.....	.....	.....	.....	9.2	21
22	.....	195	305	415	530	650	770	.....	.....	.....	.....	9.5	20
24	.....	.....	340	480	620	765	905	.....	.....	.....	.....	9.9	54
26	.....	.....	385	545	710	875	1,040	.....	.....	.....	.....	10.2	47
28	.....	.....	435	625	810	1,000	1,190	1,380	.....	.....	.....	10.6	36
30	.....	.....	495	705	915	1,130	1,345	1,560	.....	.....	.....	11.0	21
32	.....	.....	555	795	1,030	1,270	1,510	1,750	1,190	.....	.....	11.3	53
34	.....	.....	.....	885	1,145	1,415	1,690	1,960	2,230	.....	.....	11.6	57
36	.....	.....	.....	970	1,270	1,570	1,880	2,180	2,480	.....	.....	12.0	17
38	.....	.....	.....	1,065	1,400	1,730	2,070	2,400	2,730	.....	.....	12.3	7
40	.....	.....	.....	1,170	1,540	1,910	2,270	2,630	3,000	.....	.....	12.6	11
42	.....	.....	.....	.....	1,690	2,090	2,480	2,890	3,270	3,650	4,030	12.8	67
44	.....	.....	.....	.....	1,820	2,250	2,680	3,150	3,580	4,030	4,480	13.1	44
46	.....	.....	.....	.....	1,930	2,420	2,910	3,400	3,900	4,390	4,890	13.4	42
48	.....	.....	.....	.....	.....	2,660	3,170	3,680	4,200	4,720	5,230	13.6	61
50	.....	.....	.....	.....	.....	2,860	3,410	3,970	4,540	5,090	5,720	13.8	34
52	.....	.....	.....	.....	.....	3,070	3,680	4,280	4,870	5,470	6,060	14.1	21
54	.....	.....	.....	.....	.....	3,310	3,940	4,580	5,220	5,860	6,490	14.3	37
56	.....	.....	.....	.....	.....	.....	4,200	4,900	5,590	6,300	7,020	14.5	16
58	.....	.....	.....	.....	.....	.....	4,520	5,250	5,970	6,700	7,430	14.7	19
60	.....	.....	.....	.....	.....	.....	4,800	5,580	6,370	7,150	7,940	15.0	18
62	.....	.....	.....	.....	.....	.....	5,080	5,930	6,780	7,600	8,450	15.2	9
64	.....	.....	.....	.....	.....	.....	5,410	6,290	7,180	8,070	8,960	15.4	4
66	.....	.....	.....	.....	.....	.....	.....	6,650	7,590	8,540	9,490	15.6	3
68	.....	.....	.....	.....	.....	.....	.....	.....	7,820	8,980	10,040	16.0	1
Basis.	.....	1	17	50	87	107	159	145	93	52	20	Total	730

NORTH COAST VOLUME TABLE, SITKA SPRUCE (PICEA SITCHENSIS).

Based on measurements of windfalls, and trees felled during logging operations on North Coast and Queen Charlotte Islands. Stump-height, 2.5 feet up to 50 inches, D.B.H. Above 50 inches D.B.H. stump-heights range to 10 feet on account of butt swelling and diameter taken at stump-height. 32-foot logs and B.C. Rule. Compiled by frustum form factor method. Check against basic trees, 0.4 per cent.

D.B.H.	Number of 32-foot Logs.											Top D.I.B.	Basis.
	1.	1½.	2.	2½.	3.	3½.	4.	4½.	5.	5½.	6.		
10	55	110	....	....	....	....	....	....	....	....	....	7.5	..
12	65	125	185	....	....	....	....	....	....	....	....	7.8	4
14	75	140	220	....	....	....	....	....	....	....	....	8.6	4
16	90	175	255	345	....	....	....	....	....	....	....	9.1	11
18	100	210	315	420	535	....	....	....	....	....	....	9.6	18
20	115	250	375	520	650	760	....	....	....	....	....	10.2	14
22	....	295	455	610	770	920	....	....	....	....	....	10.7	18
24	....	350	530	710	900	1,070	....	....	....	....	....	11.3	20
26	....	400	605	810	1,030	1,240	1,470	....	....	....	....	11.8	15
28	....	450	685	920	1,170	1,420	1,700	....	....	....	....	12.5	22
30	....	....	770	1,050	1,330	1,630	1,940	....	....	....	....	12.9	23
32	....	....	850	1,180	1,510	1,840	2,180	....	....	....	....	13.4	32
34	....	....	930	1,310	1,690	2,070	2,450	2,990	....	....	....	14.0	33
36	....	....	....	1,470	1,870	2,320	2,720	3,150	....	....	....	14.4	22
38	....	....	....	1,640	2,110	2,580	3,020	3,500	....	....	....	15.0	25
40	....	....	....	1,810	2,320	2,840	3,340	3,860	....	....	....	15.6	14
42	....	....	....	1,990	2,550	3,110	3,680	4,240	4,800	....	....	16.2	24
44	....	....	....	....	2,770	3,390	4,010	4,630	5,240	....	....	16.7	12
46	....	....	....	....	2,980	3,680	4,360	5,050	5,720	....	....	17.3	9
48	....	....	....	....	3,230	3,970	4,710	5,370	6,200	....	....	17.8	17
50	....	....	....	....	3,470	4,280	5,090	5,900	6,710	....	....	18.3	11
52	....	....	....	....	3,730	4,620	5,510	6,360	7,240	8,130	....	18.9	10
54	....	....	....	....	4,030	4,980	5,920	6,870	7,810	8,750	....	19.4	10
56	....	....	....	....	4,320	5,330	6,340	7,360	8,370	9,390	....	20.0	11
58	....	....	....	....	....	5,760	6,750	7,930	8,960	10,040	....	20.0	2
60	....	....	....	....	....	6,110	7,220	8,430	9,540	10,740	11,830	20.0	3
62	....	....	....	....	....	....	7,660	8,970	10,130	11,400	12,620	20.0	1
64	....	....	....	....	....	....	8,110	9,490	10,740	12,150	13,400	20.0	2
66	....	....	....	....	....	....	8,670	10,150	11,480	12,970	14,360	20.0	4
68	....	....	....	....	....	....	....	10,750	12,150	13,740	15,240	20.0	1
70	....	....	....	....	....	....	....	11,380	13,000	14,610	16,170	20.0	2
72	....	....	....	....	....	....	....	12,110	13,760	15,390	17,100	20.0	2
74	....	....	....	....	....	....	....	12,820	14,570	16,470	18,260	20.0	1
76	....	....	....	....	....	....	....	13,710	15,440	17,420	19,320	20.0	..
78	....	....	....	....	....	....	....	14,380	16,280	18,630	20,430	20.0	1
80	....	....	....	....	....	....	....	....	17,280	19,510	21,600	20.0	1
82	....	....	....	....	....	....	....	....	18,190	20,580	22,800	20.0	3
84	....	....	....	....	....	....	....	....	19,240	21,980	24,130	20.0	..
86	....	....	....	....	....	....	....	....	20,040	22,940	25,410	20.0	1
88	....	....	....	....	....	....	....	....	21,430	24,220	26,890	20.0	..
90	....	....	....	....	....	....	....	....	22,370	25,500	28,380	20.0	1
Basis.	....	6	27	42	170	72	48	9	25	....	5	Total	404

Coast Volume Table, Western Hemlock (Tsuga heterophylla).

Based on measurements of felled trees and windfalls, North and South Coast and Vancouver Island. Stump-height, 2.5 to 4 feet; 32-foot logs and B.C. rule. Compiled by frustum form factor method. Check against basic trees, 0.2 per cent.

D.B.H.	Number of 32-foot Logs.									Top D.I.B.	Basis.
	1.	1½.	2.	2½.	3.	3½.	4.	4½.	5.		
10	65	110	....	....	....	....	....	....	....	7.5	5
12	70	130	190	....	....	....	....	....	....	7.8	16
14	75	155	230	....	....	....	....	....	....	8.2	17
16	80	180	280	370	470	....	....	....	....	8.5	39
18	90	205	325	440	555	....	....	....	....	8.8	50
20	..	230	370	510	645	780	920	....	....	9.2	49
22	..	....	420	580	740	910	1,080	....	....	9.5	50
24	..	....	460	650	840	1,040	1,230	....	....	9.9	51
26	..	....	510	720	940	1,160	1,380	....	....	10.2	37
28	..	....	560	810	1,050	1,300	1,540	....	....	10.6	40
30	..	....	620	890	1,150	1,420	1,690	1,960	....	11.0	23
32	..	....	680	970	1,260	1,560	1,850	2,140	....	11.3	25
34	..	....	....	1,060	1,370	1,700	2,020	2,360	2,680	11.6	15
36	..	....	....	1,150	1,500	1,860	2,230	2,590	2,940	12.0	23
38	..	....	....	1,230	1,620	2,010	2,390	2,780	3,170	12.3	12
40	..	....	....	1,330	1,760	2,180	2,600	3,010	3,470	12.6	7
42	..	....	....	1,440	1,890	2,360	2,800	3,280	3,710	12.8	4
44	..	....	....	1,550	2,040	2,550	3,000	3,520	4,010	13.1	5
46	..	....	....	1,660	2,190	2,750	3,250	3,800	4,360	13.4	4
48	..	....	....	....	....	2,940	3,500	4,060	4,650	13.6	2
50	..	....	....	....	....	3,150	3,750	4,370	4,990	13.8	2
52	..	....	....	....	....	3,350	4,010	4,670	5,320	14.1	1
54	..	....	....	....	....	3,660	4,290	4,990	5,690	14.3	2
56	..	....	....	....	....	....	4,550	5,330	6,050	14.5	1
58	..	....	....	....	....	....	4,880	5,660	8,440	14.7	..
60	..	....	....	....	....	....	5,160	6,010	6,850	15.0	..
Basis	18	36	80	94	158	59	32	3	....	Total	480

Cubic-foot Volume Table, Western Hemlock (Tsuga heterophylla).

Based on measurements of windfalls from all types, Kitimat Valley, 1921. Stump-height, 2.5 feet; 32-foot logs. Compiled by frustum form factor method from taper curves. Check against basic trees, 0.4 per cent.

D.B.H.	Number of 32-foot Logs.											Top D.I.B.	Basis.
	1.	1½.	2.	2½.	3.	3½.	4.	4½.	5.	5½.	6.		
8	9	13	18	...	...	...	...	...	...	...	....	6.0	4
10	12	18	24	30	...	...	...	...	...	...	....	6.0	9
12	16	23	31	39	47	...	...	...	...	...	....	6.3	11
14	20	30	40	50	60	...	...	...	...	...	....	6.6	19
16	25	37	49	62	74	86	...	...	...	...	....	6.9	16
18	30	44	59	74	89	103	...	...	...	...	....	7.2	26
20	35	53	70	88	105	123	...	...	...	...	....	7.5	19
22	..	61	82	102	123	143	163	...	...	...	....	7.8	17
24	..	..	94	118	141	165	188	212	...	...	....	8.1	11
26	..	..	108	135	162	189	216	243	...	...	....	8.4	19
28	..	..	122	152	182	213	243	263	..	...	....	8.7	8
30	..	..	...	171	206	240	274	309	...	...	....	9.0	11
32	..	..	...	189	227	265	303	342	...	...	....	9.3	6
34	..	..	...	207	248	289	331	372	413	...	....	9.6	10
36	..	..	...	228	274	319	365	411	456	502	....	9.9	6
38	..	..	...	250	300	350	400	450	500	550	....	10.2	6
40	..	..	...	...	328	382	436	490	546	600	....	10.5	4
42	..	..	...	...	355	414	473	532	591	650	....	10.8	5
44	..	..	...	...	383	447	510	574	638	702	....	11.1	4
46	..	..	...	...	416	486	556	626	695	765	835	11.4	2
48	..	..	...	...	447	522	596	671	745	820	895	11.7	3
50	..	..	...	...	484	565	646	727	808	889	970	12.0	2
52	..	..	...	...	524	611	698	785	872	959	1,046	12.3	1
Basis	18	18	47	40	42	31	21	1	1	...	....	....	219

GENERAL VOLUME TABLE, AMABILIS FIR (ABIES AMABILIS).

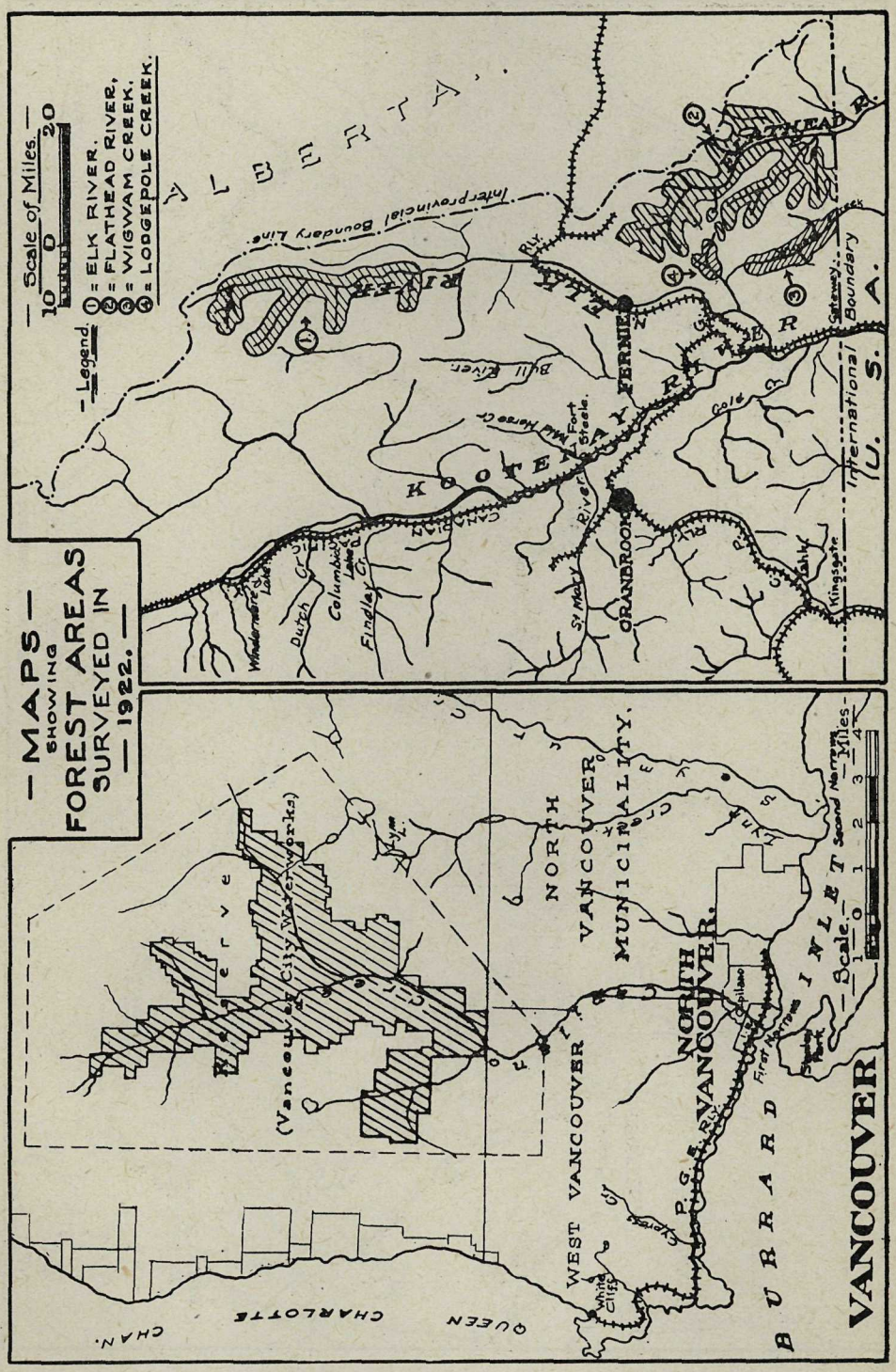
Based on measurements of windfalls, and trees felled during logging operations on North and South Coast and Vancouver Island. Stump-height, 2.5 feet; 32-foot logs and B.C. Rule. Compiled by frustum form factor method. Check against basic trees, 0.4 per cent.

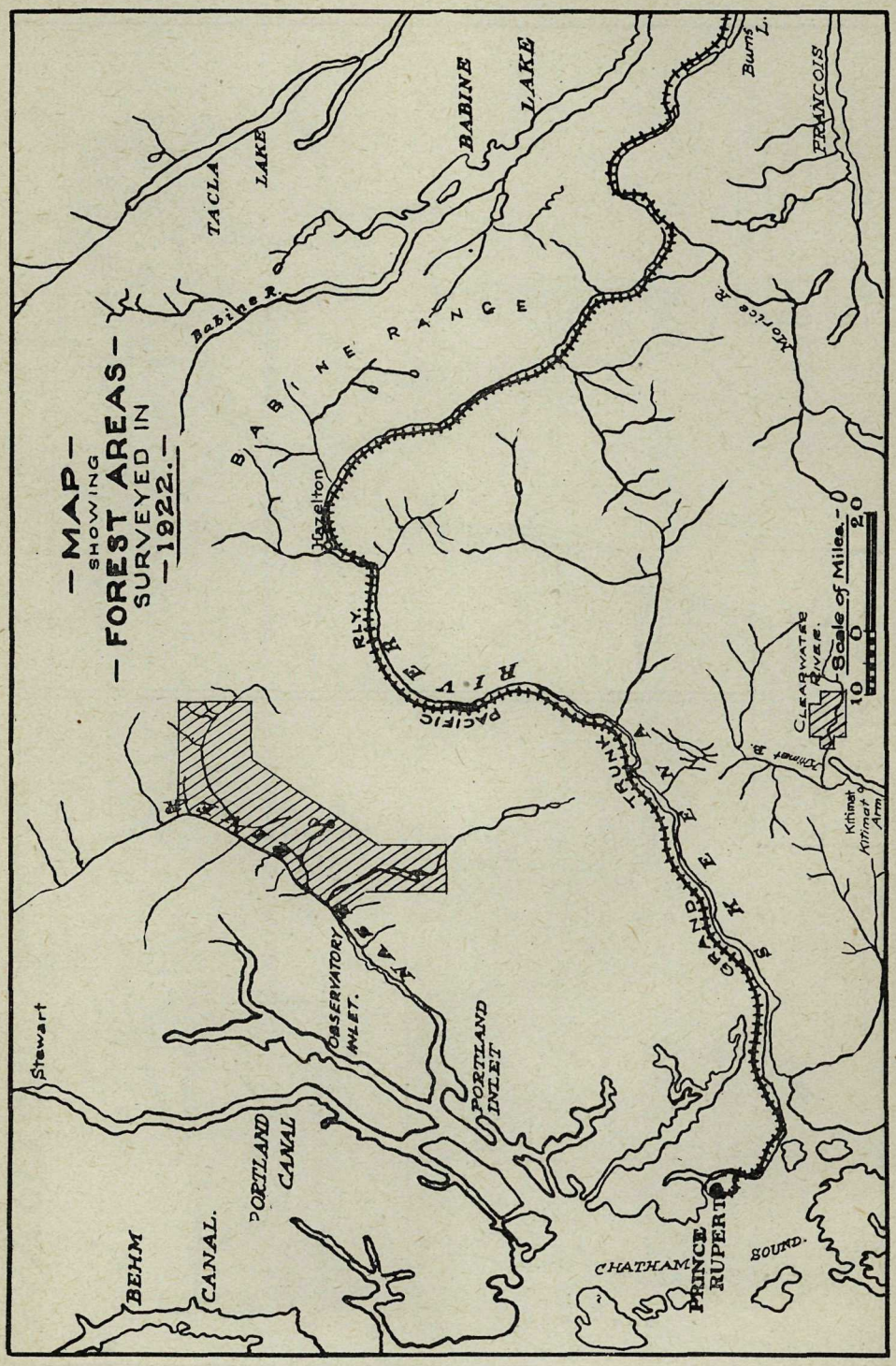
D.B.H.	Number of 32-foot Logs.									Basis.	Top D.I.B.
	1.	1½.	2.	2½.	3.	3½.	4.	4½.	5.		
10	65	110	...	....	....	....	....	....	....	5	7.5
12	70	130	190	....	....	....	....	....	....	16	7.8
14	75	155	230	310	....	....	....	....	....	15	8.2
16	85	185	280	375	475	....	....	....	....	24	8.5
18	90	210	330	450	570	....	....	....	....	31	8.8
20	95	240	380	530	670	810	....	....	....	33	9.2
22	..	260	430	600	770	940	....	....	....	34	9.5
24	..	290	480	680	870	1,080	1,280	....	....	35	9.9
26	..	...	530	760	990	1,220	1,450	....	....	27	10.2
28	..	...	600	860	1,120	1,380	1,640	1,880	....	15	10.6
30	..	...	670	950	1,230	1,520	1,810	2,100	....	16	11.0
32	..	...	730	1,050	1,360	1,690	2,010	2,320	....	22	11.3
34	..	...	...	1,150	1,500	1,850	2,220	2,570	....	22	11.6
36	..	...	...	1,260	1,650	2,030	2,440	2,830	....	10	12.0
38	..	...	...	1,370	1,790	2,220	2,650	3,080	....	11	12.3
40	..	...	...	1,480	1,960	2,430	2,900	3,360	3,860	5	12.6
42	..	...	...	1,620	2,130	2,650	3,140	3,680	4,160	5	12.8
44	..	...	...	1,750	2,290	2,870	3,280	3,970	4,510	4	13.1
46	..	...	...	1,880	2,460	3,100	3,660	4,280	4,910	1	13.4
48	..	...	...	....	....	3,340	3,980	4,620	5,300	2	13.6
50	..	...	...	....	....	3,590	4,290	4,990	5,700	1	13.8
52	..	...	...	....	....	3,850	4,610	5,370	6,110	1	14.1
54	..	...	...	....	....	4,220	4,940	5,760	6,570	..	14.3
56	..	...	...	....	....	....	5,270	6,160	7,020	1	14.5
58	..	...	...	....	....	....	5,670	6,590	7,490	..	14.7
60	..	...	...	....	....	....	6,030	7,010	7,980	..	15.0
Basis.	16	24	54	58	87	49	38	9	1	336	....

VOLUME TABLE, WESTERN WHITE PINE (PINUS MONTICOLA).

Based on scaled contents of 170 felled trees, Southern Interior, to top D.I.B. shown. Logs scaled as cut by B.C. Rule. Average trimming allowance, 0.4-foot. Average stump-height, 2.5 feet. Compiled by frustum form factor method. Check against basic data, 0.5 per cent. low.

D.B.H. Class.	Number of 16-foot Logs.									Top D.I.B.	Basis No. Trees.
	1.	2.	3.	4.	5.	6.	7.	8.	9.		
	Volume, B.F.										
10	25	60	....	....	....	....	....	....	....	7.5	..
12	30	80	130	180	....	....	....	....	....	7.8	6
14	35	100	160	230	300	....	....	....	....	8.2	21
16	..	120	200	280	370	....	....	....	....	8.5	28
18	..	140	240	340	450	....	....	....	....	8.8	18
20	..	160	290	410	540	670	....	....	....	9.2	20
22	..	190	340	490	640	790	940	....	....	9.5	18
24	..	....	390	560	740	920	1,090	....	....	9.9	22
26	..	...	440	640	850	1,050	1,260	....	...	10.2	9
28	..	....	510	740	970	1,200	1.440	1,670	....	10.6	11
30	..	....	570	830	1,100	1,360	1,630	1,900	....	11.0	7
32	..	....	630	930	1,230	1,530	1,820	2,120	....	11.3	4
34	..	....	....	1,030	1,360	1,700	2,040	2,370	....	11.6	3
36	..	....	....	1,130	1,510	1,890	2,260	2,630	....	12.0	2
38	..	....	....	1,240	1,660	2,080	2,480	2,890	....	12.3	1
40	..	....	....	1,360	1,810	2,260	2,700	3,140	....	12.6	..
42	..	....	...	....	1,970	2,450	2,940	3,430	....	12.8	..
44	..	....	....	....	2,120	2,650	3,180	3,710	4,250	13.1	..
46	..	....	....	....	....	2,860	3,430	4,010	4,570	13.4	..
48	..	....	....	....	....	3,060	3,670	4,280	4,900	13.6	..
Basis.	..	....	25	43	44	43	12	3	....	....	170


— MAPS —
SHOWING
FOREST AREAS
SURVEYED IN
— 1922. —
— Scale of Miles. —
10 0 20
— Legend. —
1 = ELK RIVER.
2 = FLATHEAD RIVER.
3 = WIGWAM CREEK.
4 = LODGEPOLE CREEK.
ALBERTA
Interprovincial Boundary Line
KOOTENAY RIVER
FERNIE
CRANBROOK
Fort Steele
Wheadon Lake
Dutch Cr.
Columbia Lake
Findley Cr.
St. Mary River
Bull River
Wild Horse Cr.
Galt Cr.
Kingsgate
International Boundary
U. S. A.
FLATHEAD R.
Reserve
(Vancouver City Waterworks)
NORTH VANCOUVER MUNICIPALITY.
WEST VANCOUVER
NORTH VANCOUVER.
BURRARD INLET
Second Narrows
Scale. — Miles.
VANCOUVER
QUEEN CHARLOTTE CHAN.


—MAP—
SHOWING
—FOREST AREAS—
SURVEYED IN
—1922.—
TACLA
LAKE
BABINE
LAKE
Babine R.
BABINE RANGE
Hazelton
RIVER
PACIFIC
RLY.
TRUNK
GRANDE
FORKS
Burns L.
FRANCOIS
Nortice R.
Scale of Miles.
0
10
20
CLEARWATER RIVER.
Kitimat R.
Kitimat Arm
Stewart
OBSERVATORY INLET.
PORTLAND INLET
PORTLAND CANAL
BEHM
CANAL.
CHATHAM
PRINCE RUPERT
SOUND.

FOREST RECONNAISSANCE.

Wigwam River Cruise.

Early in 1922 an inquiry was received for a sale of the timber in the valley of the Wigwam River and tributaries, East Kootenay District, to form part of the supply for a proposed pulp-mill to be erected near Elko. The reconnaissance started on March 1st and finished on May 15th, having covered a total timbered area of 13,551 acres, bearing a total stand of 209,355,100 board-feet. Of this total stand, spruce comprised 50 per cent.; balsam, 8 per cent.; lodge-pole pine, 20 per cent.; Douglas fir, 16 per cent.; tamarack, 5 per cent.; and cedar, 1 per cent. The spruce, balsam, and lodge-pole pine will be used for pulp and the Douglas fir, tamarack, and cedar for sawlogs. The total amount of pulping species is therefore 162,200,000 board-feet, or 74 per cent. of the total.

All the merchantable timber in the Wigwam Valley lies within a mile of the main river and its tributaries. The hills are steep, but with smooth, firm surface and little rock-outcrop. The Wigwam River averages a drop of 60 feet per mile, while its tributaries, rising high up in the mountains, have a much steeper fall. Snow-logging is most feasible. Several of the tributary streams will need flumes, while the Wigwam can be driven to its mouth.

Lodgepole Creek Area.

The largest tributary of the Wigwam River is Lodgepole Creek. A separate cruise and report was made on the timber within its valley on the same basis as for the Wigwam. General topographic conditions were found to be similar to those in the main valley. A total stand of 112,951,200 board-feet of timber was found on a merchantable area of 3,633 acres. Spruce formed 53 per cent.; balsam, 13 per cent.; lodge-pole pine, 6 per cent.; Douglas fir, 13 per cent.; tamarack, 10 per cent.; and cedar, 5 per cent. The average stand per acre on the merchantable area was found to be 31,000 board-feet, with eleven or twelve logs per thousand.

Upper Elk River Area.

Upon the completion of the Wigwam River and Lodgepole Creek cruises, and as the result of the same inquiry, the reconnaissance party moved on to the Elk River above Natal, where several large bodies of Crown timber were cruised. A total area of 14,479 acres was covered, containing a total stand of 291,404,672 board-feet, of which spruce comprises 73 per cent.; balsam, 10 per cent.; lodge-pole pine, 15 per cent.; and Douglas fir, 2 per cent. Total pulp species is thus 98 per cent. of the stand, or 285,073,572 board-feet. The areas included in this cruise are vacant Crown lands lying outside the alienated lands, the latter taking in by far the greater part of the valley. The work was completed on August 30th.

The Elk River Valley and its tributary valleys vary in width from ½ to 3 miles, with practically all the timber cruised lying within 1½ miles of its tributaries. The mountains rise steeply, as a rule, from the valley-floor, but surfaces are regular and not too broken for profitable logging. Stands average 20,000 board-feet per acre, with a maximum of 70,000 board-feet. Logs will run eleven or twelve per thousand.

The timber can be skidded or hauled to the subsidiary or main streams, flumed or driven to the Elk River, and driven down the Elk to their destination. A railway has been surveyed through the valley and easy grades can be found. A common carrier or logging-railway might profitably be considered for handling this timber. A map was prepared to accompany this cruise, showing the topography in 100-foot contours and the location of the timber.

Flathead Reconnaissance.

Following the close of the Elk River reconnaissance, an extensive cruise of the Flathead Valley was made. This area comprises the watershed of the Flathead River north from the International Boundary to Corbin. It presents a fairly easy logging chance, all the timber being within skidding or easy hauling distance of the creeks. Many of these can be flumed for short distances, while chutes will take care of a large portion of the timber.

The area covered by this reconnaissance contains a grand total of about 1,250,000,000 board-feet of timber, of which 71 per cent., or about 900,000,000 board-feet, is on vacant Crown lands. In addition, knowledge was obtained of another 250,000,000 board-feet in tributary valleys not

examined. Of the total amount, spruce makes up 60 per cent.; balsam, 5 per cent.; lodge-pole pine, 15 per cent.; Douglas fir, 10 per cent.; and tamarack, 10 per cent. This gives a total of 80 per cent. pulping species, or about 1,250,000,000 board-feet.

This area in itself would supply a pulp-mill of 100 tons daily capacity for forty or fifty years. Suitable locations for such a mill can be found, either close to existing railways or made accessible by an easily constructed branch line.

KITIMAT AREA.

During 1921 the vacant Crown lands in the Kitimat Valley were cruised. but it was found impossible at that time to complete one of the tributaries—namely, the Clearwater River. A small party was organized in the spring of 1922 and commenced work on May 12th. A total area of 4,099 acres was cruised, bearing a stand of 79,086,900 board-feet of timber, of which 52 per cent. is hemlock, 33 per cent. balsam, 13 per cent. spruce, and 2 per cent. cedar, or practically all species suitable for pulp purposes.

This cruise was made on a 5-per-cent. basis and a map prepared showing 100-foot contours, timber types, and streams. Elevations were carried in from tide-water by aneroid barometers, being checked several times during the reconnaissance. The topographic Abney level and trailer tape were used for measuring distances and elevations on the cruise strips. Volume tables constructed for the Kitimat Valley by a special party in 1921 were used and checked for local application.

The topography presents a series of high benches, one rising steeply above another, and dissected by many steep and deep ravines. However, the difficulties of logging the area are not great. The timber would be removed by logging-railway, as the river is not drivable.

NASS RIVER AREA.

During 1921 some 31,000 acres were cruised in the Nass River Valley. Reports showed additional large bodies of timber farther up the river, and these were partly cruised to the extent of 75,000 acres during 1922. The Tseax Valley, a tributary of the Nass, contains 24,000 acres of this, and the east side of the Nass, between the Tseax and Cranberry Rivers, the balance. A total stand of 888,000,000 board-feet was found, of which hemlock made up 46 per cent.; spruce, 27 per cent.; balsam fir, 14 per cent.; cedar, 9 per cent.; and lodge-pole pine, 4 per cent. This makes a total for the Nass below the Cranberry and Kinskooch Rivers of 1,350,000,000 board-feet.

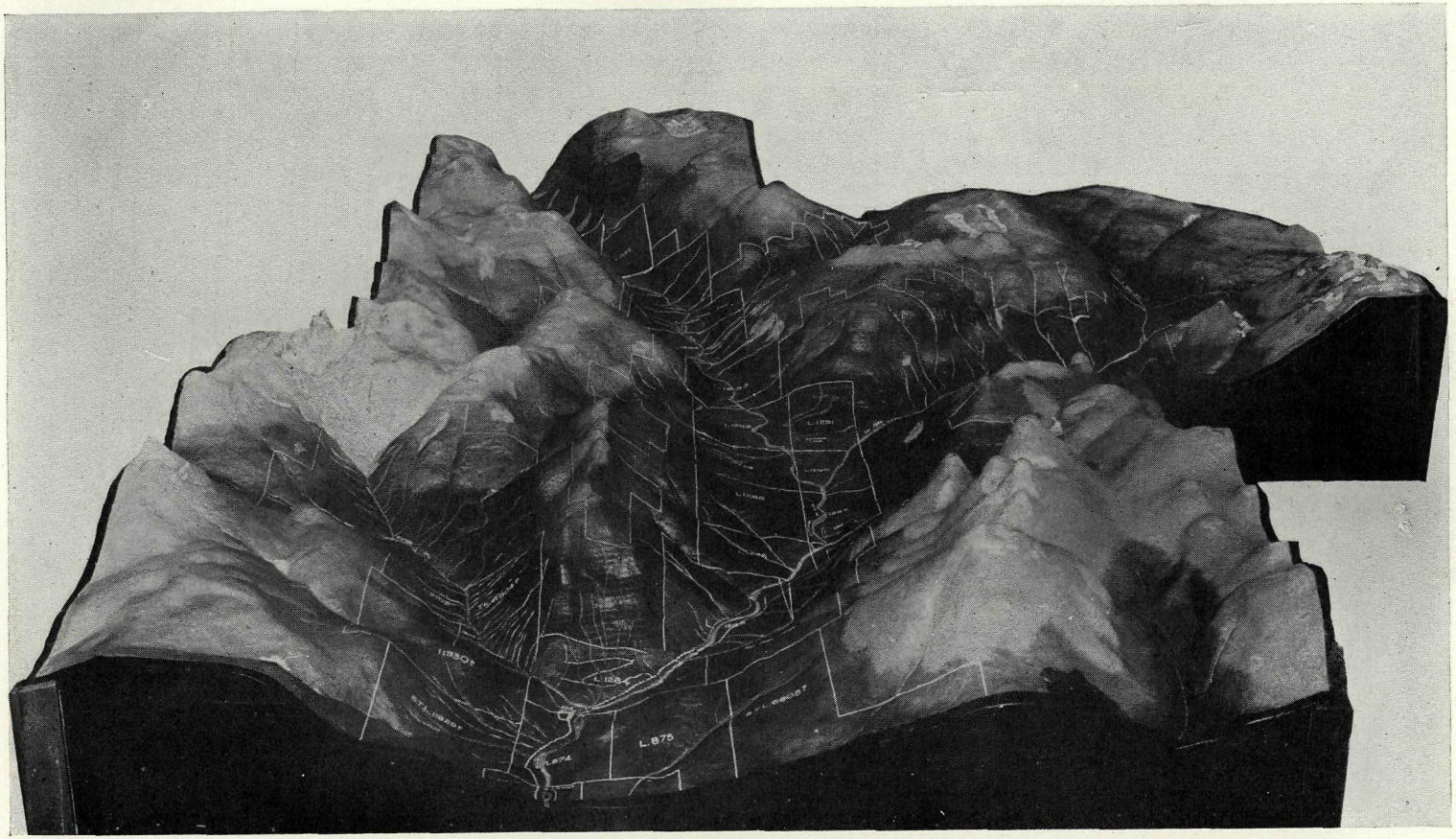
Further large bodies of timber extend more or less continuously to the headwaters of the Nass. Judged by present-day standards, the stands become progressively smaller and of less merchantable character, but will eventually prove of great value for pulp-manufacture.

Stands reported after an extensive reconnaissance in 1913, corrected on a basis of comparison with the accurate figures obtained during the past two years, indicate additional timber chiefly hemlock and spruce, on the upper reaches of the river to the extent of 4,000,000,000 board-feet.

Actual logging of those areas already cruised will present no unusual difficulties. Most of the timber is found on moderately sloping benches along the river, extending back to 5 miles in width, and on the mountain-sides. For the most part the mountains are not nearly so precipitous as many chances now being logged on the Lower Coast. The climate is very moderate and logging operations will be possible, except for about two months in the spring and a like period of heavy rains before the freeze up in the fall.

Transportation facilities present the only obstacle to immediate utilization of these 5,000,000 M. feet of timber. The Nass River below Aiyansh is broad, shallow, and badly obstructed by islands. It is drivable during two months in the spring and a like period during the fall. Improvements necessary will consist chiefly of sheer-booms around islands and sand-bars. For 20 miles above Aiyansh the river is narrow, deep, and swift and will present no difficulties to driving. Above this again it takes on the character of the lower river. The tributaries are not drivable.

There is possibly an alternative route to the Canadian National Railway at Terrace for all timber on the Tseax and on the Nass above Aiyansh. Levels over the existing survey are sufficiently accurate to indicate this possibility, but a careful survey by competent engineers would be necessary to definitely decide on this course. This route would tap a large body of



Capilano Valley, showing timber areas.

timber on the Kitsumgallum, for delivery at a mill situated on Kitsumgallum or Mud Lake, approximately 15 miles from the Canadian National.

Capilano Cruise.

A detailed cruise of the unalienated timber in the Capilano watershed was undertaken during the year as a result of an application to purchase this timber for logging purposes. The City of Vancouver and adjacent municipalities are dependent on this watershed for a part of their water-supply, and it is of the utmost importance that logging operations conducted therein should be so regulated as to cause the least deleterious effect on the watershed, either as to the quantity or purity of the water derived therefrom.

The object of the cruise was to determine the quality, quantity, and value of the timber therein, and if possible to devise some means of logging without impairment of the watershed value.

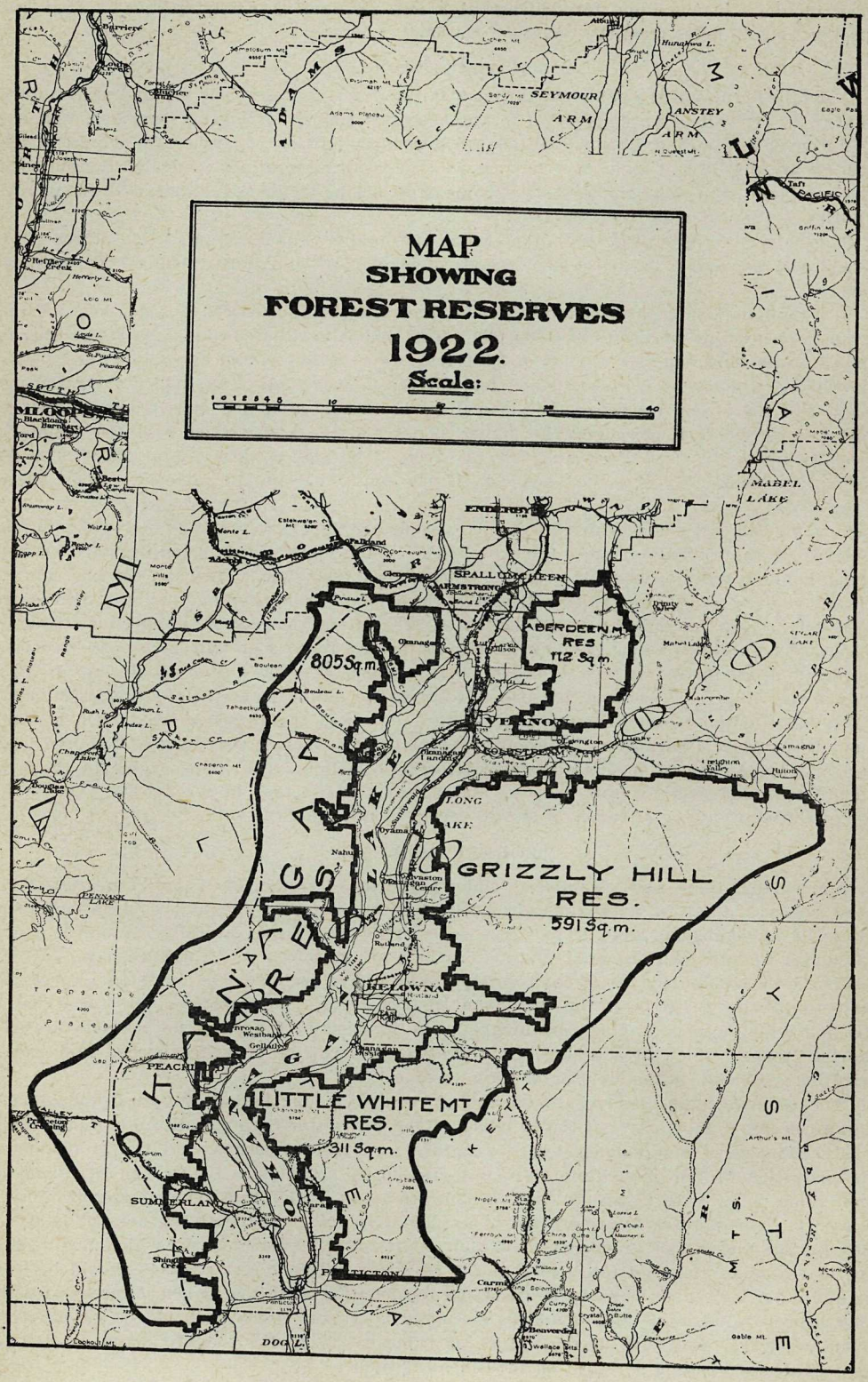
The Capilano is a typical mountain stream, the valley being bordered by steep slopes extending up to an extreme elevation of 6,200 feet. The timber is situated along the valley-floor and extends up the slopes to an elevation of 3,500 feet, where it is replaced by scrubby, unmerchantable species, which, however, will serve for watershed-protection. The timber along the main valleys and the lower reaches of the side-valleys is already alienated and is being logged, the Crown timber being found along the higher slopes and the upper reaches of the tributaries, especially along the East Fork and Sisters Creek. The stand, estimated at 230,000,000 feet, consists of: Cedar, 57 per cent.; hemlock, 17 per cent.; balsam, 10 per cent.; other species, 16 per cent.

Logging can easily be conducted through extension of the logging-railway and system already employed by the Capilano Timber Company, some of the upper slopes being operated by hand-logging methods down to where they can be reached by the sky-line. The chief concern, however, is in establishing a new crop which will protect the slopes from erosion and maintain the porosity of the soil to equalize run-off. Reproduction on areas already logged was found unsatisfactory, and in order to ensure a new crop on this site artificial reforestation will have to be resorted to in order to assist the scanty natural growth. Any scheme of reforestation should include all the lands in the valley. The risk of fire makes it impossible to undertake the planting of the higher Crown lands without including the lower valley now held in private hands. Such a scheme would also require assurance of sufficient appropriations to replant year by year the area logged over, and to provide an adequate system of forest-protection. The timber value in the valley is more than sufficient for this purpose, and it is estimated that in seventy-five years a new crop of timber would be of sufficient size to permit of relogging the valley.

FOREST RESERVES.

During 1922 there were established, under authority of section 12 of the "Forest Act," four forest reserves, totalling approximately 1,250,000 acres, covering the higher elevations of the watershed of Okanagan Lake. The areas so reserved have been carefully examined, a cover map and a contour map prepared, and areas which are suitable for agriculture have, so far as possible, been eliminated. It is from streams which have their sources on these reserves that the fruit-growing districts of the Okanagan District receive their water-supply for irrigation. The double purpose of having certain areas not in demand for other purposes dedicated to growing timber, which at the same time preserve the run-off of water needed and used in irrigation, is served by the creation of these reserves.

To produce a crop of merchantable timber requires a long period of years, probably more than a century in most parts of the Province. It also requires the expenditure of funds for the re-establishment of new stands either by natural or artificial means, and the protection and administration of the area while trees are growing to maturity. A more or less fixed and unalterable policy with regard to lands which are to be used for growing timber is therefore necessary. Forest reserves are created to fix definitely and permanently an area of land to be used for the purpose of growing timber and to preserve the forest-cover, which regulates the flow of streams. It is not intended that the resources within forest reserves should be locked up, and other legitimate uses of the areas, not incompatible with the principal reasons for their reservation, are desirable and should be encouraged. Forest reserves should be regarded as a public resource. They are in the nature of fields set aside for the production of the only crop capable of yielding a return on investment, "timber."


MAP
SHOWING
FOREST RESERVES
1922.
Scale:
805 Sq.m.
ABERDEEN MT. RES.
112 Sq.m.
GRIZZLY HILL RES.
591 Sq.m.
LITTLE WHITE MT. RES.
311 Sq.m.
SEYMOUR ARM
ANSTEY ARM
MABEL LAKE
ENDERBY
SPALLUMCHEEN
ARMSTRONG
VERNON
LONG LAKE
KELOWNA
PEACHLAND
SUMMERLAND
PENTICTON
DOG L.

Exhibit, 51 Yonge Street, Toronto. Royal Red Cedar Shingles, with Western White Pine trim.

Dining-room in British Columbia Lumber Commissioner's Exhibit, 51 Yonge Street, Toronto. Western Larch Floors; Western Hemlock Panelling; Red Cedar Beam Ceiling; Cottonwood Ceiling Panels.

LUMBER TRADE EXTENSION.

The outstanding accomplishment in this field has been the completion of the splendid permanent exhibit of British Columbia woods at 51 Yonge Street, Toronto, in the business centre of the city. This exhibit includes two large rooms finished in British Columbia woods and completely furnished, so that architects and builders can easily visualize the effects obtainable. An exterior is also shown, featuring red cedar shingles for roofing and side-walls. The other woods featured are Douglas fir, western hemlock, western white pine, larch, and cottonwood ply-wood. The exhibit is very effective and is attracting large numbers of potential purchasers of British Columbia forest products. The exhibit was installed by the lumber and shingle manufacturers of the Province in co-operation with the Forest Branch.

Very effective changes were made in our exhibit at the Canada National Exhibition at Toronto. The exhibition was visited by 1,372,500 people this year.

A large number of architects and builders were visited this year in order to show them samples and give them information personally pertaining to our woods and the best methods of using them. Very effective work in this way was done with school architects and small-house builders. Heretofore 3X shingles have been used almost universally in Eastern Canada. This year two cars of Royal shingles were sold in Toronto as the result of trade-extension work there. Western hemlock, for which it is highly desirable to create a market in order that it may be logged with the other species with which it occurs, is proving very popular with those builders and architects who have tried it. One architect, after seeing our exhibit-room finished in hemlock, specified it for interior finish and floors in a large housing development scheme. Every builder who has used it is very well pleased.

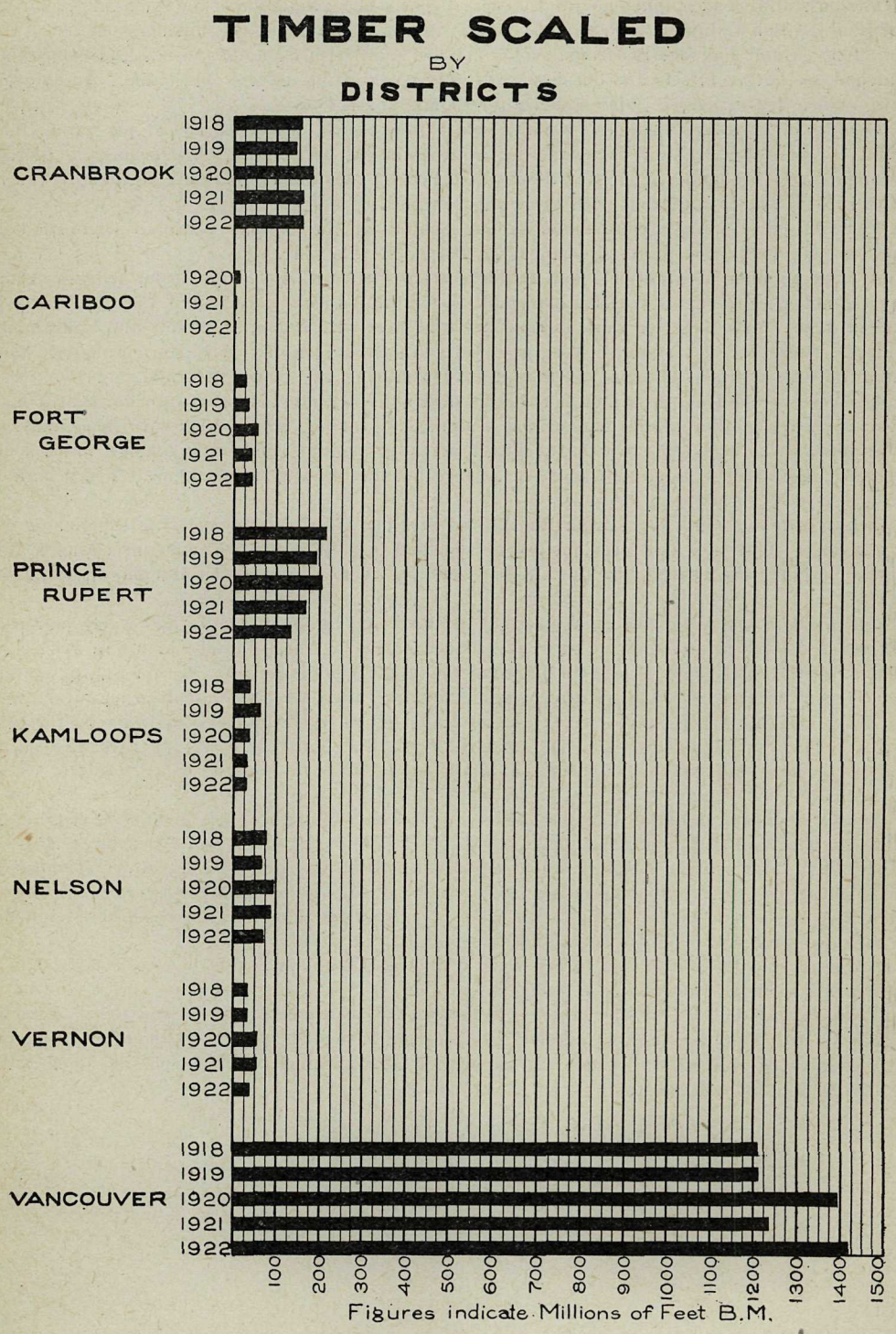
In the railway field a large order for railway-cars has been placed specifying Douglas fir for car material. This item had previously been specified in a foreign wood, but was changed, due to tests made for the railways by the Lumber Commissioner, which proved Douglas fir the more suitable wood.

Considerable effort has been made to find markets for our lower grades and waste material. Progress in this work was shown by the fact that a market has been found which will at present consume all the waste from cross-arm manufacture, and when developed will take approximately 2,000,000 feet per year in small clears for stave-manufacture. Eastern Canadian manufacturers now using Douglas fir for stave stock formerly imported all their lumber requirements for that purpose. The market for fir shop should develop rapidly, and this will take care of a large quantity of large knotted stock which will grade shop, but is at present going into No. 1 and No. 2 common.

Several thousand bulletins showing the uses of British Columbia woods have been distributed on the Prairies and in Eastern Canada. All of the architects, builders, and retail lumbermen in Ontario have been sent bulletins. A new bulletin has been prepared, giving information as to how to finish British Columbia woods and containing illustrations of interiors and exteriors in which they have been used, together with tables for architects, engineers, and builders showing the safe loads for various-sized joists and beams of British Columbia woods.

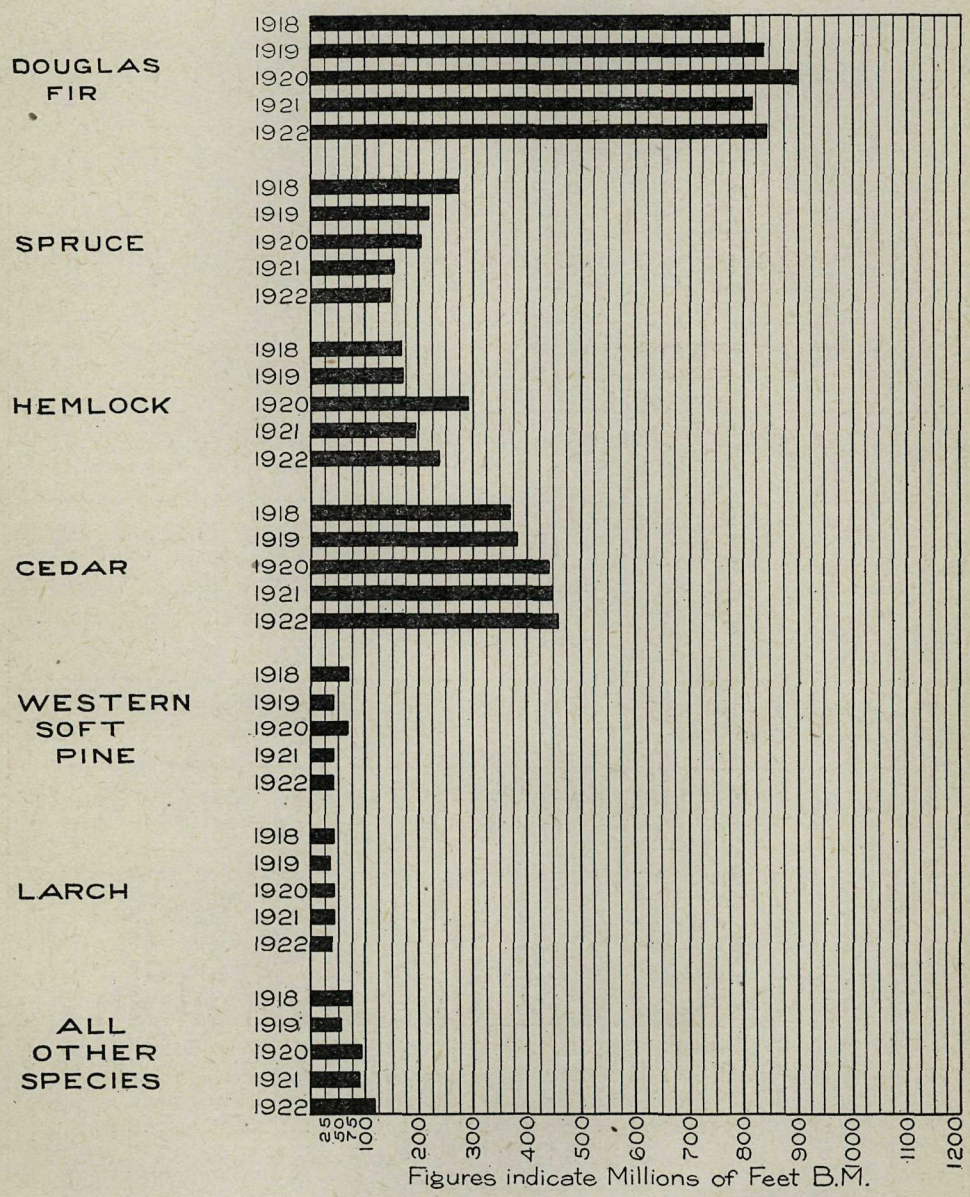
Advertising calling attention to the uses of British Columbia woods has been carried in a few selected trade and professional journals.

Trade-extension work will be largely confined to Ontario and Quebec during 1923. A study of railway uses and the market for shop lumber will be made. All of the leading architects and engineers in the two Provinces will be visited and as much work as possible done with individual builders and contractors.


TIMBER SCALED
BY
DISTRICTS
CRANBROOK
CARIBOO
FORT GEORGE
PRINCE RUPERT
KAMLOOPS
NELSON
VERNON
VANCOUVER
1918
1919
1920
1921
1922
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
1400
1500
Figures indicate Millions of Feet B.M.

SPECIES CUT

1922



TIMBER SCALED IN BRITISH COLUMBIA IN 1922 (BY MONTHS AND DISTRICTS).

		Cranbrook.	Prince George.	Williams Lake.	Kamloops.	Nelson.	Vernon.	Prince Rupert.	Vancouver.	Total Logs, M.B.M.	Total Lineal Feet, Thds.	Total Cords.	Total Ties.
January	logs, M.B.M.	1,941	2,388	95	2	1,311	1,332	6,735	66,244	80,048	.....	.....	.....
"	lineal ft., thds.	29	20	.....	8	198	163	24	322	.....	764	.....	.....
"	cords	724	373	343	274	599	94	102	10,343	.....	.....	12,852	.....
"	ties.	8,898	28,083	.....	12,223	6,188	26,456	.....	1,664	.....	.....	.....	83,512
February	logs, M.B.M.	6,245	3,970	.....	609	4,049	1,531	1,118	58,596	76,118	.....	.....	.....
"	lineal ft., thds.	46	31	.....	22	122	53	597	374	.....	1,245	.....	.....
"	cords.	1,945	338	.....	213	800	260	119	6,278	.....	.....	9,953	.....
"	ties.	3,966	76,408	.....	17,475	2,392	.....	22,241	.....	.....	.....	.....	122,482
March	logs, M.B.M.	3,109	1,834	127	13	2,182	1,630	478	116,594	125,967	.....	.....	.....
"	lineal ft., thds.	46	20	.....	14	309	70	8	778	.....	1,245	.....	.....
"	cords.	1,779	371	403	101	1,511	420	.....	11,716	.....	.....	16,301	.....
"	ties.	7,710	109,302	871	13,777	36,443	.....	80,216	3,616	.....	.....	.....	251,935
April	logs, M.B.M.	5,298	3,340	134	99	5,924	1,895	517	103,168	120,375	.....	.....	.....
"	lineal ft., thds.	3	28	.....	3	219	92	55	303	.....	703	.....	.....
"	cords.	259	118	25	23	814	363	27	17,671	.....	.....	19,300	.....
"	ties.	49,766	58,718	.....	25,028	11,136	3,000	516,989	.....	.....	.....	.....	664,637
May	logs, M.B.M.	10,202	.....	.....	787	3,954	3,096	6,783	138,378	163,200	.....	.....	.....
"	lineal ft., thds	.....	.....	.....	78	424	19	80	347	.....	948	.....	.....
"	cords.	1,478	.....	.....	16	250	18	488	26,184	.....	.....	28,434	.....
"	ties.	45,872	.....	.....	4,708	34,921	154	61,762	453	.....	.....	.....	147,870
June	logs, M.B.M.	9,967	4,957	.....	112	.....	1,940	8,952	149,821	175,749	.....	.....	.....
"	lineal ft., thds.	73	45	.....	156	.....	2	18	188	.....	482	.....	.....
"	cords.	736	540	.....	103	.....	20	.....	39,010	.....	.....	40,409	.....
"	ties.	151,917	44,825	.....	1,344	.....	.....	3,702	.....	.....	.....	.....	201,788
July	logs, M.B.M.	16,042	.....	11	.....	5,897	4,112	10,044	99,892	135,998	.....	.....	.....
"	lineal ft., thds,	16	.....	.....	.....	643	18	43	318	.....	1,038	.....	.....
"	cords.	317	.....	.....	.....	1,642	.....	45	19,928	.....	.....	21,932	.....
"	ties.	137,220	.....	.....	.....	8,500	2,586	23,888	.....	.....	.....	.....	172,194
August	logs, M.B.M.	19,387	.....	30	660	5,386	3,561	12,784	110,627	152,435	.....	.....	.....
"	lineal ft., thds.	29	.....	.....	362	171	39	21	217	.....	839	.....	.....
"	cords.	108	.....	.....	154	668	80	20	14,120	.....	.....	15,150	.....
"	ties.	166,281	.....	.....	7,203	32,161	769	51,647	.....	.....	.....	.....	258,061
September	logs, M.B.M.	15,975	6,964	.....	3,409	1,718	3,287	10,493	143,859	185,705	.....	.....	.....
"	lineal ft., thds.	22	55	.....	68	196	35	91	504	.....	971	.....	.....
"	cords.	666	624	.....	311	344	141	142	15,590	.....	.....	17,818	.....
"	ties.	181,353	73,035	.....	32,524	10,889	.....	.....	1,868	.....	.....	.....	299,669
October	logs, M.B.M.	18,263	2,265	.....	3,856	8,350	3,092	20,231	103,909	159,966	.....	.....	.....
"	lineal ft., thds.	.....	39	.....	87	410	178	164	144	.....	1,022	.....	.....
"	cords.	1,649	16	.....	398	2,341	607	1,450	12,111	.....	.....	18,572	.....
"	ties.	129,986	46,673	.....	.....	1,273	.....	.....	2,500	.....	.....	.....	180,432
November	logs, M.B.M.	5,022	50	310	12,002	3,980	3,418	13,839	125,541	164,162	.....	.....	.....
"	lineal ft., thds.	33	3	.....	16	275	70	201	169	.....	767	.....	.....
"	cords.	2,358	166	.....	440	1,567	270	.....	15,395	.....	.....	20,196	.....
"	ties.	85,733	.....	.....	300	23,324	1,603	.....	.....	.....	.....	.....	110,960
December	logs, M.B.M.	8,001	112	117	891	2,220	2,709	10,919	81,053	106,022	.....	.....	.....
"	lineal ft., thds.	8	3	.....	6	301	70	12	293	.....	693	.....	.....
"	cords.	951	.....	52	239	608	116	.....	17,789	.....	.....	19,755	.....
"	ties.	46,899	.....	.....	.....	2,960	.....	364	.....	.....	.....	.....	50,223
Totals for year	logs, M.B.M.	119,452	25,880	824	22,440	44,971	31,603	102,893	1,297,682	1,645,745	.....	.....	.....
"	lineal ft., thds.	305	244	.....	820	3,268	809	1,314	3,957	.....	10,717	.....	.....
"	cords.	12,970	2,546	823	2,272	11,144	2,389	2,393	206,135	.....	.....	240,672	.....
"	ties.	1,015,601	437,044	871	114,582	170,187	34,568	760,809	10,101	.....	.....	.....	2,543,763

Total scaled, 1,899,158,273 feet B.M.

LOG-SCALE.

The timber scaled during the year shows an increase of 109,000,000 feet, or 6 per cent. The quantity of sawlogs, however, increased from 1,481,000,000 feet to 1,645,000,000 feet, or 10 per cent. Hewn ties fell from 3,856,203 in 1921 to 2,543,763 during 1922. The increase in sawlog production was chiefly in the Vancouver and Cranbrook Districts. Vernon and Prince Rupert showed a distinct falling-off. All districts showed a falling-off in ties and minor products.

The table of species cut discloses the gradual increasing percentage of hemlock and other inferior species used, thus: Hemlock increased from 8 per cent. in 1915 to 10 per cent. in 1918 and 12 per cent. in 1922; balsam from 0.01 per cent. in 1915 to 2 per cent. in 1922; lodge-pole pine from 0.07 per cent. in 1915 to 2 per cent. in 1922.

Species cut in 1922.

Forest District.	Douglas Fir, M.B.M.	Red Cedar, M.B.M.	Spruce, M.B.M.	Hemlock, M.B.M.	Balsam Fir, M.B.M.	Yellow Pine, M.B.M.	White Pine, M.B.M.	Jack-pine, M.B.M.	Larch, M.B.M.	Cottonwood, M.B.M.	Other Species, M.B.M.	Totals, M.B.M.
Cranbrook	66,287	1,540	25,648	1,645	1,849	12,982	7,904	8,986	32,078	271	10	159,200
Williams Lake	1,073	.....	120	.....	70	.....	.....	.....	.....	.....	....	1,263
Prince George	4,351	1,416	23,316	.....	1,664	.....	.....	11,283	.....	....	....	42,030
Kamloops	16,071	9,090	2,502	9	10	1,125	2,299	9	141	.....	....	31,256
Nelson	10,168	25,480	2,616	7,954	139	2,434	16,212	2	7,167	30	....	72,202
Vernon	8,589	833	552	.....	.....	27,089	7	330	373	150	....	37,923
Totals, Interior	106,539	38,359	54,754	9,608	3,732	43,630	26,422	20,610	39,759	451	10	343,874
Prince Rupert	5,052	24,182	52,946	19,301	9,401	.....	2	23,164	.....	375	12	134,435
Vancouver	734,580	398,724	41,547	209,982	25,771	.....	7,981	.....	.....	2,043	221	1,420,849
Totals, Coast	739,632	422,906	94,493	229,283	35,172	.....	7,983	23,164	.....	2,418	233	1,555,284
Grand totals, 1922	846,171	461,265	149,247	238,891	38,904	43,630	34,405	43,774	39,759	2,869	243	1,899,158
Grand totals, 1921	821,025	450,368	151,792	195,005	32,023	41,869	18,838	30,785	45,245	2,961	106	1,790,017

Total Amounts of Timber scaled in British Columbia for Years 1921–22
(Comparative Statement in Board-feet).

Forest District.	1921.	1922.	Gain.	Loss.	Net Loss.	Net Gain.
Cranbrook	161,038,620	159,200,392	.....	1,838,228	.....	.....
Prince George	43,689,461	42,030,343	.....	1,659,118	.....	.....
Williams Lake	4,539,924	1,262,836	.....	3,277,088	.....	.....
Kamloops	31,379,605	31,255,790	.....	123,815	.....	.....
Nelson	89,374,662	72,201,521	.....	17,173,141	.....	.....
Vernon	52,740,408	37,922,757	.....	14,817,651	.....	.....
Totals, Interior	382,762,680	343,873,639	.....	38,889,041	38,889,041	.....
Prince Rupert	171,264,991	134,434,962	.....	36,830,029	.....	.....
Vancouver	1,235,989,694	1,420,849,672	184,859,978	.....	.....	.....
Totals, Coast	1,407,254,685	1,555,284,634	.....	.....	.....	148,029,949
Totals for B.C.	1,790,017,365	1,899,158,273	.....	.....	.....	109,140,908

TIMBER-SALES.

The sale of Crown timber is one of the most exacting functions of the Branch. With the staking of timber licences many small fractions of timber were left in the hands of the Crown, in addition to the larger bodies in the more remote and inaccessible valleys. It is not the policy of the Branch to force these reserves on the market in competition with private holdings, but where tracts are isolated and form a natural logging unit with existing operations a sale must be made to avoid loss through excessive overhead in opening a new operation at a later date. Many small operators are also dependent on Crown stumpage to meet their requirements.

Although several pulp inquiries reached the Department, no large sales were put through.

The total number of sales completed reached 671, covering 108,501 acres and containing 249,000 M. feet of saw-timber in addition to minor products. The quantity of timber scaled from sales was 187,000 M. feet, an increase of 10,000 M. feet over 1921. The average stumpage on

all species received from sales made during the year was $1.39, to which must be added the royalty reserved under the "Royalty Act" to arrive at the true value the Government received for this timber. A comparison of prices for species and years is given in the second table hereunder.

TIMBER-SALES AWARDED BY DISTRICTS, 1922.

Forest District.	No. of Sales.	Acreage.	Saw-timber (Ft. B.M.).	Poles and Piles (Lineal Feet).	No. of Posts.	Shingle-bolts and Cordwood (No. of Cords).	No. of Railway-ties.	Estimated Revenue.
Cariboo	13	1,311	611,188	.....	.....	895	.....	$ 1,916 60
Cranbrook	39	6,242	6,567,340	.....	.....	4,828	28,810	23,167 34
Fort George	44	6,933	13,625,587	235,500	.....	963	133,982	52,060 53
Kamloops	15	4,583	14,195,480	217,265	.....	4,000	20,757	34,246 97
Nelson	58	6,785	14,619,980	2,028,520	.....	2,680	80,550	74,707 35
Prince Rupert	182	25,087	62,559,793	363,825	.....	1,100	606,493	180,017 93
Vancouver	284	50,324	119,108,000	352,764	.....	24,654	....	448,049 08
Vernon	36	7,236	18,255,440	106,380	.....	2,460	9,715	48,722 69
Totals, 1922.	671	108,501	249,572,808	3,304,254	.....	41,580	880,307	$ 862,888 49
Totals, 1921.	531	91,614	188,971,774	2,479,095	.....	34,291	993,417	$ 646,487 65
Totals, 1920.	594	121,690	440,649,755	2,811,095	149,300	86,726	6,415,349	$ 1,799,039 03
Totals, 1919.	356	61,809	245,209,300	2,899,000	5,000	52,557	957,804	$ 654,372 99
Totals, 1918.	227	34,257	159,659,000	378,080	20,000	18,478	701,654	$ 380,408 33
Totals, 1917.	255	44,914	240,307,057	1,517,450	40,000	43,756	381,200	$ 483,281 50
Totals, 1916.	133	23,318	136,345,000	435,810	.....	26,666	92,000	$ 259,769 12

AVERAGE SALE PRICE BY SPECIES.

Saw-timber.	Figures for 1922.		Figures for 1921.		Figures for 1920.		Figures for 1919.	
	Board-feet.	Price per M.	Board-feet.	Price per M.	Board-feet.	Price per M.	Board-feet.	Price per M.
Douglas fir	58,467,465	$1 43	44,835,675	$1 65	93,483,893	$2 04	57,456,450	$1 48
Cedar	62,788,240	1 66	41,980,000	1 57	75,223,700	2 23	55,655,350	1 54
Spruce	42,207,248	1 46	22,588,143	1 60	141,849,200	2 05	69,151,000	1 56
Hemlock	42,987,260	1 01	40,866,166	1 08	71,176,462	1 06	28,836,200	73
Balsam	16,757,880	1 04	12,834,000	98	25,056,500	1 23	17,296,000	82
White pine	4,304,380	1 93	1,662,500	1 55	3,457,000	2 06	2,257,500	1 63
Western soft pine	9,704,385	1 47	11,009,710	1 82	20,919,000	1 37	7,479,900	1 50
Tamarack	2,998,750	1 75	8,679,480	1 79	5,437,000	2 24	3,019,400	1 55
Other species	9,357,200	78	4,516,100	1 31	4,047,000	1 78	4,057,500	1 18
Totals	249,572,808	$1 39	188,971,774	$1 46	440,649,755	$1 84	245,209,300	$1 38

TIMBER CUT FROM TIMBER-SALES DURING 1922.

Forest District.	Feet B.M.	Lineal feet.	Cords.	Ties.
Cariboo	867,620	.....	467.00	2,056
Cranbrook	4,989,759	32,410	1,111.00	28,885
Fort George	12,020,634	212,966	884.00	118,919
Kamloops	1,529,128	120,522	164.00	124,854
Nelson	5,424,796	562,502	1,318.85	57,924
Prince Rupert	58,244,446	314,078	1,059.00	158,968
Vancouver	92,830,481	142,709	31,686.71	743
Vernon	11,310,287	138,557	655.35	3,323
Totals, 1922	187,217,151	1,523,744	37,345.91	495,672
Totals, 1921	179,780,056	2,169,550	10,483.00	831,423
Totals, 1920	168,783,812	1,638,549	17,703.00	654,829
Totals, 1919	107,701,950	672,699	12,208.00	573,286
Totals, 1918	113,927,610	499,589	15,539.00	146,807
Totals, 1917	99,078,832	545,429	14,862.00	34,937
Totals, 1916	63,055,102	225,799	8,425.00	.....

LOGGING INSPECTION.

The number of logging operations have doubled during the last four years, there being 2,652 in 1922 as compared with 1,322 during 1919. Inspection of these operations is essential to assure proper segregation and marking of the logs and to prevent trespass. These inspections are a protection to the private timber-holder as well as to the Crown, since any trespass occurring on private lands is reported to the owner for settlement. During the year 4,654 inspection reports were received by the Branch from its field staff, as compared with 1,884 in 1919, or an increase in this work of 147 per cent. in four years.

The result of inspection is disclosed in the trespass table hereunder, that whereas the number of trespasses caught have increased, the quantities cut have been materially reduced. In addition to the ninety-eight cases of trespass against the Crown, thirty-four cases were reported to private owners for settlement.

LOGGING INSPECTION, 1922.

Forest District.	Operations.				No. of Inspections.
	Timber-sales.	Hand-loggers' Licences.	Leases, Licences, Crown Grants, and Pre-emptions.	Totals.	
Cariboo	10	...	16	26	40
Cranbrook	52	...	29	81	93
Kamloops	39	...	71	110	161
Nelson	120	...	179	299	406
Prince George	53	...	157	210	253
Prince Rupert	173	115	192	480	699
Vancouver	403	44	750	1,197	2,633
Vernon	64	...	185	249	369
Totals, 1922	914	159	1,579	2,652	4,654
Totals, 1921	691	186	1,331	2,208	4,053
Totals, 1920	605	220	1,961	2,796	2,703
Totals, 1919	365	200	757	1,322	1,884

TRESPASSES, 1922.

Forest District.	No. of Cases.	Areas cut over (Acres).	Quantity cut.				No. of Resulting Seizures.	Amount.
			Feet B.M.	Lineal Feet.	Cords.	Ties.		
Cariboo	4	35	90,000	.....	29	.....	1	$ 149 50
Cranbrook	8	141	436,210	45,960	216	572	..	1,934 33
Kamloops	5	127	798,183	16,420	...	5,328	..	2,964 55
Nelson	14	117	436,555	14,965	83	.....	2	1,356 84
Prince George	4	17	.....	.....	8	1,825	..	236 75
Prince Rupert	30	379	694,090	6,920	40	19,297	6	3,323 70
Vernon	7	67	127,040	7,178	17	.....	..	506 82
Vancouver	26	176	420,803	7,460	2,198	.....	7	5,933 81
Totals, 1922	98	1,059	3,002,881	98,903	2,591	27,022	16	$16,406 30
Totals, 1921	98	1,938	3,222,673	209,395	1,639	21,605	10	$15,924 22
Totals, 1920	73	1,788	4,904,079	104,048	1,882	6,716	10	$17,119 85
Totals, 1919	87	2,454	12,708,365	48,860	88	87,120	8	$21,730 12

SAW AND SHINGLE MILLS OF THE PROVINCE, 1922.

Forest District.	Sawmills.		Shingle-mills.		Sawmills.		Shingle-mills.	
	No.	Operating, Estimated Daily Capacity, M.B.M.	No.	Operating, Estimated Daily Capacity, Shingles, M.	No.	Shut down, Estimated Daily Capacity, M.B.M.	No.	Shut down, Estimated Daily Capacity, Shingles, M.
Cariboo	8	44	..	...	19	95	..	...
Cranbrook	26	1,215	..	...	9	295	..	...
Kamloops	9	323	1	120	2	65	..	...
Nelson	34	680	11	595	10	355	..	...
Prince George	21	519	..	...	2	85	..	...
Prince Rupert	23	550	4	75	20	621	2	45
Vancouver	136	5,748	92	14,754	26	473	6	635
Vernon	35	604	..	..	2	65	..	...
Totals for 1922	292	9,683	108	15,544	90	2,054	8	680
Totals for 1921	289	8,912	79	10,885	78	2,029	6	788
Totals for 1920	341	10,729	109	13,426	37	909	2	30

TIMBER EXPORTS.

EXPORT OF LOGS DURING YEAR 1922.

Species.	Grade No. 1.	Grade No. 2.	Grade No. 3.	Ungraded.	Totals.
Cedar	7,390,114	33,441,110	25,812,208	.....	66,643,432
Fir	3,860,485	27,791,458	7,243,737	.....	38,895,680
Spruce	569,602	4,569,217	1,737,697	816,238	7,692,754
Hemlock	.....	.....	.....	30,796,845	30,796,845
White pine	45,824	387,038	74,072	1,397,464	1,904,398
Other species	28,668	158,472	62,811	5,335,652	5,585,603
Totals, 1922	11,894,693	66,347,295	34,930,525	38,346,199	151,518,712
Totals, 1921	10,457,378	42,860,296	18,524,059	18,374,774	90,216,507

EXPORT OF POLES, PILING, MINE-PROPS, TIES, FENCE-POSTS, SHINGLE-BOLTS, AND CORDWOOD.

Forest District.	Quantity exported.	Approximate Value, F.O.B.	Where marketed.	
			United States.	Canada.
Cranbrook—				
Cordwood	Cords, 1,147	$ 8,030	.....	1,147
Poles	Lin. ft., 37,940	4,553	.....	37,940
Piling	Lin. ft., 159,370	19,124	92,500	66,870
Mine-props	Cords, 3,725	37,250	.....	3,725
Fence-posts	Cords, 7,019	63,171	.....	7,019
Mine-ties	Cords, 48	1,440	.....	48
Railway-ties	Number, 962,605	510,180	.....	962,605
Prince George—				
Poles	Lin. ft., 212,570	25,508	149,605	62,965
Piling	Lin. ft., 6,295	755	.....	6,295
Mine-props	Cords, 1,275	12,750	.....	1,275
Fence-posts	Cords, 459	4,131	.....	459
Cordwood	Cords, 48	336	.....	48
Mine-ties	Cords, 48	1,440	.....	48
Railway-ties	Number, 354,679	187,979	.....	354,679
Kamloops—				
Poles	Lin. ft., 767,125	76,712	588,165	178,960
Piling	Lin. ft., 23,950	2,395	.....	23,950
Fence-posts	Cords, 243	2,430	.....	243
Nelson—				
Poles	Lin. ft., 3,989,618	398,962	2,938,122	1,051,496
Piling	Lin. ft., 2,884	288	.....	2,884
Fence-posts	Cords, 4,611	323	2,701	1,910
Prince Rupert—				
Poles	Lin. ft., 190,775	19,078	190,775	.....
Vancouver—				.....
Poles	Lin. ft., 1,842,074	184,207	1,842,074	
Piling	Lin. ft., 55,760	5,576	55,760	.....
Fence-posts	Cords, 2,940	29,400	2,940	.....
Shingle-bolts	Cords, 2,195	21,950	2,195	.....
Vernon—				
Poles	Lin. ft., 522,981	62,758	513,011	9,970
Piling	Lin. ft., 32,680	3,922	32,680	.....
Total, 1922	.....	$1,684,648	.....	.....
Total, 1921	.....	$1,773,034	.....	.....

LAND CLASSIFICATION.

The work of land classification and inspection of pre-emptions was carried on as in previous years. Some 129,481 acres of land were examined, of which 14,848 were recommended for reservation as timbered land; 41,066 acres were found to be suitable for agriculture. Pre-emption inspection for the information of the Lands Branch totalled 3,266 reports during the year.

AREAS EXAMINED, 1922.

Forest District.	Applications for Crown Grants.		Applications for Grazing and Hay Leases.		Applications for Pre-emption Records.		Applications to Purchase.		Miscellaneous.	
	No.	Acres.	No.	Acres.	No.	Acres.	No.	Acres.	No.	Acres.
Cariboo	3	640	103	9,666	147	21,760	55	8,802	9	1,171
Cranbrook	2	333	..	....	6	890	12	2,876	2	5,057
Fort George	4	605	1	641	143	21,954	19	5,675	8	465
Kamloops	6	834	..	....	11	1,342	4	614	2	1,093
Nelson	5	690	..	....	26	3,475	27	2,868	20	6,949
Prince Rupert	16	2,458	3	656	5	2,725	20	3,200	11	215
Vancouver	19	2,264	..	....	21	3,393	26	1,463	41	6,253
Vernon	6	1,051	4	565	22	3,264	20	4,903	4	1,671
Totals	61	8,875	111	11,528	381	55,803	183	30,401	97	22,874

CLASSIFICATION OF AREAS EXAMINED, 1922.

Forest District.	Total Area.	Agricultural Land.	Area recommended for Reserve.	Estimate of Timber on Reserved Area.
	Acres.	Acres.	Acres.	M.B.M.
Cariboo	42,039	4,956	63	970
Cranbrook	9,156	1,258	653	.....
Fort George	29,340	20,524	7,517	67,063
Kamloops	3,883	2,024	40	.....
Nelson	13,982	3,159	2,122	5,724
Prince Rupert	7,254	4,053	855	19,874
Vancouver	12,373	3,480	2,399	28,026
Vernon	11,454	1,612	1,199	5,852
Totals	129,481	41,066	14,848	127,509

PRE-EMPTION RECORD EXAMINATIONS, 1922.

Cariboo	716
Cranbrook	99
Kamloops	180
Nelson	174
Prince George	436
Prince Rupert	582
Vancouver	752
Vernon	327
Total	3,266

FOREST ENTOMOLOGY AND PATHOLOGY.

The Control of Forest Insects.—During the past summer further work was carried on in controlling the epidemic of bark-beetles which is infesting the western yellow pine in the Vernon District, and has been the cause of killing millions of feet of standing timber over the past few years. This is a continuation of the work carried on during 1920 and 1921. During 1922 three distinct areas were worked over by parties under the direction of forest officers:—

(1.) In the Voght Valley an area of about 2½ square miles was covered with direct control and 4,502 trees, scaling 894 M. feet, were treated by felling the trees and peeling and burning the bark and slash on the spot.

(2.) An area north of Kettle Valley Railway between the sidings of Stirling and Phalia, covering approximately 2 square miles, was covered and 2,619 trees, scaling 1,045 M. feet, were treated.

(3.) On the Coutlee Plateau lying south and east of Merritt an area of 72 acres containing 536 infested trees, scaling 225 M. feet, were treated. Due to the late spring the work was not commenced until the middle of April and was finished up when the beetles commenced to emerge in large numbers towards the end of June.

In the Kamloops District direct control was followed up on the isolated areas at Adams Lake and Rock Creek; in all, 415 trees were treated in the district.

In addition to the areas enumerated above, the lessees of Timber Licences 12907 and 12908P, located on Pike Mountain, carried out their own control measure under our supervision. The beetle-infested trees were marked for cutting by forest officers.

In the Midday area slash resulting from the logging operations of the Nicola Pine Mills, Limited, was left to serve as a trap for the fresh broods and was burned during May and June by the company.

The work is being carried on as heretofore under the direction of Ralph Hopping, of the Division of Entomology, Ottawa. He reports in part as follows:—

"The entomological aspect was practically the same in 1922 as 1921, except that unworked areas showed an increase in some instances of 300 per cent. and demonstrated the necessity of covering the epidemic areas as soon as possible in order to check this tremendous increase. Every year's work has demonstrated that instead of this enormous increase we have reduced the loss on all worked areas at least 80 per cent. The controlled area in Midday Valley, although

Result of Pine-bark beetles.

not worked in 1922, showed only 16.7 per cent. reinfestation in spite of the menace from heavily infested timber on Timber Sale X2076.

"The Kingsvale area worked in 1921 showed very little infestation, probably not more than 10 per cent. The most notable factor recorded was the occurrence of a beetle usually killing individual limbs on trees known as *Pityogenes carinulatus*. This beetle, usually of secondary importance, increased so rapidly in the epidemic area of Voght Valley that many trees not attacked by *Dendroctonus* or any other beetle on the bole of the tree had every limb killed. This, of course, added to the mortality in the area and emphasized the necessity of immediately controlling the bulk of the infestation in epidemic area."

White-pine Blister-rust.—The white-pine blister-rust, a disease that affects all five needle (white) pines, was discovered during the fall of 1921 to be present in the Province. On account of the lateness of the season little work could be done that year, but a hurried examination established the fact that the disease was present on imported eastern white pines in the neighbourhood of Vancouver. No trace was found in the limited portion of the Interior that could be covered.

The possibility that this destroyer of white pines that has caused enormous damage in the Eastern Provinces and States should become prevalent among the white pines of British Columbia caused considerable alarm. Action was at once taken by the Department of Agriculture to establish a quarantine against white-pine seedlings entering the Interior from the Coast. The peculiar fact that this rust has an alternate host in the plants of the gooseberry and currant family made it also necessary to quarantine them.

Plans were made for a complete survey of the Province in 1922. Beginning in April, on the Coast, the Forest Branch co-operated with the Dominion and Provincial Departments of Agriculture in scouting for the white-pine blister-rust. Before the middle of the summer it had been found on white pines and currant-bushes throughout the range of the white pine on the Coast, both on western white pine (*Pinus monticola*) and imported eastern white pine (*P. strobus*).

At the end of July the scouting-parties were moved to the Interior, and between then and the end of the field season in October a thorough search for the rust was made throughout the white-pine belt. This included the valleys of the Shuswap, Columbia, and Kootenay Rivers, from Chase, on the main line of the Canadian Pacific Railway, to Cranbrook, in the East Kootenays. The rust was found in spots in the northern end of this belt, notably near Lumby, Revelstoke, Canoe, Heaton, Taft, Craigellachie, Malakwa, Solsqua, Sicamous, Salmon Arm, Tappen, Notch Hill, Mara, Grindrod, and Enderby, but the infections were not widespread. However, the season was too late to determine the extent of the attack on pine, the infection found being mainly on currants.

The season's scouting has shown that the white-pine blister-rust has secured a firm hold on the Coast, but may not yet be widespread in the Interior. Another season's scouting will have to be done before the absolute extent of the disease east of the Cascades can be determined, and what control measures, if any, are deemed advisable. As western white pine is one of the most valuable species in the Province, though not the most widespread, any effort possible to control the spread of this disease should be taken.

Grateful acknowledgment is made to the various officers of the United States Department of Agriculture for their assistance and advice in scouting for this disease.

FOREST FINANCE.

It is gratifying to record that while collections for the year increased 19 per cent. or more than $500,000, expenditure on general administration showed a decrease. For the nine months of the fiscal year to December 31st, 1922, expenditure was $315,474.05, as compared with $351,570.13 the previous year.

The amount of revenue derived from licence fees and rentals is gradually diminishing, while the revenue from active operations is increasing with the development of logging and the increasing value of stumpage and royalty. It must be borne in mind, however, that whereas the collection of rentals and licence fees is a simple matter, the safeguarding of our revenue from operations can only be done by a vigilant field staff through inspection, scaling, and a close appraisal of stumpage values.

Forest Protection Fund.—The extra hazardous fire season caused another heavy drain on the Forest Protection Fund, which made it necessary to call a special levy under provision of section 26 of the "Forest Act." This levy amounted to 3½ cents per acre on timber land, which together with the Government contribution of $338,100 will liquidate the accumulated deficit to date. The collection of the levy has been most satisfactory.

FOREST REVENUE.

	12 Months to Dec., 1922.	12 Months to Dec., 1921.	12 Months to Dec., 1920.	12 Months to Dec., 1919.	12 Months to Dec., 1918.	12 Months to Dec., 1917.
Timber-licence rentals....	$1,390,999 64	$1,193,654 58	$1,654,747 43	$1,236,530 41	$1,372,789 28	$1,074,129 07
Trespass penalty.....	13,397 91	11,245 86	18,114 34	7,464 12	1,599 38	3,207 32
Royalty and tax.....	1,203,884 89	990,326 99	879,003 16	788,746 69	698,059 27	785,543 42
Timber-lease rentals.....	94,392 31	81,840 61	81,989 68	85,101 37	77,748 25	76,426 74
Scaling fees	3,138 05	2,015 83	25,476 91	64,571 19	56,304 90	62,381 50
Scaling expenses.....	1,061 94	765 98	5,041 71	13,072 79	9,753 29	6,055 74
Seizure expenses.....	454 35	330 80	530 03	280 12	2,813 82	507 11
Licence penalty	83,376 60	50,859 19	232,309 85	49,259 95	79,605 09	11,928 01
Timber stumpage.....	358,984 19	317,488 77	247,234 71	219,012 08	151,598 86	113,498 13
Transfer fees	1,950 00	3,735 00	4,855 00	2,790 00	4,625 00	4,070 00
Hand-loggers' licence fees	6,050 00	9,175 00	6,525 00	7,250 00	2,975 00	9,700 00
Interest.....	247 77	21 85	12 59	345 10	69 67	68 04
Timber-sale rentals.....	26,790 12	12,659 91	17,881 40	10,045 26	7,753 84	9,457 72
Timber-sales cruising ...	8,699 50	4,640 39	7,642 80	3,763 49	1,921 73	2,687 03
Timber-sales advertising.	2,188 63	1,695 08	2,749 93	1,929 71	1,152 40	1,183 35
Scalers' examination fees.	175 00	455 00	670 00	205 00	315 00	295 00
General miscellaneous ...	3,135 47	1,972 33	3,363 90	1,055 67	1,980 70	561 53
Exchange.....	357 14	291 03	2,519 43	3,550 80	1,637 91	470 61
	$3,199,283 51	$2,683,174 20	$3,190,667 87	$2,494,973 75	$2,472,703 39	$2,162,170 32
Grazing fees.....	8,171 21	11,221 79	15,617 44	9,500 41	.....	.....
Taxation from Crown-grant timber lands.....	319,410 51	261,896 49	302,557 26	251,264 82	258,105 14	176,163 20
Total revenue from forest sources....	$3,526,865 23	$2,956,292 48	$3,508,842 57	$2,755,738 98	$2,730,808 53	$2,338,333 52

Revenue from Logging Operations, 1922.

(Amounts charged.)

Forest District.	Royalty and Tax.	Trespass Penalties.	Seizure Expenses.	Scaling Expenses.*	Scaling Fees.*	SCALING FUND. Scaling Expenses.	SCALING FUND. Scaling Fees.	Stumpage.	Total.
Vancouver and Island..	$ 844,692 10	$ 4,702 19	$ 136 35	$ 420 46	$ 1,228 66	$11,424 71	$ 96,852 33	$192,475 82	$ 1,151,932 62
Cariboo.....	1,208 75	145 50	29 85	5 00	.....	.....	.....	1,500 43	2,889 53
Cranbrook ...	105,291 69	1,351 61	25 95	280 94	.....	.....	.....	11,844 65	118,794 84
Prince Rupert	81,699 07	3,042 58	182 05	114 05	711 42	982 79	6,922 57	74,457 48	168,112 01
Nelson.....	42,396 44	3,257 54	1 92	125 85	.....	.....	.....	23,894 52	69,676 27
Vernon.....	29,034 18	374 10	.....	.....	.....	.....	.....	19,093 90	48,502 18
Fort George..	34,913 75	.....	947 68	987 42	.....	.....	.....	34,720 74	71,569 59
Kamloops....	10,509 78	2,053 11	3 00	.....	.....	.....	.....	17,619 88	30,185 77
Totals.....	$ 1,149,745 76	$14,926 63	$1,326 80	$ 1,933 72	$ 1,940 08	$12,407 50	$103,774 90	$375,607 42	$ 1,661,662 81
Totals, 1921	$ 1,005,261 61	$14,297 39	$ 516 85	$ 769 08	$ 1,256 70	$11,396 11	$114,450 43	$396,303 19	$ 1,544,251 36
Totals, 1920	$ 1,091,389 81	$15,284 61	$ 121 33	$ 2,677 68	$14,155 57	$10,114 36	$ 90,889 44	$322,828 67	$ 1,547,461 47

* On scales made by Rangers, etc.

FOREST EXPENDITURE.

The sums voted for the fiscal year 1922–23 were as follows:—

Vote No. 171	—Salaries	$218,120 00
„ 173	—Travelling expenses and wireless telephone	50,250 00
„ 175	—Lumber-trade extension	20,000 00
„ 176	—Reconnaissance, etc.	30,000 00
„ 177	—Insect damage: investigation and control	10,000 00
„ 178	—Grazing: range improvement	6,000 00
		$334,370 00

In addition to this total, sums were available from Vote No. 172 for temporary assistance, and from Vote No. 173 for office supplies, maintenance of launches and autos, and miscellaneous expenses; from Vote No. 186 for publicity; from Vote No. 187, general investigations; and from Vote No. 188, contingencies. The sum of $300,000 was also voted as the amount of the contribution of the Government to the Forest Protection Fund under Vote No. 174.

General Administrative Expenditure.

(For Nine Months, April to December, inclusive, 1922.)

Forest District.	Vote 171: Salaries.	Vote 172: Temporary Assistance.	Vote 173: Expenses.	Total.
Headquarters	$ 66,459 12	$ 342 60	$13,833 56	$ 80,635 28
Cariboo	3,630 79	100 00	3,854 09	7,584 88
Cranbrook	9,100 81	665 80	6,043 47	15,810 08
Kamloops	5,999 97	416 66	3,217 61	9,634 24
Nelson	11,057 26	564 00	4,509 03	16,130 29
Prince George	11,163 52	1,114 33	3,520 98	15,798 83
Prince Rupert	39,327 65	592 42	18,757 91	58,677 98
Vancouver	58,390 15	1,632 78	39,731 14	99,754 07
Vernon	7,243 26	352 16	3,852 98	11,448 40
Totals	$212,372 53	$ 5,780 75	$97,320 77	$315,474 05

FOREST PROTECTION FUND.

The following statement shows the standing of the Forest Protection Fund as of December 31st, 1922:—

Deficit brought forward from fiscal year 1920–21		$360,690 22
Expenditure, fiscal year 1921–22	$471,341 70	
Less refunds	14,143 51	
		457,198 19
		$817,888 41
Collections, fiscal year 1921–22	$192,601 31	
Government contribution	324,777 02	
	$517,378 33	
Government loan (special advance)	300,000 00	
	$817,378 33	
Less amount transferred to Special Advance A/c.	49,503 08	
		767,875 25
Balance (deficit)*		$ 50,013 16

* In addition to this deficit, the sum of $250,496.92 was owing to the Government on March 31st, 1922, in respect of Special Advance Account.

Balance (deficit) at April 1st, 1922			$ 50,013 16
Expenditure, April–Dec., 1922 (nine mths.)	$722,865 86		
Less refunds	11,290 72		
		$711,575 14	
Refunds of revenue		316 39	
			711,891 53
			$761,904 69
Collections, April to December		$158,438 40	
Collections under special levy		29,065 79	
Carried forward		$187,504 19	$761,904 69

FOREST PROTECTION FUND—*Continued.*

Brought forward	$187,504 19	$761,904 69
Government contribution	232,677 02	
Government contribution under special warrant	100,000 00	
	$520,181 21	
Less amount transferred to Special Advance A/c.	15,303 08	
		504,878 13
Balance (deficit)*		$257,026 56

* In addition to this deficit, the sum of $235,193.84 was owing to the Government on December 31st, 1922, in respect of Special Advance Account.

Forest Protection Expenditure.

	FISCAL YEARS.							
	1915-16.	1916-17.	1917-18.	1918-19.	1919-20.	1920-21.	1921-22.	1922-23. (9 mos., April 1st to Dec. 31st, 1922.)
Patrols	$157,432	$144,251	$100,304	$159,030	$198,172 35	$267,402 76	$339,163 85	$219,166 85
Improvements	5,151	3,747	20,111	36,913	28,397 43	85,548 87	25,286 68	12,707 95
Fires	19,449	7,124	91,470	50,293	165,688 80	292,890 66	106,891 17	490,991 06
Totals	$182,032	$155,122	$211,885	$246,236	$392,258 58	$645,842 29	$471,341 70	$722,865 86

For Twelve Months, April, 1921, to March, 1922, inclusive.

Forest District.	Patrol.	Fires.	Improvements.	Total.
Victoria	$ 21,889 76	.....	.....	$ 21,889 76
Cariboo	14,126 45	$ 4,028 15	$ 2,064 57	20,219 17
Cranbrook	33,019 82	22,900 14	1,446 91	57,366 87
Kamloops	28,377 20	2,713 94	1,591 80	32,682 94
Nelson	32,338 51	44,339 64	2,486 37	79,164 52
Prince George	24,027 54	2,507 96	3,545 43	30,080 93
Prince Rupert	16,822 02	692 30	532 11	18,046 43
Vancouver	107,740 66	15,348 56	12,287 40	135,376 62
Vernon	20,821 89	14,360 48	1,332 09	36,514 46
Undistributed	40,000 00	.....	.....	40,000 00
Totals	$339,163 85	$106,891 17	$25,286 68	$471,341 70

By Districts for Nine Months ending December 31st, 1922.

Forest District.	Patrol.	Fires.	Improvements.	Total
Cariboo	$ 11,181 87	$ 9,484 62	$ 765 13	$ 21,431 62
Cranbrook	20,147 68	51,990 34	864 70	73,002 72
Kamloops	16,642 15	21,922 34	1,675 57	40,240 06
Nelson	23,809 94	106,909 96	1,338 09	132,057 99
Prince George	15,494 30	34,090 34	392 60	49,977 24
Prince Rupert	12,476 38	86,627 45	519 75	99,623 58
Vancouver	84,288 37	167,294 14	6,072 69	257,655 20
Vernon	14,748 10	12,671 87	1,079 42	28,499 39
Victoria	20,378 06	.....	.....	20,378 06
Totals	$219,166 85	$490,991 06	$12,707 95	$722,865 86

Crown-grant Timber Lands.

	Area of Private Timber Lands (Acres).	Average Value per Acre.
1911	824,814	$ 8 72
1912	874,715	8 60
1913	922,948	9 02
1914	960,464	9 66
1915	913,245	9 55
1916	922,206	9 73
1917	916,726	9 61
1918	896,188	9 60
1919	883,491	9 48
1920	867,921	11 62
1921	845,111	10 33
1922	887,980	11 99

The extent and value of timber land in the various assessment districts are shown by the following table:—

Assessment District.	Acreage, 1922.	Increase or Decrease in Acreage over 1921.	Average Value per Acre.	Change in Value per Acre since 1921.
Alberni	45,251	No change.	$25 89	+$5 17
Comox	187,694	+1,334	15 61	+ 2 45
Cowichan	93,849	-1,100	19 68	+ 2 92
Fort Steele	29,732	No change.	11 83	+ 80
Golden	81,098	-200	4 77	+ 97
Kettle River	4,908	+393	3 92	+ 95
Nanaimo	87,772	-373	15 93	+ 3 42
Nelson	201,444	+16,592	4 17	+ 79
Prince Rupert	1,100	-68	20 90	+ 4 39
Revelstoke	48,609	No change.	14 40	+ 2 88
Rossland (district merged with others)	.....	-16,673	.....	.....
Slocan	80,900	+36,450	5 15	- 1 82
Vancouver	2,660	No change.	31 25	+ 6 25
Victoria	22,963	+6,514	20 79	- 82
Totals	887,980	+42,869	11 99	+$1 66

Report on Timber-marks for the Year 1922.

	1921.	1922.
Old Crown grants	106	129
Crown grants, 1887–1906	73	120
Crown grants, 1906–1914	83	132
"Royalty Act"	240	291
Stumpage reservations	26	26
Pre-emptions under sections 28A and 28B, "Land Act"	53	20
Timber leases (50 cents royalty)	3	3
Dominion lands	36	58
Timber-sales	524	671
Hand-loggers	140	58
Special marks	1	3
Rights-of-way	2	..
Totals	1,287	1,511
Trespass and changes of marks	350	345
Hand-loggers' licences issued	370	288

CORRESPONDENCE.

Letters inward, numbered and recorded	29,500
Letters, reports, etc., received, not numbered or recorded	12,500
Total	42,000
Outward typed letters	21,000
Outward circulars, form letters, etc.	23,000
Total	44,000

FOREST-PROTECTION.

The fire season of 1922 was abnormal throughout the Province. A long, cold winter, during which little snow fell, froze the ground deeply in every forest district in the Province. The spring was late and cold, with the result that the early vegetation did not start until late May or early June. As a result of this the previous year's ground-cover was left in a condition that tended to spread the early spring fires rapidly. Late in May the weather broke suddenly to hot and dry, and this was not followed by the rains which usually prevail in the month of June. The vegetation that did start was soon dried and left the forest-floor a veritable tinder-heap for the spread of any fire which might occur. The season, as a matter of fact, was the driest of which we have record, the prolonged drought being alike disastrous to the farmer and the forest.

The result of these conditions was a fire situation frought with the gravest danger which might have at any moment developed a conflagration of which the disasters at Merville and Lang Bay would have been mere details.

Causes of Fires.—The causes of fires show that the travelling public is still the biggest single factor in causing the outbreak of fires. Campers and travellers are responsible for 626, or 24.2 per cent. of the total. Brush-burning is responsible for 355, or 13.7 per cent; railway operations for 332, or 12.4 per cent.; lightning for 246, or 9.5 per cent.; while industrial operations and miscellaneous known causes are each responsible for 203, or 7.8 per cent. Sixty-nine fires are known to be of incendiary origin, and public road-construction for 22, or less than 1 per cent., while the remaining 536 fires started from causes unknown.

It seems incredible that the travelling public should year after year head the list in starting fires, but it is to be hoped that the educational work that is being assiduously carried on, assisted by the stern prosecution of known offenders, will result in a decreased number of fires as time progresses.

NUMBER AND CAUSES OF FIRES, 1922.

Forest District.	Lightning.	Campers and Travellers.	Railway Operation.	Railways under Construction.	Brush-burning, not Railway-clearing.	Public Road-construction.	Industrial Operation.	Incendiary.	Miscellaneous (Known Causes).	Unknown Causes.	Total.	Per Cent. of Total Fires in Province.
Cariboo	6	81	2	..	15	2	2	..	5	42	155	5.9
Cranbrook	46	52	33	..	13	1	9	18	6	56	234	9.1
Kamloops	44	9	86	..	14	2	..	16	4	8	183	7.1
Nelson	118	83	103	..	41	7	6	4	17	33	412	15.9
Prince George	5	117	36	..	46	8	3	11	16	65	307	11.8
Prince Rupert	..	53	18	..	55	..	7	6	13	105	257	9.9
Vancouver	9	172	30	..	158	1	172	3	131	207	883	34.1
Vernon	18	59	24	..	13	1	4	11	10	20	160	6.2
Totals	246	626	332	..	355	22	203	69	202	536	2,591	100.0
Per cent.	9.5	24.2	12.8	..	13.7	0.8	7.8	2.7	7.8	20.7	100.0	.....

NUMBER AND CAUSES OF FOREST FIRES FOR THE LAST NINE YEARS.

Causes.	1922.	1921.	1920.	1919.	1918.	1917.	1916.	1915.	1914.
Lightning	246	164	304	115	134	48	67	100	169
Campers and travellers	626	308	246	310	158	209	268	305	487
Railway operation	332	283	227	146	104	335	121	82	361
Railways under construction	...	2	1	22	1	...	...	17	98
Brush-burning, not railway-clearing	355	126	96	97	100	48	148	267	164
Public road-construction	22	20	7	5	2	5	12	20	11
Industrial operation	203	119	104	129	80	59	59	28	50
Incendiary	69	40	32	21	15	13	22	28	42
Miscellaneous (known causes)	202	64	69	140	72	55	19	24	83
Unknown causes	536	204	165	156	224	214	148	160	367
Totals	2,591	1,330	1,251	1,141	910	986	864	1,031	1,832

FOREST-FIRE PUBLICITY.

Between 80 and 90 per cent. of the fires originate from human causes, mostly due to carelessness or the procrastination of taking precautionary measures until too late. Eliminate these fires and much of the problem is solved. The work conducted by the Forest Branch with this end in view is along the line of educational publicity, and the past season was as follows:—

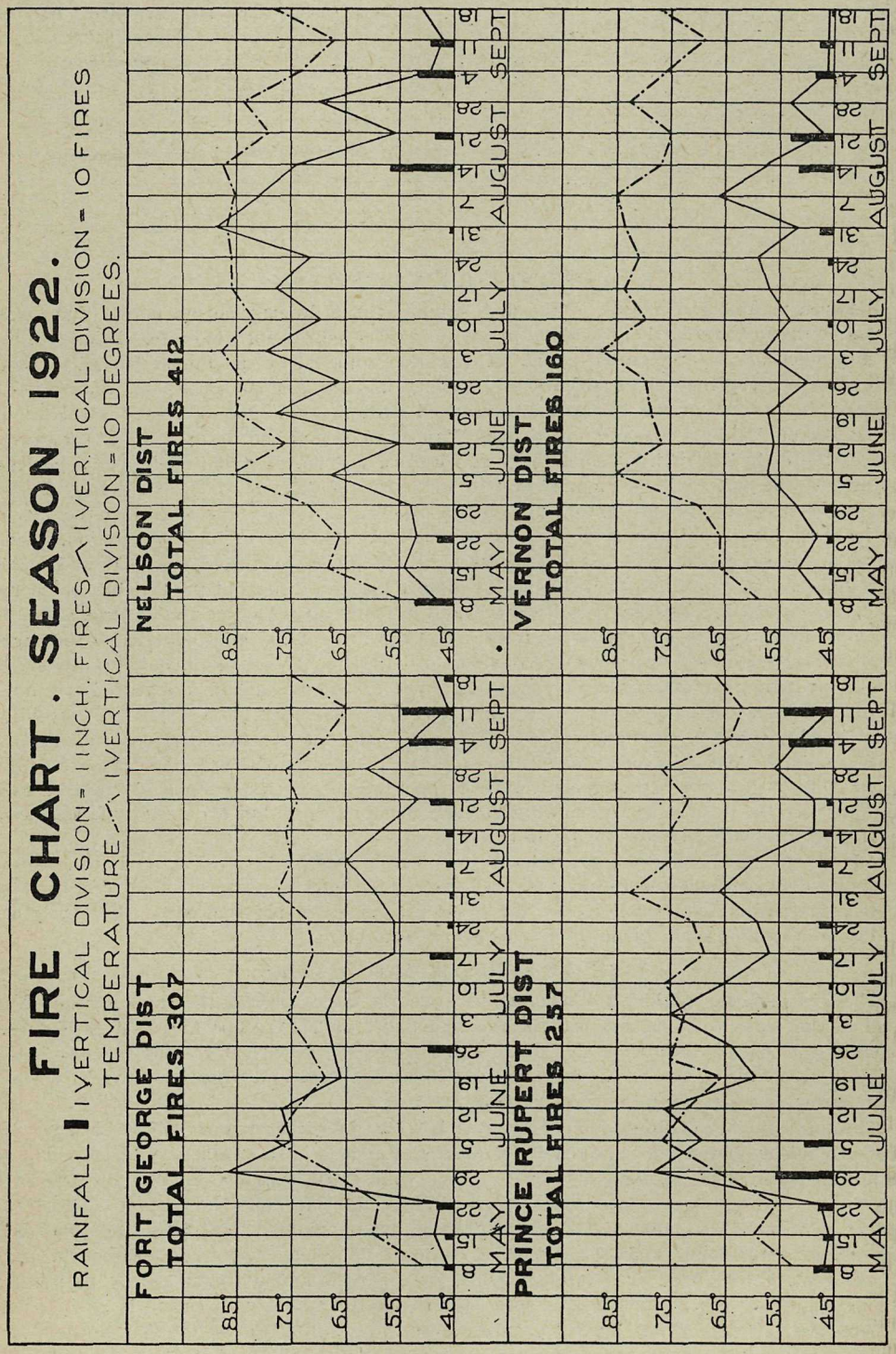
Early in the season the Department arranged with the Canadian Forestry Association to send its Forests Exhibits car on a tour through Vancouver Island and that portion of the Province south of the main line of the Canadian Pacific Railway. The car had models which portrayed in miniature the principal wood-manufacturing industries of Canada, and was specially designed to show the necessity for preventing fires in the woods. A lecturer accompanied the car, and gave lectures, illustrated by moving pictures, to show the necessity of forest-protection. School-children were especially invited, and lectures were also given to different schools and moving-picture houses. The proprietors of the moving-picture houses throughout the Province co-operated splendidly, lending the theatres free of charge, and in many cases lending the lecturer a standard moving-picture projector and operating it as well. Upwards of 70,000 people visited the car and attended these lectures. The benefit of this sort of educational work is difficult to measure, but there is but little doubt that it did much good. Even though throughout the season the number of fires increased, it is hard to say what might have been the result in these years of exceptional hazard if it were not for this and other educational work that is being carried out along forest-protection lines. We must bring our citizens to the point where they realize that the forests are our chief natural asset, that their welfare largely depends on the welfare of our timber land, and that in careless use of fire they are not merely burning brush, but are destroying real wealth in which they themselves have a vital interest.

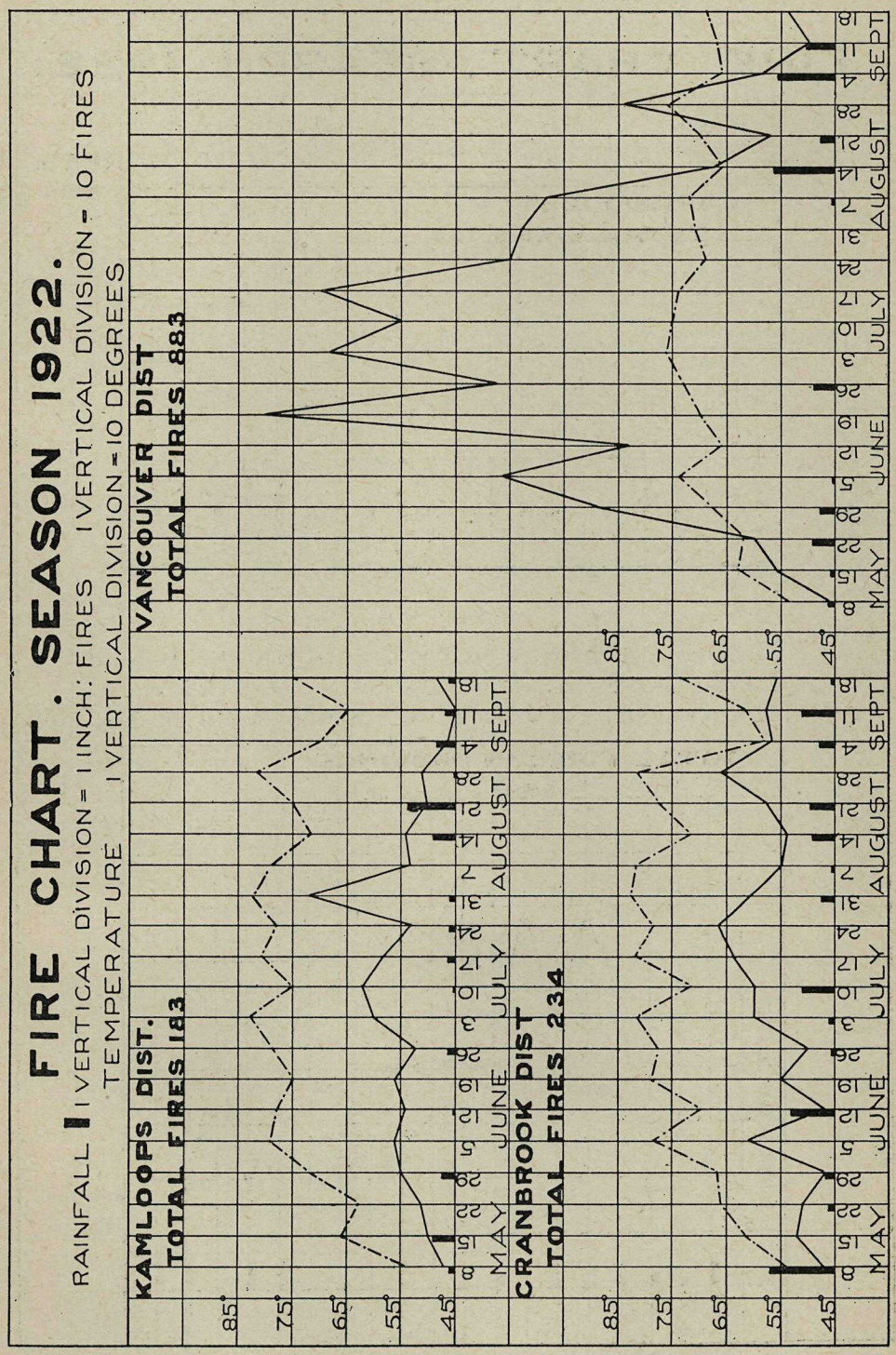
Advertisements during the fire season were again carried in local newspapers. Posters, calendars, and envelopes were printed and distributed and forest-protection literature was supplied to schools; also publicity by the press was given to prosecutions. All is helping to mould public opinion more favourably to forest-protection.

FIRE OCCURRENCE AND CONTROL.

The weather charts which follow show very clearly the causes for the rapid spread of fires, which in the season of 1922 reached the record number of 2,591. The fact that 1,546 fires, or almost 60 per cent. of the fires which broke out, were extinguished before they reached 10 acres in size is a convincing record of the work put in by the field and organizing staffs, when the fire conditions were taken into consideration.

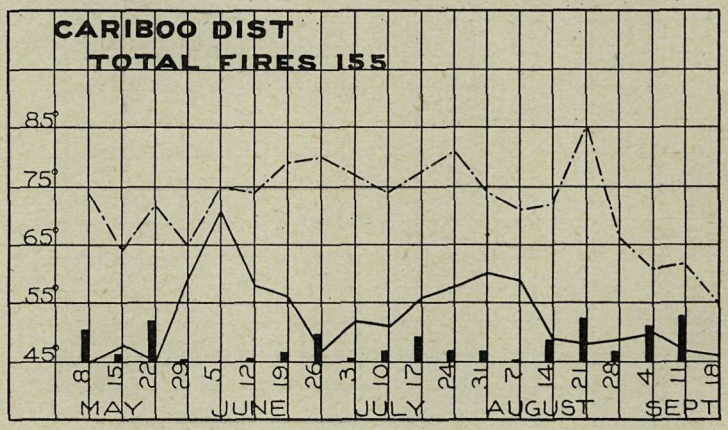
The total number of fires fought amounted to 2,591, of which number 637, or 24.6 per cent., were extinguished before they had reached a quarter of an acre in size; 909, or 35.1 per cent., were extinguished before they grew to be of 10 acres; while 1,045 spread over 10 acres before they were finally extinguished. Classification according to damage done shows that 2,171 fires, or 83.8 per cent., were extinguished before the damage done amounted to $100; 9.8 per cent. before $1,000 damage was done; and 6.4 per cent. of the total did damage over the $1,000 mark. Again, 64.9 per cent. of the fires, or a total of 1,665, were caught and extinguished by patrol forces without additional cost. Such figures speak for themselves; and while there is an increase in the percentage of fires which burned property over those of 1921, it is felt that in view of the conditions which existed during the past season, credit is due to the field staff, who in spite of the numerous calls day and night were able to come out of the season as well as these records show.


FIRE CHART. SEASON 1922.
RAINFALL ▌1 VERTICAL DIVISION = 1 INCH. FIRES ^ 1 VERTICAL DIVISION = 10 FIRES
TEMPERATURE / \ 1 VERTICAL DIVISION = 10 DEGREES.
FORT GEORGE DIST
TOTAL FIRES 307
NELSON DIST
TOTAL FIRES 412
PRINCE RUPERT DIST
TOTAL FIRES 257
VERNON DIST
TOTAL FIRES 160
85°
75°
65°
55°
45°
8 15 22 29 5 12 19 26 3 10 17 24 31 7 14 21 28 4 11 18
MAY JUNE JULY AUGUST SEPT

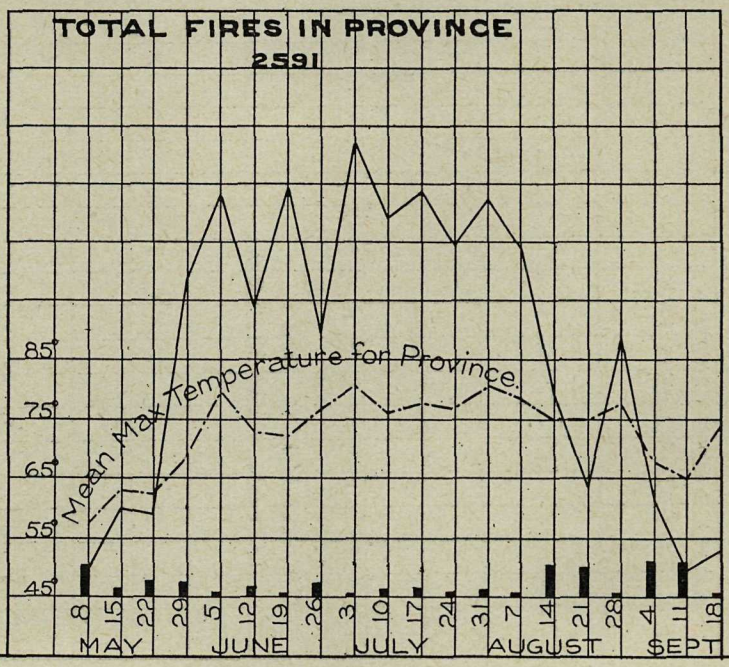

FIRE CHART. SEASON 1922.
RAINFALL 1 VERTICAL DIVISION = 1 INCH: FIRES 1 VERTICAL DIVISION = 10 FIRES
TEMPERATURE 1 VERTICAL DIVISION = 10 DEGREES
KAMLOOPS DIST.
TOTAL FIRES 183
VANCOUVER DIST
TOTAL FIRES 883
CRANBROOK DIST
TOTAL FIRES 234
85°
75°
65°
55°
45°
MAY
JUNE
JULY
AUGUST
SEPT

FIRE CHART. SEASON 1922.

RAINFALL ▌ 1 VERTICAL DIVISION = 1 INCH.
FIRES ⌃ 1 VERTICAL DIVISION = 10 FIRES.
TEMPERATURE ⌃ 1 VERTICAL DIVISION = 10 DEGREES.



RAINFALL ▌ 1 VERTICAL DIVISION = 1 INCH.
FIRES ⌃ 1 VERTICAL DIVISION = 30 FIRES.
TEMPERATURE ⌃ 1 VERTICAL DIVISION = 10 DEGREES.



FIRES, 1922, CLASSIFIED BY PLACE OF ORIGIN AND COST OF FIRE-FIGHTING.

Forest District.	Total Fires.	Originated on Vacant Crown Lands and Lands paying F.P. Tax.	Originated on Lands not paying F.P. Tax.	Extinguished without Cost.			Cost Money to extinguish.			Total Cost of fighting Fire.		Average Cost per Fire.
				No.	Per Cent. of Total Fires in District.	Per Cent. of Total Fires in Province.	No.	Per Cent. of Total Fires in District.	Per Cent. of Total Fires in Province.	Dollars.	Per Cent. of Total spent in fighting Fires in Province.	Dollars.
Cariboo	155	105	50	94	60.6	3.63	61	39.4	2.35	9,484 62	1.9	61 19
Cranbrook	234	60	174	134	57.5	5.17	99	42.5	3.82	51,990 34	10.8	222 18
Kamloops	183	57	126	135	73.6	5.22	48	26.4	1.85	21,922 34	4.6	119 79
Nelson	412	102	310	236	57.3	9.12	176	42.7	6.79	102,307 32	21.3	248 31
Prince George	307	104	203	231	75.0	8.91	76	25.0	2.93	34,068 84	7.1	110 97
Prince Rupert	257	82	176	123	47.8	4.74	135	52.2	5.21	88,977 40	18.6	346 21
Vancouver	883	204	679	607	68.7	23.45	276	31.3	10.64	158,378 12	33.1	179.36
Vernon	160	52	108	105	65.6	4.05	55	34.4	2.12	12,671 87	2.6	79.19
Totals	2,591	766	1,826	1,665	....	64.29	926	....	35.71	479,800 85	100.0	185 17
Per cent	100.0	29.5	70.5	64.29	....	.....	35.71	....	.....	.....	....	.....
Totals, 1921	1,330	415	915	891	....	67.0	439	....	33.0	98,476 00	.....	74.04
Per cent	100.0	31.2	68.8	67.0	....	.....	33.0	....	.....	.....	.....	.....
Totals, 1920	1,251	384	867	611	....	48.8	646	....	51.2	257,126 00	.....	205.53
Per cent	100.0	30.7	69.3	48.8	....	.....	51.2	....	.....	.....	.....	.....

FIRES, 1922, CLASSIFIED BY SIZE AND DAMAGE.

Forest District.	Total Fires.		Undrr ¼ Acre.			¼ Acre to 10 Acres.			Over 10 Acres in Extent.			Damage.		
	No.	Per Cent. of Total Fires in Province.	No.	Per Cent. of Total Fires in District.	Per Cent. of Total Fires in this Class.	No.	Per Cent. of Total Fires in District.	Per Cent. of Total Fires in this Class.	No.	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.
Cariboo	155	5.0	26	16.7	4.8	14	9.2	1.5	115	74.1	10.9	115	35	5
Cranbrook	234	9.1	75	32.1	11.7	82	35.1	8.8	77	32.8	7.4	208	16	10
Kamloops	183	7.2	68	37.2	10.6	70	38.2	7.7	45	24.6	4.4	159	17	7
Nelson	412	15.9	173	41.9	27.2	140	34.1	15.4	99	24.0	9.5	316	65	31
Prince George	307	11.9	29	9.4	4.4	103	33.5	11.7	175	57.1	16.7	246	25	36
Prince Rupert	257	9.9	19	7.4	2.7	62	24.2	6.7	176	68.4	16.8	205	36	16
Vancouver	883	34.1	215	24.4	33.6	360	40.8	39.6	308	34.8	29.5	774	50	59
Vernon	160	6.9	32	20.0	5.0	78	48.7	8.6	50	31.3	4.8	148	9	3
Totals	2,591	100.0	637	.....	100.0	909	.....	100.0	1,045	.....	100.0	2,171	253	167
Per cent	100.0	.....	24.6	.....	.....	35.1	.....	.....	40.3	.....	.....	83.8	9.8	6.4
Totals, 1921	1,330	.....	554	.....	.....	436	.....	.....	340	.....	.....	1,169	134	27
Per cent	100.0	.....	41.6	.....	.....	32.8	.....	.....	25.6	.....	.....	88.0	10.0	2.0
Totals, 1920	1,251	.....	345	.....	.....	392	.....	.....	514	.....	.....	1,049	107	95
Per cent	100.0	.....	27.6	.....	.....	31.3	.....	.....	41.1	.....	.....	83.8	8.6	7.6

DAMAGE BY FIRE.

The appalling loss by fire this year is shown in the total of almost 729,000,000 feet of timber killed, of which 117,000,000 feet will be salvaged, causing a net stumpage loss of over $1,500,000. Other forms of property destroyed amounted to $693,016, of which total, $232,783 was the loss of logs, shingle-bolts, and other forest products; $127,587 damage to buildings; $217,270 was the value of railway and logging equipment destroyed; and miscellaneous damage to the extent of $115,376 was done. The fact that this huge loss of property, largely logging equipment and property in and around logging operations, again stresses the fact that the hazard in the woods was unusually high, as the property was destroyed in places where fire-fighting gangs, in the persons of the logging crews, were instantly available and every known effort was made to control the situation.

DAMAGE CAUSED BY FOREST FIRES.

Forest District.	Merchantable Timber destroyed or damaged.				Valuable Reproduction.		Cut-over Land, Unmerchantable Timber, Old Burn, not Restocking.			Grazing Range.		Area of Slash burned.		Grand Totals.					
	Area.	Quantity killed.	Quantity salvable.	Net Stumpage Loss.	Area.	Estimated Present Damage.	Area.	Quantity killed.	Damage to Standing Timber.	Area.	Damage.	Area burned.	Cost to Department.	Area.		Quantity.		Damage.	
	Acres.	M. Ft. B.M.	M. Ft. B.M.	Dollars.	Acres.	Dollars.	Acres.	M. Ft. B.M.	Dollars.	Acres.	Dollars.	Acres.	Dollars.	Acres.	Per Cent.	M.Ft. B.M.	Per Cent.	Dollars.	Per Cent.
Cariboo	3,865	4,815	.....	11,425	1,036	802	77,706	.....	200	114,875	2,870	815	263	198,297	12.6	4,815	0.7	15,297	0.9
Cranbrook	9,791	22,227	3,306	19,338	10,515	2,829	45,597	.....	.....	5,631	110	16,624	.....	88,158	5.6	22,227	2.9	22,277	1.4
Kamloops	2,716	10,405	.....	12,693	7,614	20,238	17,184	.....	.....	1,585	48	2,601	.....	31,700	2.1	10,405	1.5	32,979	2.1
Nelson	20,516	97,232	19,373	90,849	1,851	28,992	80,383	1,000	1,010	43,324	728	8,879	.....	154,953	9.9	98,232	13.5	121,579	7.9
Prince George	18,036	75,941	4,837	116,055	62,374	176,227	237,437	.....	.....	38,144	750	17,230	.....	373,221	23.8	75,941	10.4	293,032	19.4
Prince Rupert	71,795	122,494	16,008	108,342	106,366	249,825	234,481	.....	.....	38,758	436	5,741	.....	457,141	29.2	122,494	16.8	358,603	23.4
Vancouver	47,531	393,765	73,354	594,740	15,958	87,963	127,155	.....	.....	862	17	51,109	106,080	242,615	15.4	393,765	53.9	682,720	44.6
Vernon	738	2,062	128	2,330	4,760	2,427	13,529	.....	.....	2,772	56	701	.....	22,500	1.4	2,062	0.3	4,813	0.3
Totals	174,988	728,941	117,006	955,772	210,474	569,303	833,472	1,000	1,210	245,951	5,015	103,700	106,343	1,568,585	100.0	729,941	100.0	1,531,300	100.0
Per cent	11.2	99.9	16.03	62.4	13.4	37.2	53.1	0.1	0.1	15.7	....	6.6	0.3	100.0	....	100.0	....	100.0	....
Totals, 1921	29,993	68,076	39,553	73,011	8,912	18,262	68,921	400	730	38,012	5,329	.....	.....	145,838	....	68,476	....	97,332	....
Per cent	20.6	99.9	57.7	75.0	6.1	18.8	47.3	0.1	0.7	26.0	5.5	.....	.....	100.0	....	100.0	....	100.0	....
Totals, 1920	50,290	225,140	49,575	294,873	55,662	184,859	244,187	4,113	5,042	39,707	1,189	.....	.....	389,846	....	229,253	....	485,963	....
Per cent	13.8	75.0	24.6	66.7	9.4	31.2	67.6	0.4	1.6	9.2	0.5	.....	.....	100.0	....	100.0	....	100.0	....

Damage to Property other than Forests, 1922.

Forest District.	Products in Process of Manufacture.	Buildings.	Railway and Logging Equipment.	Miscellaneous.	Totals.	Per Cent. of Total.
Cariboo	$ 265	$ 1,250	.....	$ 3,404	$ 4,919	0.7
Cranbrook	33,500	1,200	$ 5,500	2,070	42,270	6.1
Kamloops	30	375	.....	106	511	0.07
Nelson	60,600	30,500	.....	3,370	94,470	13.7
Prince George	31,230	5,490	1,000	3,525	41,245	5.9
Prince Rupert	1,650	9,890	500	4,118	16,158	2.4
Vancouver	105,418	73,382	210,270	98,658	487,728	70.3
Vernon	90	5,500	.....	125	5,715	0.83
Totals	$232,783	$127,587	$217,270	$115,376	$693,016	100.00

Comparison of Damage caused by Forest Fires in the Last Seven Years.

	1922.	1921.	1920.	1919.	1918.	1917.	1916.
Total number of fires	2,591	1,330	1,251	1,141	910	986	864
Area burned (acres)	1,568,585	145,838	389,846	433,797	140,085	237,289	161,288
Standing timber destroyed or damaged (M. ft. B.M.)	729,941	68,476	229,253	287,520	42,886	267,186	50,415
Amount salvable (M. ft. B.M.)	117,006	39,553	49,575	93,559	22,387	48,133	2,757
Damage to forests	$1,531,300	$ 97,332	$485,963	$393,183	$ 25,930	$129,125	$ 48,913
Damage to other forms of property	693,016	195,221	473,900	345,787	200,335	162,333	26,962
Total damage	$2,224,316	$292,553	$959,863	$738,970	$226,265	$291,457	$75,875

SLASH-BURNING.

The late spring, followed by a hot, dry summer, greatly interfered with the burning of slash; but in spite of this, 59,396 acres of slash was destroyed by the Department and private interests, and 103,700 acres of slash was burned over during the course of several fires.

A total of 12,120 permits to burn was issued, compared with 12,730 last year, a decrease of 610, or 5 per cent.

These figures show that the permit system does not hold up the farmer and prevent land-clearing, but rather encourages burning at the proper time. The farmer knows that he will not be allowed to burn should the season become dangerous, and consequently hurries his clearing at a time when it is safe.

Of the total of 12,120 permits issued, 163, or 1.3 per cent., escaped control, showing that reasonable care is exercised in regard to these privileges by the field staff and permittees in regard to granting permits and the privilege so granted.

BURNING PERMITS, 1922.

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.
Cariboo	302	2,493	.....	9	9	92	.....	.....	1	2	.....	.....	5	26	.....	.....	317	2,613	.....	9
Cranbrook	466	1,683	2	.....	21	1,688	.....	2	6	236	1	.....	3	12	.....	.....	496	3,619	3	2
Kamloops	558	1,300	11	1	30	71	.....	.....	30	28	1	.....	24	27	.....	.....	642	1,426	12	1
Nelson	1,397	2,713	17	6	28	127	2	.....	16	1,897	.....	.....	19	94	10	.....	1,460	4,831	29	6
Prince George	924	6,276	24	21	20	158	3	.....	60	611	6	.....	10	46	2	5	924	7,091	35	26
Prince Rupert	709	7,420	18	27	.....	.....	.....	.....	.....	.....	.....	.....	3	3	.....	3	712	7,423	18	30
Vancouver	6,586	17,610	56	65	161	7,482	1	.....	8	652	1	.....	14	106	.....	.....	6,769	25,850	58	65
Vernon	679	3,727	6	5	20	2,279	.....	.....	4	300	.....	.....	7	237	2	.....	710	6,543	8	5
Totals	11,621	43,222	134	134	289	11,897	6	2	125	3,726	9	.....	85	551	14	8	12,120	59,396	163	144
Per cent. of Grand Totals	95.8	72.7	82.2	93.1	2.4	20.1	3.7	1.4	1.1	6.3	5.5	.....	0.7	0.9	8.6	5.5	100.0	100.0	100.0	100.0
Totals, 1921	12,181	48,770	31	62	324	15,683	2	32	118	8,530	19	5	107	1,713	7	2	12,730	74,696	59	101
Per cent	95.7	65.4	62.6	61.4	2.5	20.9	3.4	31.7	0.9	11.4	32.2	4.9	0.8	2.3	11.8	2.0	100.0	100.0	100.0	100.0

FIRE-LAW ENFORCEMENT.

The enforcement of the law against fire trespass is a matter which is receiving every possible attention, and wherever there was clearly cause the offenders were prosecuted. One hundred and thirty-five convictions were recorded during 1922, as against 61 in 1921, while the fines levied amounted to $2,543, as compared with $1,029 in 1921. In a few cases stiff fines were levied; the penalty meted out for leaving a camp-fire burning in one instance was $150.

It must be understood that the person who wilfully or carelessly causes a fire is guilty of an offence and detrimental to the public welfare. The Department has the same obligation in bringing these offenders to justice as in fighting the fire which results from these actions.

The amendments to the "Forest Act" provide for an increase in the minimum fine for such offences, and the Forest Branch has every intention of rigorously enforcing these provisions. In this I believe we have the support of the majority of law-abiding citizens. Thanks is due to the Provincial and various municipal authorities who co-operated with the Branch during the past fire season.

PROSECUTIONS FOR FIRE TRESPASS, 1922.

Forest District.	Information laid.	Failure to equip Donkey or Camp with Fire-fighting Tools.	Contravention of Section 111 of "Forest Act."	Contravention of Section 121 of "Forest Act."	Operating Open Burner without Permit.	Contravention of Section 127 of "Forest Act."	Burning without Permit.	Incendiary.	Leaving Camp-fires burning.	Refusing to fight Fires.	Fines. No.	Fines. Amount.	Suspended Sentence.	Case dismissed.	Cases pending.	Cases withdrawn.
Cariboo	12	..	..	1	..	2	8	..	1	..	10	$ 115 00	1	1	..	..
Cranbrook	16	..	..	..	..	1	14	..	1	..	8	180 00	..	3	..	5
Kamloops	5	..	..	..	..	1	1	..	..	3	3	30 00	1	1	..	..
Nelson	9	..	..	..	..	2	6	..	..	1	6	115 00	2	1	..	..
Prince George	28	..	5	..	..	1	19	..	2	1	18	220 00	..	8	1	1
Prince Rupert	29	..	2	..	..	1	21	2	..	3	25	255 00	..	3	..	1
Vancouver	67	..	6	..	1	9	39	..	6	6	53	1,558 00	2	8	1	..
Vernon	4	..	..	..	..	..	3	..	..	1	3	70 00	..	1	..	..
Totals	170	..	13	1	1	17	111	2	10	15	126	$2,543 00	6	26	2	7
Totals, 1921	79	2	1	2	2	6	45	2	14	5	54	1,029 50	7	9	7	2

FLYING OPERATIONS.

The use of air-craft during the season of 1922 was subjected to a very severe test. The very smoky condition of the atmosphere, commencing as early as June 1st, restricted their use by restricting the visibility from the machine. Later on it became difficult and sometimes dangerous to navigate, owing to the pall of smoke which hung over the whole district.

The results obtained from the use of air-craft in our opinion fully justified the expenditure incurred, and the uses to which air-craft were put bore out the methods and plans formulated in conjunction with the Air Board officials.

The mention of air-craft in this district must be coupled with an appreciation of the wonderful personality and work of Major C. McLaurin, who was in charge of the Air Station at Jericho Beach, and who gave his life towards the end of the season in the cause of flying. To Major McLaurin's personal efforts can be attributed a great measure of the success which was obtained. He personally did a great deal of the flying for fire-protection work, and his experience and wonderful sense of direction was called on many times to overcome difficulties which few others would have faced. He was on the job twenty-four hours in the day, and on more than one occasion he got out of his machine and helped fight fires of his own free will, to make things a success. In spite of the handicap of obsolete types of machines and of flying operations many miles from his base, he rendered a service to the cause of forest-protection in this district that will not be forgotten.

An appreciation is also due to the staff of the Jericho Air Station for the excellent co-operation rendered the Forest Service throughout the trying period of the 1922 fire season.

The plans for 1922 proposed the use of air-craft principally on: (1) Supervision of fire-fighting; (2) transportation of fire-fighters and equipment; (3) general supervision of a field staff spread over 22,000,000 acres; (4) fire-detection.

Possibly the most outstanding feat of the season was the transporting of fire-fighters to Buttle Lake in the centre of Vancouver Island. This fire was reported on July 28th. To get into this lake with a crew of men would have required a two-day trip and construction of about 14 miles of trail over a difficult country. By the time the crew arrived in all probability the fire would have been of such a size that it would have been impossible to have taken in sufficient additional men to have fought it. The big machine and emergency fire-fighting equipment were wired for. The equipment consisted of a portable pump and set of tools. These were loaded together with 1,200 feet of hose, a sixteen-man tent, six shovels, six mattocks, six axes, camp outfit, and provisions for six men for two weeks. Four fire-fighters were carried also, in addition to the crew of the machine. The total load on this trip was 4,895 lb. Visibility was very poor, but the machine rose to the height of 1,000 feet and hit across Vancouver Island in the direction of Buttle Lake. The route following the Campbell River to Campbell Lake was taken, crossing the Campbell River fire; then following the Elk River and landing in Buttle Lake about fifty-four minutes from Campbell River. Equipment and personnel were put ashore at the fire in collapsible boats. The machine then returned to Campbell River and picked up three more fire-fighters and took them in to the fire. The fire-fighters were landed at 4 in the afternoon, fought fire all night, surrounded the fire with a fire-trench, and got the pump into action. The fire was practically under control in the morning. The crew were left on the fire for two more days, and on the fourth day the machine went in and took out the crew and equipment. The gasolene taken in for the portable pump was used as extra fuel and one man was left to patrol the fire.

The total flying-time for the season of 1922 was 105 hours 51 minutes. One hundred and ninety-seven passengers were transported, a total of 6,606 miles.

WIRELESS TELEPHONE.

The hazardous season is reflected no less in the record of the Department's wireless telephone service than in the other tables compiled. For instance, during the month of July a total of 1,150 messages were transmitted, containing 51,000 words. During the year a total of 4,690 messages were transmitted (which number does not include the necessary relays), or a total of 177,266 words. With the growing use of the wireless telephone it is expected that improvements will be made, especially in the smaller or portable sets, which will greatly extend the usefulness of this aerial communication.

EQUIPMENT.

The standardization of mechanical equipment has proceeded with satisfactory results, as borne out by the saving in time in obtaining and applying spare parts at less cost and increasing the efficiency thereby.

Two standard types of launch have been evolved and adopted, and in each type the whole equipment is standard, from the lines of the hull to the cooking-utensils. Parts of engines or equipment are thus interchangeable between the launches of each type and between the types. These are showing a great improvement in efficiency and economy of operation over previous years' transportation costs. Motor-cars used are two-seater Ford cars, with a standard Forest Branch delivery-box attached, capable of carrying a load up to 800 lb. The parts for these are readily obtained in all parts of the Province. Standard types of pumps are in use, and the equipment and parts of the several forest fire-fighting units are identical with one another.

The number of launches maintained on the Coast, amounting to twenty-seven out of a total of forty-two, were kept in running-order mainly by the Department's repair station at Thurston Bay, Sonora Island, and in addition to the ordinary repair-work several launches were entirely rebuilt. The station machine-shop also kept forty forest-fire pumps in working-order, and considerable repair-work was carried out with the utmost efficiency and the least loss of time. During the fire season forty-two launches covered a total of 103,711 miles, or an average of 2,593 miles per launch.

The fifty-one cars used by the Department covered a total of 271,203 miles, or an average of 5,317.7 miles per car in the same period. Thirteen Forest Branch railway speeders ran a distance of 39,528 miles, averaging 3,040.6 miles each. The total distance covered for six months (April to September, inclusive) for all transportation units above mentioned was 414,542 miles.

Pump-hours run were 4,932, which means that the amount of water pumped on fires amounted to (at 30 gallons per minute) 8,877,600 gallons, 44,388 tons. The service given by these units

was uniformly good, and instances abound showing where the use of these pumps saved valuable property and timber.

Fire-fighting equipment was kept up to strength; the only departure this year was the use of portable hand-power tank pumps holding 5 gallons of water, which proved to be extraordinarily useful in extinguishing spot and smudge fires.

IMPROVEMENTS AND MAINTENANCE, 1922.

The following amounts were spent on improvements and maintenance, by districts:—

Cariboo.

Improvements—	
Launch "Poplar"	$ 606 00
One Ford car	764 00
One outboard motor	175 00
	$ 1,545 00

Cranbrook.

Improvements—	
Two Ford cars	$ 1,411 00
One fire-fighting pump and equipment	900 00
Bridge Creek Trail	107 00
Lizard Patrol Station	73 00
Inlet Creek Trail	164 00
9-Mile Lake Ranger Station	77 00
Wigwam River Trail	300 00
McQuarrie Creek Trail	125 00
Bugaboo River Trail	120 00
Camp-sites	73 00
	$ 3,350 00
Maintenance—	
Bridge Creek Trail	$ 128 00
Casey Mountain Telephone Line	34 00
Elk Valley Telephone Line	70 00
Baker River Trail	120 00
Elk River Valley Trail	350 00
Flathead Valley Trail	270 00
Kootenay River Trail	220 00
Bugaboo River Trail	120 00
	$ 1,312 00

Kamloops.

Improvements—	
One Ford car	$ 717 00
One fire-fighting pump and equipment	706 00
Two hand-pumps	28 00
One rowboat for Humamilt Lake	99 00
Clearwater–Blue River Trail	39 00
Bear Creek Ranger Station Cabin	244 00
New engine for launch "Aspen"	785 00
	$ 2,618 00
Maintenance—	
Clearwater–Blue River Trail	$ 14 00
Pyramid Trail	28 00
Adams–Seymour River Arm Trail	27 00
Carried forward	$ 69 00

KAMLOOPS—*Continued.*

Brought forward	$ 69 00
Maintenance—*Continued.*	
Albas–Humamilt Lake	4 00
Main Seymour River Trail	27 00
Main Columbia River Trail	4 00
Canoe River Trail	124 00
Barriere–Adams Lake Trail	11 00
Birch Island Telephone Line	9 00
Big Bend Telephone Line	21 00
Seymour River Ferry	29 00
	$ 298 00

NELSON.

Improvements—	
Two Ford cars	$ 1,445 00
One fire-fighting pump and equipment	747 00
Five hand-pumps	70 00
One gasolene-speeder	512 00
One launch ("Juniper") and boat-house	300 00
Duncan River Crossing at Boulder	137 00
	$ 3,211 00
Maintenance—	
Duncan River Crossing No. 2	$ 94 00
Lardeau Trail	79 00
Hamil Creek Trail	109 00
Duncan River Trail	63 00
Lardeau Telephone Line	30 00
Davis Creek Trail	13 00
Fry Creek Trail	9 00
Hooker Creek Trail	68 00
Gray Creek Trail	96 00
Grizzly Creek Trail	84 00
Green Mountain Trail	4 00
Black Rock Trail	24 00
West Fork Trail	84 00
Big Slide Trail	12 00
Rest Creek Trail	8 00
Hilltop Creek Trail	32 00
	$ 809 00

PRINCE GEORGE.

Improvements—	
Two outboard motors	$ 255 00
One hand-speeder	177 00
	$ 432 00
Maintenance—	
Hose for fire-fighting pump	$ 81 00

PRINCE RUPERT.

Improvements—	
One Ford car	$ 730 00
Four outboard motors	606 00
One hand-speeder	93 00
	$ 1,429 00

PRINCE RUPERT—*Continued.*

Maintenance—	
Smithers garage	$ 38 00

VANCOUVER.

Improvements—	
Six Wonder pumps	$ 2,850 00
One Wonder gear-pump	75 00
Hose, discharge, suction, and fastenings	3,686 56
Miscellaneous equipment, fire-fighting	212 80
Four new launches—	
"Balsam"	2,794 05
"Cherry"	2,787 82
"Cottonwood"	5,123 31
"Yew"	250 00
One Elto outboard motor	175 55
Six new cars	4,345 90
Garage lean-to, Victoria	10 00
Two dinghies	83 86
"Alanbee" wireless	244 50
One rowboat	74 50
Chemainus Trail	381 75
"Cottonwood" wireless	542 47
Elk Trail	100 00
Mooring, "W. Hemlock"	20 30
Various Island trails	8 29
	$23,766 66
Maintenance—	
Wellbore Ranger Station	$ 29 80
Thurston Bay Station	56 06
Myrtle Point Station	63 57
Pitt River Cabin	60
Cowichan Lake Boat-house	1 20
Lynn Creek Cabin	3 30
Squamish Ranger Station	108 60
Heriot Bay–Roy Line	31 32
Myrtle Point Telephone Line	96 12
Thurston Bay Float	37 14
Repairing tools	296 26
Thurston Bay chimneys	96 31
Myrtle Point House repairs	115 61
	$ 935 89

VERNON.

Improvements—	
Two Ford cars	$ 1,494 00
One fire-fighting pump and equipment	695 00
Two rowboats	207 00
One outboard motor	175 00
	$ 2,571 00
Maintenance—	
B.X. Telephone Line	$ 9 00

GRAZING.

The grazing season of 1922 opened with the live stock in fair condition and the forage on the ranges making a good growth. As the season advanced, however, very dry conditions were experienced, which prevailed throughout the entire season, very little or no rain falling from April to about the end of September. The result was a shortage of feed on the overgrazed areas of low range, the early drying-up of water, and a general shortage in the growth of hay-crops in many sections of the country. As a result of this shortage of crops the stockmen of the Nicola District, where dry conditions were particularly bad, petitioned both the Provincial and the Dominion Governments to secure low rates on shipments of hay from outside points in order that the stockmen might profitably ship in supplies needed for winter feed. Fortunately, however, the September rains started a good growth of grass, both on the range and in pastures, and the mild weather which has prevailed generally throughout the Province up to the first week of December will carry the cattle a long way into the winter on the open range and pastures, and it is hoped that the supplies of hay, even though short in some sections, will be sufficient to bring the cattle through the winter in good condition.

PRICES FOR BEEF CATTLE.

The average prices paid for prime steers and best feeders on the Western Canadian markets during the past year were around $6.70 and $4.80 per 100 lb. respectively. While these prices are not far below the general average of pre-war prices, they are profit-bearing even though production costs are still high.

The great majority of beef animals raised on the range are of mediocre quality and generally reach market in only fair condition and take their place in the "lower grades." They are so numerous that they cut down the average in price, the result being that animals which might be profit-bearing are required to pay the loss incurred in raising and marketing the profitless ones.

Inattention to the cattle while on the open range renders it impossible for the average range stockman to evenly distribute his beef over the market during the summer months. The market is glutted with low-conditioned animals after the general fall beef ride and the effect on the prices is demoralizing.

The production of inferior stuff that is difficult to sell at anything like satisfactory prices is actually overproduction on the part of the rancher, even though he has a surplus of range and hay crops for winter feeding. There is an eager market for the high-grade animal, but it is only through unremitting attention to the cattle on the range and to the protection of the range itself that the range stockman can reach this market. It will not pay to raise beef unless it is of high quality. There are so many leaks in the handling, or rather lack of handling cattle on the open range that any prices received which appproximate the average of present and pre-war prices for the medium or lower grades will hardly pay expenses. The stopping of the leaks will, however, mean the equivalent of at least a 50-per-cent. increase in revenue, producing a satisfactory profit.

SHEEP PRODUCTION.

The production of sheep is not being given the attention it should. There is a splendid opportunity for every rancher to augment his profits and benefit his ranch by keeping a small farm flock. The surplus of farm flocks may be banded together and grazed as community flocks in charge of herders during the summer months. Some of the finest sheep-range in the West is to be obtained in British Columbia. Many cattlemen are talking of changing from cattle to sheep. This is not advised unless they are familiar with the range-sheep business.

ORGANIZATION.

A great deal of the time of the Grazing Office force has been taken up in the organization-work among the stockmen. The Assistant Commissioner of Grazing spent the fore part of the season in Nelson and Vernon Districts and brought about the organization of the following associations: The Grand Forks Association, Grand Forks; the Stock-breeders' Association of Greenwood Riding, Rock Creek; White Lake Association, White Lake.

Three other associations were organized—the Big Bar Association at Jesmond, the 4-Mile Association at Penticton, and the Riske Creek Stock-breeders' Association. The Fraser Lake

range-users and the Barrett Lake range-users are also organizing for range management and development work.

The ultimate aim of the organization of stockmen was covered very fully in my report for 1921. An important phase of this corporation work, however, is that it deals with the improvement of the ranges. It is advisable, in order that the best results may be secured, to arrange for consultation with Advisory Boards of the Stock Associations regarding all range-improvement work undertaken. It is very difficult to do this where large associations operate; that is to say, where these associations have jurisdiction over a large area of range, such as the Lillooet Stock-raisers' Association with jurisdiction over the range within the Lillooet Electoral District, and the Nicola Association with jurisdiction over the range commonly known as the Nicola District. It has been very difficult to secure a proper representation of range-users at the meetings of these large associations, and in consequence the discussion of work proposed for portions of various districts has not always resulted in satisfactory suggestions regarding the work. The reason for this was that the people most vitally affected by the proposed improvements would probably not be in attendance at the meetings, often on account of the distance which they were required to travel. These large districts are, however, being split up into smaller units, and range committees selected for each unit for the primary purpose of discussing with the Department the range improvements proposed for each unit of range. This work is well under way and in a very short time I hope to have every distinct unit of range in each grazing district properly represented by a range-improvement committee.

Range Improvements.

Much progress has been made in the range-improvement work. The attention of the stockmen, individually and collectively, has been called to the importance of the work by correspondence and at meetings, yet it has in some sections been very difficult to secure their co-operation.

Dangerous mud-holes on the range take a very heavy toll annually from the herds turned out to graze. The worst of these dangerous places are generally known to the stockmen or their employees. Although each individual user of the Crown range has been written asking for information regarding any needed range improvements, no response at all from some localities has been received. As far as it has been possible for this office to do so, the location of dangerous mud-holes and other necessary improvements have been ascertained by field investigation. The apathy of the stockmen may be due to the fact that many do not seem to fully realize that a fund is available each year for improving the ranges used by their stock.

This condition is gradually being changed, however, and I am very confident that the close of 1924 will see all units of the main grazing districts co-operating with the Government in its efforts to improve the ranges for the benefit of the live-stock interests.

The following is a record of improvement-work completed to November 30th, 1922, that completed or under way, but not paid for, and of projects authorized and planned to begin at once, or as early as possible in the season of 1923:—

Receipts.

1920. Sum equal to one-third of 1919 grazing fees collected	$3,398 00	
1921. Sum equal to one-third of 1920 grazing fees collected	5,314 89	
1922. Sum equal to one-third of 1921 grazing fees collected to November 30th	3,602 38	
		$12,315 27

Expenditures.

Drift-fences	$4,501 00	
Mud-holes	1,268 49	
Trails	594 50	
Spring development	97 50	
Grasshopper-control	328 22	
Reseeding	91 80	
Salt demonstration	31 00	
		6,912 51
By Balance, November 30th, 1922		$ 5,402 76

Detailed List of Range Improvements completed to November 30th, 1922.

Date.	District.	Kind of Improvement.	Name.	Cost.	Total.
Nov. 24, 1920	Cranbrook	Drift-fence	Creston Valley Stock Range	$ 200 00	
June 18, 1921	Vernon	"	Lundbum Common	4,101 00	
April 8, 1922	"	"	Allen Grove	49 50	
Oct. 30, "	"	"	Crater Mountain	70 00	
" 30, "	"	"	Armstrong	80 00	
					$4,501 00
Dec. 21, 1920	Kamloops	Mud-hole	Heffley Range	$ 63 00	
July 14, 1921	"	Mud-holes (2)	"	221 25	
Dec. 9, "	Vernon	" (3)	Nicola Range, Green Lake	223 85	
June 13, 1922	Cariboo	" (2)	Lac la Hache	50 00	
July 20, "	"	" (1)	Restone	175 00	
" 31, "	"	" (1)	Big Bar Range	535 39	
					1,268 49
May 17, 1921	"	Trail	Churn Creek, Big Bar Basin	$ 259 50	
Nov. 1, "	"	"	Baynes Pass	175 00	
Oct. 31, 1922	Vernon	"	Crater Mountain	150 00	
					594 50
June 18, 1921	"	Spring development	Nicola Lundbum Common		97 50
May 17, "	Cariboo	Grasshopper-control	Riske Creek Range		328 22
Oct. 14, "	"	Artificial reseeding	Lillooet Stock-range	$ 20 95	
" 14, "	Vernon	"	Lower Nicola Range	48 95	
May, 1922	Prince Rupert	"	Barrett Lake Range	21 90	
					91 80
Sept. 30, "	Kamloops	Salting demonstration	Heffley Stock Range		31 00
Total expenditures to November 30th, 1922.					$6,902 57

Projects completed but not yet paid for, pending Inspection Reports.

Date.	District	Kind of Improvement.	Name.		Estimated Cost.
May, 1922	Kamloops	Trail	Fennell	$150 00	
" "	"	Corral	"	50 00	
					$200 00
Aug, "	Vernon	Mud-hole	Otter Creek Range		125 00

Projects authorized for 1922, Progress not yet reported.

District.	Kind of Improvement.	Name.	Estimated Cost.
Cariboo	Drift-fence	Baker Range	$ 100 00
Cranbrook	Drift-fence (corral)	Cranbrook Range	25 00
Vernon	"	4-Mile Range	40 00
"	"	Green Lake Range, Nicola	300 00
"	Mud-hole	Allen Grove Range	165 00
Cariboo	"	Lac la Hache, 141-Mile	75 00
Cranbrook	"	Waldo Range	100 00
Vernon	Trail	Vavenby Range	200 00
"	Spring development	Allen Grove (5 springs)	125 00
Total			$1,130 00

Projects listed to Date for Execution during 1923.

District.	Kind of Improvement.	Name.	Estimated Cost.
Vernon	Drift-fence	Allen Grove, Keremeos Range	$ 75 00
Cariboo	Mud-holes	Canoe Creek Range (5)	575 00
"	"	Dog Creek–Pigeon Range (4)	285 00
"	"	Alkali Lake (3)	175 00
"	"	Bowe	200 00
"	"	39-Mile Reservation	300 00
"	"	Gang Ranch	45 00
"	"	Lac la Hache Range	75 00
"	"	" (2)	40 00
"	"	St. Peter's Spring, Alkali Range	25 00
Total			$2,840 00

Land Reservations.

Area.	Purpose.
E. ½ Sec. 8, Tp. 14, Lillooet District	Watering-place
W. ½ Sec. 9, Tp. 14, Lillooet District	Watering-place
Lot 1687, Lillooet District	"
S.E. ¼ Sec. 23, Tp. 78, Lillooet District	Control bad mud-hole.
Area near Williams Lake, Cariboo District, shipping-point	Beef holding-ground.
59-Mile, temporary, pending detailed examination, Lillooet District (this examination is now made)	" "
Springhouse Stock-range, Lillooet District	Spring and fall range.
Big Bar Stock-range	" "
Lot 1706, Kamloops District	Water.
Coutleau Plateau, temporary, Kamloops District	Spring and fall range.
Lot 4562, Green Lake Range, Kamloops District	" "

Water Reservations.

Area.	Purpose.
St. Peter's Spring, Alkali Lake Range, Lillooet	Water for stock.
Eleven springs, Big Bar Range, Lillooet, listed June 14th, 1922, File 038883	"
Small stream on holding-ground at Williams Lake	"
Spring on Lot 1687, Lillooet District	"
China Gulch Spring, Lillooet District	"
Water on Lot 1706, Kamloops District	"
Water on Lot 1398, Kamloops District	"
Water on Lot 3902, Kamloops District	"
Water on Lot 4066, Kamloops District	"
Water on Lot 2118 (S.), Yale District	"

Burning and Reseeding on the Crown Ranges.

No range-burning work was undertaken during the past season. It is believed that the experiments now under way at Lower Nicola in the Vernon District and Alberta Lake in the Lillooet District will be sufficient for the time being, in that they will give ample figures in the course of time to show results following the effect of burning on the grazing ranges. The experiments were under observation during the past season, but, of course, it is too early to give any definite information without figures.

No further reseeding was undertaken during the past season. Fifty pounds of seed was, however, shipped to the ranges of the Barrett Lake District for experimental work there. A definite plan for reseeding experiments has been arranged for with Mr. Barrett, of Barrett Lake, and it is hoped to find some hardy grass that will be suitable for these ranges for use in finishing off range beef. Observations at the experimental ranges at Lower Nicola and Alberta Lake showed no results in the early part of the year, apparently on account of the dry conditions prevailing. The Alberta Lake area was examined on October 10th, a few weeks after the first heavy rainfall in September, and showed a surprising growth of the grasses and clovers sown, with the exception of sweet clover. Fescue in particular showed a surprising growth, and there was every indication that the white or Dutch clover will establish itself. A portion of this area was fenced at the time the experiment was established in order that areas entirely protected from grazing, as well as areas on the outside range, could be closely observed and figures obtained regarding the growth on protected areas as well as on areas subject to heavy grazing. It was well that this fencing was done, for the examination of the range made in October showed that the cattle were congregating very heavily around the experimental plot and had kept the cultivated plants sown outside of the fenced plot cut down very closely; in fact, they seemed to neglect the native forage so long as they could obtain the cultivated species. It is quite possible that this heavy grazing outside of the fence will prevent the cultivated grasses and clovers from establishing a root system, with the result that they are very apt to weaken and die. This indicates that wherever any seeding is done on the range with cultivated species, protection during the growing months, or from April to August, must be given the plants if benefit is to

be derived from expenditures in reseeding ranges. It will be impossible to think of building drift-fences all over the range for this purpose for many years to come; consequently the only way in which this protection can be given is through the organization of the stockmen and the introduction by them of proper control measures. This could be brought about by the employment of herders and the distribution of salt in such a way that the stock will be compelled to graze on the different divisions of each unit of range, in accordance with the grazing plan formulated to bring about the protection of reseeded areas.

GRASSHOPPER-CONTROL.

On April 1st of the past season E. R. Buckell, of the Department of Agriculture, was assigned to the Nicola District with the view of studying the damage resulting from the grasshoppers in that locality and devising means whereby they could be controlled. Mr. Buckell was in charge of the work on the Riske Creek Range during 1920 and 1921, and is in consequence well qualified for the work. I have not yet received a copy of his report, but have discussed the situation with him, and understand that the Nicola Range is infested with varieties which may be easily controlled by poisoning. The difficulties in the way of doing effective work are the extent of the area and the limited means at his disposal. He secured good co-operation from the stockmen and ranchers of the vicinity, and, I believe, is prepared to make definite recommendations to his Department in reference to the control of grasshoppers on the Nicola as well as on other ranges where the damage they do is particularly severe.

DISEASES OF LIVE STOCK.

The stockmen of British Columbia are very fortunate in being very free from losses of stock on the ranges due to diseases or poisonous plants. The investigations of this office show that possibly the greatest losses occur in mud-holes, which are very prevalent in some portions of the grazing districts. These, however, are being located and fenced with all possible speed. An examination of the ranges has disclosed very few poisonous plants growing in such quantities that they are at all dangerous to stock. The most dangerous plants on the range are water-hemlock, larkspur, and death-camas. Death-camas is not very prevalent except on some portions of the range close to the International Boundary, and is not at all dangerous unless the stock have been confined and are very hungry when turned on to the range. The month of May is the most dangerous period. The giant larkspur, which poisons cattle and horses, but not sheep, has never been discovered in sufficient quantities in the general grazing districts to be injurious. Water-hemlock seems to be dangerous only during the dry seasons, when the small lakes and water-holes become so dry that the roots are exposed.

Stockmen have been complaining of sickness and death among their cattle, due to eating forage growing within the timber, which they claim is not palatable and dangerous at various periods of the season. A close examination of the ranges has failed to disclose any forage of a dangerous nature, outside of a few plants which may be classed as poisonous, or plants that would cause the condition or symptoms described in sick cattle. The symptoms prevalent among sick cattle show conclusively that sickness is due entirely to an insufficient supply of proper salts in the food. Very little of the forage growing on the ranges in the West furnish sufficient salts for the cattle growing on these ranges. This is particularly true in the case of the cow with the growing calf, and ewes with lambs. Experiments carried on by various Governments and experimental stations have proven conclusively that live stock needs a certain quantity of good salt each day. On the ordinary ranges of the West this quantity should be at the rate of about 1 lb. per head per month. If the stock does not get this salt it will naturally seek licks furnishing salts in different forms, which are usually very injurious and lead to indigestion and the general breakdown in the health of the stock on the range.

The failure to provide the proper salt and distribute it at the right places over the range results in a heavy loss to the stockmen. Without this salt the cattle congregate at areas where they can secure alkali or other salts. These areas are generally on or in the vicinity of the spring and fall range, but growth of forage on these ranges is retarded and the ranges are so seriously overgrazed that the growth of the stock is further prevented. The ranges are damaged so that there is generally very little forage available for fall use, which means that the stock are forced into the feeding-yards from three weeks to a month before they should be taken there.

Mismanagement of this kind results in a heavy all-round loss, which could easily be averted by intelligent organization in range-management work.

TRESPASS.

The Grazing Office has found it necessary to take action against certain persistent trespassers who fail to take out grazing permits for the use of the range, thereby taking from their neighbours range allotted to the regular permittees and appropriating to themselves the benefit of range improvements constructed for the authorized users of the range.

The following cases were tried during the past season: C. Kostering, Cariboo District; W. Grinder, Cariboo District; A. Doyle, Cranbrook District.

Evidence for use in the prosecution of other trespassers has been collected and is being placed in the hands of the legal department for action. While it is essential that the regular users of the range be protected, it is hoped that the trespass regulation will not have to be evoked by this office for the purpose of compelling those who insist on using the range without permit, to the detriment of the regular grazing permittee, to deal fairly with their neighbours and also apply for and secure grazing permits.

WORK DONE BY FOREST BRANCH DRAUGHTING OFFICE.

During the past twelve months the staff of the Draughting Office has been engaged in not only preparing the general routine plans, but in compiling data for reconnaissances undertaken last year. Considerable work is entailed in this respect, as all possible information that could be of use to the cruising parties, such as bearing trees, must be given by the draughtsmen.

The main routine work has consisted of the preparation of plans for timber-sales, timber-marks, examination sketches, and hand-logger licences. In addition, numerous sketches for various purposes were made, most of them requiring bearing trees.

Also a large number of reference maps were blue-printed from time to time, and portions of maps. Every office in the different forest districts was kept supplied with blue-prints of reference maps, and a special effort was made to furnish the district offices with copies of every new map, prepared by the Surveyor-General's Branch, directly the map was available. The number of reference maps (including portions of maps) that were blue-printed for the Forest Branch was 575, and the number of plans prepared for blue-printing amounted to 2,136; from these 10,400 prints were made.

All atlas and operation maps have been kept up to date; this has necessitated the preparation of several new ones and a constant revision of those in use.

Month.	Number of Tracings made.						Blue-prints made from S.G. Ref. Maps.
	Timber-sales.	Timber-marks.	Examination Sketches.	Hand-logger Licences.	Miscel-laneous.	Totals.	
January	19	58	34	11	18	140	104
February	15	115	43	12	11	196	11
March	21	97	43	29	22	212	35
April	8	43	43	47	9	150	19
May	9	70	67	35	44	225	28
June	17	78	34	13	34	176	141
July	11	47	33	40	6	137	5
August	16	55	60	22	4	157	23
September	20	56	39	24	21	160	20
October	17	76	36	24	40	193	10
November	48	80	65	10	11	214	39
December	33	91	35	9	8	176	140
Totals	234	866	532	276	228	2,136	575

VICTORIA, B.C.:
Printed by WILLIAM H. CULLIN, Printer to the King's Most Excellent Majesty.
1923.