PROVINCE OF BRITISH COLUMBIA

REPORT

OF

THE FOREST BRANCH

OF THE

DEPARTMENT OF LANDS

HON. F. P. BURDEN, *Minister*
H. CATHCART, *Deputy Minister*
P. Z. CAVERHILL, *Chief Forester*

FOR THE YEAR ENDED DECEMBER 31ST

1929

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1930.

VICTORIA, B.C., February 25th, 1930.

To His Honour JAMES ALEXANDER MACDONALD,
Administrator of the Province of British Columbia.

MAY IT PLEASE YOUR HONOUR:

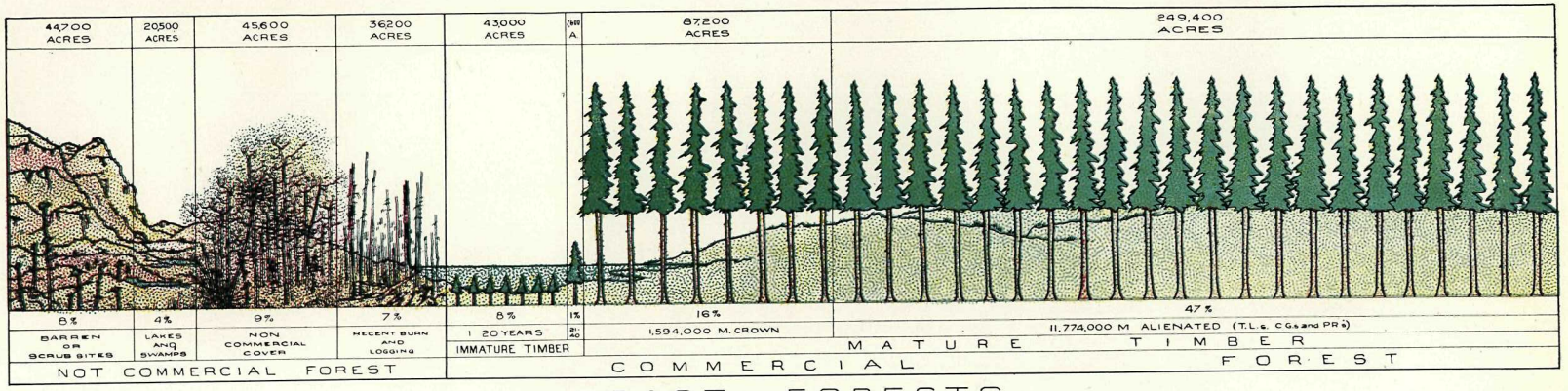
Herewith I beg respectfully to submit the Annual Report of the Forest Branch of the Department of Lands for the year 1929.

F. P. BURDEN,
Minister of Lands.

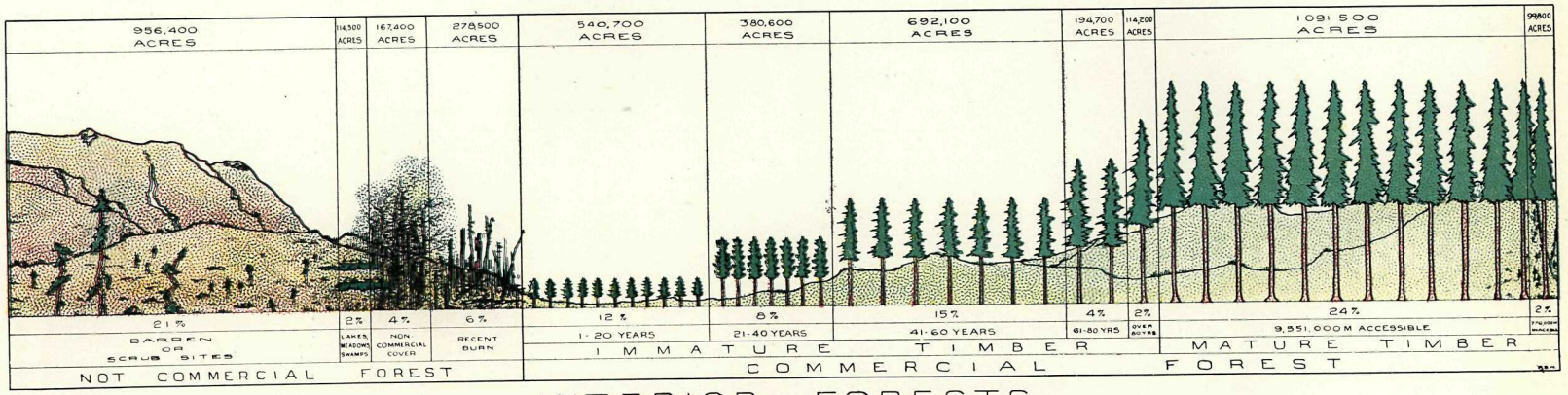
The Hon. F. P. Burden,
Minister of Lands, Victoria, B.C.

SIR,—There is submitted herewith the Annual Report on activities of the Branch during the calendar year 1929.

P. Z. CAVERHILL,
Chief Forester.



COAST FORESTS



INTERIOR FORESTS

Diagrams illustrating conditions found in fifteen Provincial Forests surveyed 1925 to 1929. Coast, 534,000 acres; Interior, 4,630,000 acres; total, 5,164,000 acres dedicated to forestry.

Scale of diagrams: { *Coast 1"=65,000 acres.* / *Interior 1"=560,000 acres.*

REPORT OF THE FOREST BRANCH,

DEPARTMENT OF LANDS.

ORGANIZATION AND PERSONNEL.

No material changes were made in the personnel during the year. J. M. Gibson, Assistant Forester in Operation Division, resigned to accept the Chair of Forestry at the University of New Brunswick. The continued drain from the higher technical personnel is a serious loss to the Province and is to be regretted. On the other hand, four Junior Foresters were added to the staff in the Survey and Research Divisions. The rearrangement of our radio system, with broadcasting from a central station at Campbell River, permitted the closing of two stations and the dispensing with the operators thereat. The force during the year mustered 550, of which 243 were on the permanent staff, as compared with 560 and 246, respectively, in 1928. The classification and distribution of the personnel is shown in the table below:—

DISTRIBUTION OF FORCE, 1929.

Forest District.	PERMANENT.													TEMPORARY.				
	Chief Forester, Assistant Chief Forester, and Foresters.	Grazing Commissioner and Assistants.	Lumber Commissioner and Assistants.	District Foresters.	Supervisors of Scalers and Assistants.	Scalers and Assistant Scalers.	Asst. Foresters, Asst. Dist. Foresters, and Junior Foresters.	Inspectors, Royalty, Mechanical and Export.	Supervisors of Rangers and Fire Inspectors.	Rangers.	Draughtsmen.	Clerks, Stenographers, and Messengers.	Wireless Telephone Operators.	Assistant Rangers.	Patrolmen, Lookout-men, and Dispatchers.	Launch Crews and Repairmen.	Cruisers, Compass-men and Packers.	Total.
Cariboo	....	....	...	1	....	....	1	....	....	4	...	2	....	7	6	....	....	21
Kamloops	....	....	....	1	....	....	1	....	....	3	....	1	....	7	19	....	....	32
Fort George	....	....	....	1	1	....	1	...	....	7	1	3	....	8	14	....	....	37
Prince Rupert	....	....	....	1	....	2	2	....	1	8	....	8	....	7	10	5	....	44
Southern Interior	....	....	....	1	1	....	3	....	4	18	1	13	....	24	70	....	...	135
Vancouver	....	....	....	1	3	31	3	1	5	18	1	25	1	24	34	14	....	160
Victoria	4	1	..	....	....	....	13	2	....	....	8	33	....	....	....	....	58	119
Toronto	...	....	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2
Totals	4	1	2	6	5	33	24	3	10	58	11	85	1	77	153	19	58	550

PROVINCIAL FORESTS.

The *Sayward Forest*, covering 394,500 acres of the Sayward Land District, north of Campbell River, on Vancouver Island, was reserved during the year. The area was examined and reported upon last year. The timber in this Forest is being logged at the rate of approximately 250,000,000 F.B.M. yearly and projected operations are expected to increase the annual cut materially.

Owing to the large proportion of old-growth timber, cutting rights over 89 per cent. of which have already been alienated, it would not be economically possible to place this Forest as a unit on a sustained yield basis. The present annual cut is approximately twice what the estimated sustained yield of large timber would be. However, it is anticipated that a much shorter period of growth after the first logging will again bring the Forest into production, since developments in wood-using industries may be expected to create a demand for smaller material as great as, if not greater than, the present demand for large timber.

It is planned by improved fire-protection and reforestation to preserve the productive capacity of this Forest and ultimately to increase the annual rate of growth.

A small area, 402 acres, was reserved on *Cowichan Lake* for experimental purposes.

The total area now under reserve in Provincial Forests is 6,907,000 acres in twenty Forests.

Forest Surveys.

The survey of the *Yahk Forest*, commenced last year, was completed. Including tie limits logged off by the Canadian Pacific Railway and other adjacent areas suitable for timber production, a total of 632,000 acres was surveyed.

The present condition of the forest is as follows:—

Area capable of producing Commercial Timber—

	Acres.	Acres.
Mature timber—		
Alienated	81,800	
On vacant Crown land	77,400	
		159,200
Immature timber—		
1–20 years old	214,400	
21–40 years old	37,000	
41–60 years old	52,200	
		303,600
Burns not yet reforested	33,500	
Bush or non-commercial cover	2,500	
		36,000
Total sites of productive quality		498,800

Incapable of producing Commercial Timber—

	Acres.
Rough and poor-quality soils capable of supporting scrub-growth only	106,300
Alpine and barren rock	24,900
Water, swamp, and meadow	2,200
Total non-productive sites	133,400

The standing mature timber with a minimum breast-high diameter of 11 inches is estimated as follows, in 1,000 board-feet.

	Crown.	Alienated.	Total.
Western larch	288,000	302,000	590,000
Engelmann spruce	243,000	163,000	406,000
Douglas fir	80,000	136,000	216,000
Lodgepole pine	147,000	51,000	198,000
Alpine fir	48,000	36,000	84,000
Yellow pine	4,000	54,000	58,000
Red cedar	21,000	14,000	35,000
White pine	5,000	10,000	15,000
Totals	836,000	766,000	1,602,000

The timber is being logged at the present rate of 54,000,000 F.B.M. per annum, chiefly for railway maintenance and the Prairie market. The Forest could support indefinitely only about 40 per cent. of this utilization, so that local industries will in time have to obtain their timber-supplies elsewhere.

Natural reforestation may be considered fairly satisfactory; more than 300,000 acres are growing young trees in sufficient quantity for at least a light merchantable crop; of the 36,000 acres on which conifers have not yet re-established themselves, some may yet be seeded naturally, being but recently burned; much of this latter area, however, will have to be planted to bring it back into production.

There are large grazing areas in this Forest which are not being utilized to capacity.

The survey of the *Shuswap Forest*, commenced last year, was completed. Conditions existing in this Forest were found to be as follows:—

Area capable of producing Commercial Timber—

	Acres.	Acres.
Mature timber—		
Alienated	38,800	
On vacant Crown land	130,900	
		169,700
Immature timber—		
1–20 years old	22,500	
21–40 years old	94,700	
41–60 years old	24,200	
61–80 years old	25,000	
		166,400
Bush or non-commercial cover		10,000
Total sites of productive quality		346,100

Incapable of producing Commercial Timber—

	Acres.
Alpine, barren, and scrub lands	147,000
Water and swamp	5,000
Total non-productive sites	152,000

A considerable amount of alpine area is unavoidably included in this Forest on the spur of the Gold Range separating Mabel Lake from the Upper Shuswap River.

Of the 169,700 acres of mature timber, 59,900 acres are estimated to be inaccessible by any known method of logging, although carrying spruce and alpine fir (balsam) of a satisfactory quality for pulp production.

A remarkable feature of this Provincial Forest is the extraordinary mixture of species, some stands including as many as nine together—fir; larch; hemlock; white, yellow, and lodgepole pine; cedar; spruce; alpine fir (balsam). Twenty-one thousand acres of the merchantable timber stands are uneven-aged, suitable for logging by the selection method or periodic logging, while in even-aged stands at the comparatively early age of 70 years on best sites thinnings can be made for ties, etc. Of the stands now mature, 31,000 acres are from 101 to 120 years old and 7,000 acres from 81 to 100 years.

The accessible timber is estimated as follows, in 1,000 board-feet:—

	Crown.	Alienated.	Total.
Douglas fir	242,000	107,000	349,000
Western hemlock	71,000	66,000	137,000
Western larch	88,000	46,000	134,000
White pine	71,000	37,000	108,000
Red cedar	53,000	39,000	92,000
Engelmann spruce	48,000	33,000	81,000
Alpine fir	22,000	3,000	25,000
Yellow pine	12,000	12,000	24,000
Total saw-timber	607,000	343,000	950,000

And in addition:—

Cedar pole timber (lineal feet)	12,400,000	6,100,000	18,500,000
Fir ties	2,560,000	790,000	3,350,000
Larch ties	1,020,000	340,000	1,360,000
Lodgepole-pine ties	890,000	70,000	960,000

Total, 18,500,000 lineal feet of poles and 5,670,000 ties.

The accompanying *Forest form diagram* illustrates a typical mature mixed stand in the Shuswap Forest, 110 years old.

FOREST FORM DIAGRAM

D B H	N° of trees per acre FIR	LARCH	CEDAR	WHITE PINE	BASAL AREA SQUARE FEET	N° of trees per acre HEMLOCK	SPRUCE & L. PINE	TOTAL	D B H
32	·1	·1	-	-		-	-	·2	32
30	·2	·2	-	-		-	-	·4	30
28	·6	·2	-	-		-	-	·8	28
26	1·0	·3	·1	·1		-	-	1·5	26
24	1·5	·5	·1	·2		-	-	2·3	24
22	2·0	·5	·3	·2		-	-	3·0	22
20	1·6	·5	·2	·2		-	-	2·5	20
18	2·5	·8	·6	·6		·1	·1	4·7	18
16	5·5	1·5	·9	1·4		·3	·2	9·8	16
14	2·6	1·9	1·4	4·0		1·1	·3	11·3	14
12	4·2	2·5	4·9	5·0		2·5	·5	19·6	12
10	3·0	1·4	5·8	5·5		2·2	·5	18·4	10
8	2·7	·7	9·3	1·2		1·8	·3	16·0	8
6	3·1	·7	12·8	2·4		4·7	-	23·7	6
4	4·5	·3	16·8	3·0		5·2	-	29·8	4
Totals	35·1	12·1	53·2	23·8	8 6 4 2 0 2 4 6 8	17·9	1·9	144·0	Totals

YIELD PER ACRE 10,200 F.B.M
(in trees over 11" dbh) 373 lin. ft. Cedar
51 ties

Based on measurements of 206·5 sq. chains on 10 strips

110-YEAR OLD MIXED STAND IN SHUSWAP FOREST

This diagram shows the basal area of each species by 2-inch classes drawn to scale. It shows clearly the relative importance of any particular species in the stand, also how cutting should be done to obtain any desired result in volume cut and condition of remaining stand.

The general form is irregular and indicates that thinning earlier in the life of the stand would have improved its form, and final yield, by removing the "wolf" trees now showing at the top of the figure. This would have prevented the existing recession in trees around 20 inches D.B.H.

These 110-year-old stands cover 31,000 acres in this Forest and are being logged for cedar poles, leaving a large volume of saw-timber.

Natural reforestation has been unusually successful, as is evidenced by the small proportion of productive land which is not covered with commercial species. The compartments of the Forest containing young growth are listed in the accompanying table, with the average number of trees per acre in each. Were the young natural stands of this Forest alone to be destroyed they could not be replaced in their present condition by planting at a cost of less than $5,000,000.

Owing to the very irregular mixtures of species in both young and old stands it was impossible to estimate the future yield of young stands by species. There are 31,000 acres of timber of the rotation age 110 years; the percentage of species varies in the different blocks of this age-class (as in all others); however, the total area is sufficiently large and distributed for it to be assumed that its average yield is a fair sample of what the younger age-classes will produce at a like age. On this basis, when there has been brought about by regulation an even distribution of age-classes, the Shuswap Forest will produce an accessible sustained annual yield of 31,000,000 F.B.M., provided all productive areas are kept stocked up to the average density of the natural forest to-day.

Natural Young Stands in the Shuswap Forest.

Compartment No.	Area (Acres).	Age (Years).	Number of Trees per Acre.							Average Height (Feet).	Average D.B.H. (Inches).	Estimated Future Yield (F.B.M.).
			Fir and Larch.	Lodgepole Pine.	White Pine.	Cedar.	Spruce and Balsam.	Hemlock.	Total.			
4 (*a*)	3,000	....	24,000	.....	300	3,400	300	2,000	30,000	*	*	36,000,000
4 (*b*)	900	10	380	.....	20	.....	.....	.....	400	10	....	10,800,000
5 (*a*)	2,400	50	500	.....	50	1,000	50	600	2,200	35	3.0	12,100,000
5 (*b*)	1,350	50	600	.....	50	600	50	100	1,500	45	4.0	16,200,000
6 (*a*)	5,300	28	150	200	40	40	50	.....	520	30	3.0	47,700,000
6 (*b*)	8,150	32	110	60	20	30	.....	.....	220	35	5.5	48,900,000
6 (*c*)	5,950	35	1,180	150	20	780	70	.....	2,200	25	2.0	71,300,000
8 (*a*)	1,400	45	160	1,000	.....	40	.....	.....	1,200	45	4.0	17,000,000
8 (*b*)	4,100	48	570	100	30	120	30	.....	850	45	5.0	49,400,000
10 (*a*)	4,550	....	45,000	1,000	1,000	12,000	1,000	.....	60,000	*	*	54,500,000
10 (*b*)	1,600	5	2,350	1,500	.....	50	.....	.....	3,900	4	....	19,000,000
11	5,400	50	630	370	40	230	160	170	1,600	40	4.5	48,600,000
16 (*a*)	8,100	38	790	350	.....	330	110	.....	1,580	30	3.0	96,900,000
16 (*b*)	2,250	40	980	500	30	170	540	.....	2,220	25	3.0	13,500,000
18	1,900	70	580	440	.....	630	120	.....	1,770	45	3.8	11,400,000
20	9,550	20	1,910	1,210	250	830	300	.....	4,510	10	0.7	11,100,000
28	2,200	20	570	.....	520	540	10	940	2,580	8	1.0	19,800,000
30 (*a*)	1,200	35	340	.....	170	390	10	2,450	3,460	20	3.5	7,300,000
30 (*b*)	13,800	33	570	.....	290	610	50	700	2,230	26	3.0	82,800,000
31	4,050	49	670	.....	210	950	100	530	2,460	35	4.0	48,800,000
33	900	16	830	.....	1,440	1,040	20	4,550	7,880	5	....	10,800,000
34	4,400	18	2,400	.....	140	1,910	40	360	4,860	9	0.9	52,800,000
37	34,900	30	340	430	110	670	110	.....	2,050	22	3.0	251,000,000
42	11,000	50	270	230	.....	170	50	.....	720	55	6.0	132,000,000

* Seedlings.
An estimated total future yield of 1,169,700,000 F.B.M.
Figures based on measurements made on 11,964 chains of examination strip; 1,745 chains tallied.

The present stocking of this Forest would support an annual cut of 24,000,000 F.B.M., all species and products. The present utilization of the forest is chiefly for cedar poles and railway-ties, with a total volume which is only a small proportion of the available yield. The cedar suitable for poles, however, is being heavily cut, the average for the last four years being just under 1,000,000 lineal feet yearly, two-thirds from alienated timber. There is enough pole cedar still standing to supply this demand for another nineteen years without increase in the annual cut; annual growth in the young stands (excluding those without a sufficient proportion of cedar to make an economic pole operation possible) amounts to the equivalent of 180,000 lineal feet. This would carry the pole-cutters a few years longer, but it is obvious that this special product will not be produced in quantity for more than twenty to twenty-five years longer at the present rate of cutting. After that period, assuming meanwhile the continued absence of other important utilization, a reserve of saw-timber of other species will remain which will provide for local labour now employed in the pole industry.

The *Okanagan Forest*, on the west side of the Okanagan Lake, was surveyed. The most readily accessible parts of this area have been logged in the past for several small sawmills now dismantled. There is still a large amount of yellow pine and fir, but a considerable proportion of the remaining stands are of pulp species, which, with the lower-grade fir, although accessible, are not of a quality which can find a ready market. The young stands are chiefly lodgepole pine, in the older classes of which considerable damage has been done in recent years by bark-beetles. An area of 640,000 acres was covered by the survey and estimates are now being compiled and the productive value of the Forest ascertained.

A survey was commenced of the *Elk Forest* and areas adjacent in the Elk River watershed. This important tributary of the Kootenay River drains the south-eastern corner of the Province and is the last to join the Kootenay before the latter enters the State of Montana.

The greater part of this watershed and of those of the adjacent Bull and Flathead Rivers is believed to be valuable forest land, with limited possibilities for agricultural development. The Bull has been logged by the Canadian Pacific Railway and its capabilities for future production will be ascertained. The area is a source of supply for mine-timber for the Crowsnest coal-mining district. Its timber is also a potential pulp resource, about which inquiries have already been received. The survey will provide information on these forest resources, a basis for improving means of protection from fire, and knowledge of the annual growth of merchantable products. A total of 220,000 acres was covered this year. This territory is directly across the Kootenay River from the Yahk Forest, which was reported above.

A survey was commenced of the watersheds of the *Adams River* and *Seymour River*, tributary to the Shuswap Lake. This is a tract of forest land between the Gold Range on the east and the watershed of the North Thompson River on the west; it joins on the south the Dominion Niskonlith and Shuswap Forest Reserves. Seven hundred and thirty thousand acres were examined this year, on sections of which area was found an estimated total of 1,470,000,000 F.B.M. saw or pulp timber, also 17,000,000 lineal feet of cedar pole timber and 250,000 fir and lodgepole-pine ties. The Adams Valley has been almost completely logged and is being examined to ascertain its future timber production value as well as its possibilities for agricultural development. Several cedar pole logging operations are being carried on in parts of this tract.

A survey was made of 213,000 acres in the *Powell Lake* vicinity on the Coast. This area has produced fine stands of old-growth timber and a great deal has been logged. Approximately 27,000 acres of merchantable timber remain. Over 40,000 acres of the recent logged or burned area is not yet reforested. Compilation of the results of this survey and mapping are proceeding.

LAND CLASSIFICATION.

In conjunction with the various forest surveys lands were examined for agricultural possibilities, particularly lands bordering the reserved Provincial Forests, so that permanent boundaries for the Forests may be defined which will not hinder agricultural development.

Adjacent to the *Yahk Forest* 16,650 acres were examined. Agriculture is handicapped in this vicinity by summer frosts and a dry climate necessitating irrigation. The areas not already settled were found to be too rough or stony for tillage or without water for irrigation. There is no merchantable timber on any of this area, but much of it has reforested after logging or fires.

In connection with the *Okanagan Forest* survey 76,000 acres of land was examined for agricultural value. Of this, 73,000 were found to be suitable for forest-growth only. In this

long-settled area all the land which can profitably be farmed has already been alienated, and in fact much unsuitable land without possibility of irrigation is privately held. The Forest boundaries might be extended to include 43,000 acres of forest land now outside.

On the *Adams River - Seymour River* survey 20,800 acres were examined for agricultural value; 8,500 acres of undeveloped farming-soils were located, 6,400 acres of which are in vacant Crown lands. The remainder of the lands were found to be unsuitable for agriculture.

An examination and classification of agricultural areas was made over 29,800 acres in the neighbourhood of the town of *Powell River*. Good agricultural soil was found to be scarce, and the cost of removing the heavy stumps and brush a great obstacle to development; 900 acres were classified as first-class and 6,300 acres as second-class agricultural land, the remaining 22,600 acres being suitable only for forest.

In connection with the *Elk Forest* survey 45,000 acres were examined and classified with regard to agricultural possibilities and for definition of a forest boundary. The area borders old settlements, and of the total examined only 715 acres of vacant land was found to be of agricultural value, but undeveloped privately-held land totalling 4,000 acres was found to be suitable for agriculture. There is practically no merchantable timber on any of this land.

The amount of agricultural area found on these soil and land-classification surveys does not indicate in any way the whole amount of farming land in any particular district. The examinations are made primarily for the purpose of classifying lands along the boundaries of Provincial Forests or to provide a basis for decision between agriculture and forestry as the best economic use of a tract. They are therefore conducted from the forest outwards, as it were. Generally speaking, the farming soils are in the valleys and on the benches and there irrigation and other factors are most favourable. All factors affecting agricultural development are examined as well as soils, of which samples are taken and, when necessary, analysed.

In doing this work a considerable amount of land suitable for settlement is classified, especially in the newer regions where farming has not progressed very far. In such cases the information obtained is of assistance to prospective settlers, who may be saved much time and expense in the personal examination of unsuitable lands.

AREAS EXAMINED FOR MISCELLANEOUS PURPOSES OF "LAND ACT," 1929.

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	..	.....	48	9,342	36	5,087	37	4,494	23	5,296
Fort George	..	.....	..	.....	24	3,427	38	9,668	11	1,487
Kamloops	7	1,239	..	.....	6	803	14	1,720	8	1,610
Prince Rupert	..	.....	..	.....	18	2,577	54	10,927	68	6,359
Southern Interior	..	.....	..	.....	9	1,439	55	6,266	24	1,603
Vancouver	..	.....	..	.....	13	1,316	53	7,906	56	6,074
Totals	7	1,239	48	9,342	106	14,649	251	40,981	189	22,426

CLASSIFICATION OF AREAS EXAMINED IN 1929.

Forest District.	Total Area.	Agricultural Land.	Non-agricultural Land.	Merchantable Timber Land.	Estimate of Timber on Merchantable Timber Land.
	Acres.	Acres.	Acres.	Acres.	M.B.M.
Cariboo	24,219	1,615	22,604	.....	.....
Fort George	14,582	4,606	9,976	635	6,583
Kamloops	5,372	888	4,484	.....	.....
Prince Rupert	19,862	5,185	14,677	536	5,430
Southern Interior	9,308	1,656	7,652	.....	.....
Vancouver	15,293	2,965	12,328	528	13,158
Totals	88,636	16,915	71,721	1,699	25,171

FOREST RESOURCES OF THE PROVINCE.

This work was continued during the year. The forest resources of the Lower Coast, Vancouver District, have now been mapped and compilation of the estimates is proceeding. The estimates of standing timber will be published in two figures—the resources of the district

which are accessible for operation under existing conditions and the total amount of timber, including those stands which cannot profitably be logged for the present.

In addition to those two estimates of standing timber, the forest inventory will include a classification of the whole land surface with respect to its forest value. The acreages of young and middle-aged second growth, scrub and non-commercial forest-cover, loggings and burns not reforested, alpine and barren lands, are being computed. It is expected that this estimate for the Vancouver District will be completed during the coming year.

In connection with the Provincial inventory and as a preliminary investigation of an area believed to be suitable for dedication to forestry, an extensive reconnaissance was made of the upper *Skeena River* watershed. The total area covered was 3,375,000 acres, including, in addition to the Skeena itself, the Kispiox, Alankis, Sustut, Bear, and Suskwa watersheds.

There are reported to be 299,000 acres of timber averaging over 10,000 F.B.M. per acre; 104,000 acres of lighter stands under 10,000 F.B.M. per acre; 53,000 acres of young growth; 46,000 acres of recent burns; 160,000 acres of bush or non-commercial cover, chiefly caused by severe fires in the past which have destroyed the previous stand of commercial species; the remainder of the area is alpine, barrens and scrub, including 26,000 acres of water and swamp. Only about 20 per cent. of the total area is reported to be productive quality. The Kispiox is the best watershed, having over 40 per cent. of its area covered with timber; this valley is recommended as suitable for a Provincial Forest outside the agricultural lands contained in it.

FOREST RESEARCH.

The outstanding features of research-work during the year have been the establishment of the Cowichan Lake Forest Experiment Station and the reservation of the Green Timbers area near New Westminster as the site for a forest nursery and experimental work in reforestation.

Cowichan Lake Experiment Station.

This station has been organized as a centre for research-work in the forests of the Douglas-fir region. At such a station it is possible to conduct experiments under close supervision and in a uniform manner from year to year without the delays and handicaps which occur when the same work is scattered over a large region. The station covers 402 acres bearing a mixture of second growth and mature timber which offers excellent opportunities for many phases of scientific forest research. It is centrally located in a district containing numerous areas of logged-off land, some of which bear good stands of natural reproduction, and there are also several blocks of virgin timber within easy reach. These surroundings offer splendid facilities for such experiments as cannot be performed within the boundaries of the experimental forest.

During 1929 a map of the forest was completed and an office building was erected, necessary trails were built to make the area readily accessible, and a fire-line was constructed to improve the protection of the area from outside forest fires.

Experimental Thinnings.—The practice of thinning is generally accepted as essential to the best forest management. In our Douglas fir region there remain to be determined the effects of various kinds of thinnings upon the behaviour of the stand, the quality of the final timber-crop, and the net profits to be earned by the forest.

With this end in view a series of experimental thinning plots have been established in the Cowichan Lake experimental forest. The plots are located in a thrifty, well-stocked, 19-year-old stand, established by seed-trees on logged-off, burned-over land of average site quality. While these experiments are intended to include various degrees and methods of thinning, the work in 1929 was of necessity confined to three plots, as follows: (*a*) Heavy thinning from below; (*b*) heavy thinning from above; and (*c*) an unthinned check-plot. The plots each contain approximately 1 acre surrounded by a control strip 1 chain wide, which has been given the same treatment as the plot which it contains, in order to prevent the experimental areas from being affected by the surrounding trees. Systematic and detailed notes have been made, so that measurements and full information may be obtained as to volume, quality, rate of growth, etc., on each plot. Subsequent examinations and thinnings will be made periodically, at which times all measurements will be repeated, so that comparative tables and curves will eventually be built up which it is hoped may indicate the proper method of forest management for second-growth stands of Douglas fir.

Studies of Seedling Survival.—The survival of young seedlings of Douglas fir and its associated species has been under study at Cowichan Lake during the past two years and in 1929 the problem was considered from a new angle. Whereas in former years the investigation was chiefly a practical study of the effect of varying intensities of sunlight as modified by artificial and natural shade, this year the effect of soil-moisture was observed. In addition to the effect of ordinary climatic conditions, the drying of a soil in nature is influenced by two major factors —(1) the demands of vegetative cover in drawing on the water in the soil to carry on its life processes, and (2) the evaporation from the surface of the soil which is prolonged by the capillary action of soil-particles in drawing water from the lower layers of the soil. In order to study the effect of vegetative cover, plots were laid out in the more common types which naturally follow after logging. Bracken, salal, fireweed, and mixed minor weeds are amongst those considered. As far as possible the plots were treated in the same way as plots formerly included in this study, each being sown with Douglas fir, hemlock, cedar, and spruce in separate sections. In order that the evaporation from the surface of the soil might be considered independently, check-plots were laid out, one adjacent to each of the above. These check-plots were denuded of all vegetation and were trenched around in such a manner that no roots could penetrate from plants outside the plot.

Each of the plots thus established was examined periodically and a calendar record was kept of all seedlings germinating and dying. These records were correlated with natural conditions of soil-moisture by means of a series of soil samples taken at intervals of not more than one week. These samples were immediately weighed and dried in an oven until all moisture was driven off; they were then reweighed and their original moisture content was recorded for comparison with the samples from other plots.

In order to make the records of the various plots properly comparable, soil-texture has also to be considered, since the proportions of fine and coarse particles affect the extent to which the moisture contained by the soil is available for the growth of seedlings. Analyses are being made of the soil samples which were tested for moisture, and the data thus secured should provide valuable information as to the soil conditions which are necessary for natural regeneration.

Aleza Lake Forest Experiment Station.

The main research project at Aleza Lake is a study of the cutting methods which are necessary in order to ensure adequate spruce regeneration after logging. This study was continued during 1929 with the necessary re-examinations and tallies of the existing experimental plots, which must be kept under observation for several years before final conclusions can be drawn. Preparations were also made for experimental logging-work where it is proposed to try out certain cutting methods which the investigations thus far would indicate as desirable.

Three new buildings were added to the equipment of this station. These were a house for the station foreman, a cook-house, and a barn.

History Maps.

The study of natural reforestation in typical logging operations was extended by the addition of two important areas at Campbell River to the ten properties which already are under observation. Maps were made of the two new areas and information secured as to the density of the reproduction. Re-examinations were made of some of the ten areas previously surveyed and in a few cases the boundaries of the study-areas were extended.

Permanent Experimental Plots.

Twenty-eight permanent plots were re-examined during the past field season. These had been established in previous years in order to study the subjects of: Natural seed-dissemination; regeneration from seed-trees; restocking under varying conditions of site and cover; mortality of reproduction; height-growth of reproduction; planting and seeding.

A study of natural seeding on logged-off lands from stands of timber adjacent to the cuttings is being made with the aid of seed-traps designed to catch the wind-blown seed. These traps are arranged in lines at locations near Ladysmith, Merville, and Lois Lake. Three thousand square feet of traps have been examined periodically in an effort to determine the quantity and quality of the tree-seed and the distance to which it is normally distributed by the wind.

Closely allied to seed-dissemination is the study of the survival of seed-trees left after logging and their effect on natural regeneration. Records dealing with this subject are being obtained from three series of plots on a burned site near Mayo.

Other features which determine the effectiveness of natural regeneration are the rate of restocking and the mortality of the seedlings from various causes. Studies of these matters are being made on permanent experimental plots located at Lois Lake, Jordan River, Read Bay, and Nanton Lake. The information obtained from these plots will be an indication of the extent to which we can depend on natural regeneration for reforestation purposes on various types of burned and unburned land, and also will be a guide in the treatment of young stands, both natural and artificial, to avoid mortality from preventable causes.

The annual growth in height of saplings and seedlings of Douglas fir and allied species was measured on four plots at Lois Lake; the effect of density of the stands on height-growth of saplings and seedlings was measured at Union Bay; and the seasonal growth of Douglas fir in its early stages is being studied on a plot at Cowichan Lake. The examination of these plots furnishes data which are necessary for a complete understanding of the growth-habits of our native commercial species.

Experimental plantations—of redwood at Lois Lake, native and exotic broadleaf species at Oyster River, and of Douglas fir, cedar, and hemlock from wild stock at Nimpkish Lake—are under observation to determine the adaptability of these species to local growing conditions.

Plots at Myrtle Point and Union Bay were remeasured in the course of an investigation into the possibility of direct seeding after fires on cut-over areas. On a plot near Nimpkish Lake the result of artificial seeding with Sitka spruce is being observed.

A special attempt is being made to secure satisfactory regeneration on a timber-sale which has been made in a valuable stand of spruce timber in the Little White Mountain Provincial Forest. The first logging on this sale was completed during the winter of 1928–29 and in the following summer a careful study was made of conditions in the logged-off area. The reproduction was tallied and permanent experimental plots were laid out; by means of subsequent examinations it will be possible to determine if the progress of reforestation is satisfactory.

Forest Mensuration.

No new yield tables were prepared during 1929, but additional growth data were gathered for Douglas fir, Engelmann spruce, and lodgepole pine in order to improve the accuracy of the present yield tables for these species, and an attempt was made to develop a satisfactory method of applying the tables to actual forest stands which often differ to a considerable extent from the average or normal conditions represented by the yield tables.

Data were collected for Douglas-fir yield tables on Saltspring Island and along the Canadian National Railway between Shawigan Lake and Cowichan Lake. The non-agricultural lands of Saltspring Island seem to be well stocked with almost pure stands of thrifty second-growth fir, all age-classes up to 150 years being well represented. In these two districts thirty-one temporary sample plots were laid out and ten additional cruise-strips from 10 to 20 chains in length were run in order to compare growth conditions on small, fully-stocked plots with those over large areas. We now have growth data covering practically the entire range of Coast Douglas fir which will give us a basis for the comparison of the rates of growth in the various parts of the region covered by this species.

Work on Engelmann spruce and lodgepole pine was carried out on the Yahk Provincial Forest, consisting mainly of diameter growth studies, and the development of practical methods of applying yield tables to extensive forests of these species. Some progress has been made in the preparation of the yield tables for uneven-aged stands of spruce in the Central Interior for which field data were secured in 1928, but due to changes in the research staff it has not been possible to bring this work to a conclusion.

Forest Nurseries.

At the experimental nursery near Victoria twenty-three beds of 1-year-old seedlings were transplanted in the spring of 1929 and seven beds were held over as 2-year-old seedlings. Twenty-seven new seed-beds were sown. Experiments were made with leaf-mulches and shading to prevent frost-heaving in seed-beds. By means of thinnings in the 1929 beds, a study was made of the effect of density on the growth and vigour of 1-year-old seedlings.

The experimental stock at the nursery now comprises approximately 80,000 2-year-old transplants, 5,000 2-year-old seedlings, and 70,000 1-year-old seedlings, including the following species: Douglas fir, Sitka spruce, western red cedar, western hemlock, grand fir, western white pine, sugar-pine, Monterey pine, Port Orford cedar, and eucalyptus.

One hundred and twenty-six sacks of cones were collected to furnish tree-seed for experimental and nursery work in 1930. In this work data were secured concerning the parent trees of each lot of seed collected, so that the final plantations may be related to the original source of the seed from which they have been derived.

After a careful survey of the Coast region the "Green Timbers" site was selected as offering the best conditions of soil, climate, water, transportation, and labour-supply for the development of a large forest nursery. Through the co-operation of the Dominion Department of the Interior a block of 620 acres of recently logged-off land was reserved for the Provincial Forest Branch.

A nursery will be developed at a central location in this area and the remainder used for an arboretum and for planting native and exotic species. A contract for clearing 5 acres, the first unit of the nursery, has been let. The one-year seedlings from Shelbourne Street will be transferred to transplant beds at this site early in 1930, and a part of the area will be planted at that time.

FOREST ENTOMOLOGY.

Field examination in the yellow-pine stands of the Merritt District in the Interior indicates the necessity for further clearing next spring, in order to prevent the only considerable area of yellow pine in British Columbia from again becoming infested with the bark-beetle, which formerly caused widespread damage in this species.

The Entomological Branch of the Dominion Department of Agriculture continued the work of tree-insect investigation throughout the Province under the direction of Mr. Ralph Hopping and his assistants. The major projects are summarized below:—

Of the two serious infestations of the western-hemlock looper (*Ellspia somniaria* Hulst.) discovered in 1928 on Indian River, North Arm of Burrard Inlet, and on Gold Creek, Alouette Lake, the former was given detailed study. Severe killing of merchantable timber has taken place, all species save spruce and white pine being affected. The infestation was lighter this year, but will probably increase in 1930. An experimental dusting by aeroplane was carried out here over an area of 45 acres, using 1,200 lb. of calcium arsenate (one part to six of hydrated lime). The results obtained are considered satisfactory, the conclusion being reached that 80 to 90 per cent. of the larvæ on the dusted area were killed. The cost of this experiment was shared by the Dominion Department of the Interior, the land-owners, and the Provincial Forest Service. The emergency nature of the project and the lack of suitable equipment ran the costs much higher than they would have been with proper organization and equipment.

Scouting-work disclosed other areas as being infested with the hemlock-looper, as follows: Seymour and Capilano Valleys, Mill Creek and McNab Creek Valleys on Howe Sound, Coquitlam Lake, Alouette Lake, Chehalis River at Harrison Lake, Popkum area near Chilliwack, and Stanley Park at Vancouver.

The life-history of the hemlock-looper, its parasites and predators are being studied by the staff of the Entomological Laboratories.

The black-headed tip-moth (*Peronia variana* Fern.) was found to be widely distributed over the southern coastal mainland and parts of Vancouver Island. No serious killings have been observed as the result of attacks made by this insect, but it is planned to make further studies of its depredations. Hemlock is the main host. The Britannia Beach infestation mentioned in last year's report has appreciably diminished and practically all trees are showing signs of recovery.

Three areas of spruce bud-worm (*Archips fumiferana*) were again examined on Vancouver Island at Colwood, Maple Bay, and Cedar Districts. It is reported most of the timber in the three infestations will probably recover if the epidemic receives a sufficient check within a reasonable time.

Further studies were conducted on the western-cedar borer (*Trachykele blondeli*) and on bark-beetles.

LUMBER TRADE EXTENSION.

The campaign for larger markets in Eastern Canada was followed as in previous years, the Lumber Commissioner keeping in touch with architects, engineers, and builders in order to have British Columbia lumber products specified where they would serve to better purpose or replace foreign materials. This work is cumulative and the result is indicated by the gradual increase in the sale of our lumber in the Eastern Canadian market. During the year new and better offices were secured at 92 King Street West, Toronto, which will be the future headquarters for this work.

Co-operation between the Government and the industry made it possible for a delegation of four lumbermen to visit Australia in the interests of trade extension. Australia is a large consumer of softwoods, secured mainly from the United States and the Baltic. The proportion of this business secured by British Columbia operators has materially declined during the past decade. The study of the market and its requirements by practical millmen, such as those constituting the delegation, should go far to turn a much larger share of this business into Empire channels.

THE FOREST INDUSTRIES.

In spite of the general slump prevailing during the last six months of the year, the value of forest products and the industrial position of the industry were maintained. Such items as pulp and paper products, shingles, and boxes show a distinct falling-off. Lumber, minor products, and the wood-working industries show an increase, which offsets the above decline. The following table gives the estimated value of production from the best information available at this time:—

ESTIMATED VALUE OF PRODUCTION.

Product.	1924.	1925.	1926.	1927.	1928.	1929.
Lumber	$41,800,000	$41,350,000	$42,516,000	$40,487,000	$48,346,000	$50,140,000
Pulp and paper	13,938,000	14,466,000	16,315,000	18,505,000	16,755,000	14,400,000
Shingles	10,000,000	10,000,000	10,500,000	6,800,000	10,000,000	8,300,000
Boxes	2,272,000	2,200,000	3,000,000	1,707,000	2,501,000	2,437,000
Piles, poles, and mine-props	2,100,000	2,400,000	2,792,000	4,030,000	4,684,000	5,500,000
Cordwood, fence-posts, and mine-ties	1,400,000	1,800,000	1,414,000	1,405,000	1,633,000	1,734,000
Ties, railway	2,242,000	1,990,000	1,420,000	1,440,000	1,873,000	2,116,000
Additional value contributed by the wood-using industry	2,100,000	2,100,000	2,100,000	2,100,000	2,200,000	2,100,000
Laths and other miscellaneous products	550,000	1,617,000	1,500,000	2,000,000	2,100,000	2,400,000
Logs exported	4,300,000	3,870,000	3,170,000	4,561,000	3,580,000	4,124,000
Pulp-wood exported	.....	148,000	75,000	52,000	115,000	50,000
Totals	$80,702,000	$81,941,000	$84,802,000	$83,087,000	$93,787,000	$93,301,000

WATER-BORNE TRADE.

The water-borne trade again increased and reached a new record of 800,000 M.B.M., as shown by the table herewith presented. The most noteworthy change is in the increased demand for British Columbia lumber from China, Australia, Egypt, the West Indies, South Africa, and Mexico. The unsegregated markets and miscellaneous sales also show a very material increase over 1928. On the other hand, purchases by Japan and the United States were less than in the previous year. The Dominion Government during the year granted a subsidy to a line of lumber-carriers between British Columbia and Australian ports, and a committee of lumbermen is now in Australia, studying the market needs there with a view of increasing our sales. Australia is a large consumer of imported softwoods and it may be expected that British Columbia lumber in still larger quantities will be marketed there in the future.

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

Destination.	1923.	1924.	1925.	1926.	1927.	1928.	1929.
Australia	78,003,422	34,848,783	40,228,887	36,809,373	53,502,046	29,843,132	41,493,476
New Zealand	11,252,890	12,169,230	12,619,730	16,201,328	10,847,545	8,531,322	8,559,208
South America	717,600	752,906	2,168,921	1,160,947	2,168,973	10,304,032	2,449,494
China	36,398,234	25,595,993	10,783,086	4,615,921	9,178,973	16,902,137	43,323,398
Japan	105,916,915	79,107,984	67,671,449	177,193,559	191,597,552	219,361,557	192,411,505
United Kingdom and Continent	16,201,290	41,527,008	53,845,679	41,575,593	36,427,449	67,075,872	69,903,655
South Africa	8,221,032	10,681,208	8,875,544	17,651,788	18,562,680	13,625,781	15,889,002
India and Straits Settlements	4,803,236	2,228,150	3,359,869	1,653,675	3,566,713	411,577	243,807
United States and Atlantic Coast	248,611,600	313,104,821	361,016,940	400,347,692	392,074,528	384,107,908	351,526,590
Philippine and Hawaiian Islands	4,361,139	134,690	56,863	221,378	1,734,314	56,681	.....
West Indies and Cuba	994,341	544,604	667,012	8,792,765	16,023,319	8,356,571	14,347,317
South Sea Islands	3,665,241	3,454,183	2,610,143	3,791,670	1,884,632	5,496,319	5,508,978
Mexico	677,756	.....	.....	.....	.....	333,660	623,766
Egypt	1,705,394	6,883,150	12,820,848	2,573,529	2,649,559	1,149,573	4,744,180
Foreign, unclassified	177,041	229,608	835,317	154,038	12,047	.....	50,494,046
Totals	521,707,132	531,262,318	577,560,288	712,743,256	740,230,330	765,556,122	801,518,422

PULP AND PAPER.

The general pulp and paper situation in Canada is reflected in the production and value of this product. The production of newsprint in British Columbia declined 10 per cent. and the value of the products $2,355,000, or 14 per cent. It may be stated, however, that British Columbia mills were able to operate as near capacity as the mills in any other section of Canada. The situation is only temporary and has not destroyed the confidence in the future of pulp and paper on the Pacific Coast, as is shown by the development programme of the Powell River Company and the many inquiries reaching the Department in regard to sites suitable for development.

In the tables below all the ground wood and 50,000 tons of sulphite went into the manufacture of newsprint within the Province.

PULP (IN TONS).

Pulp.	1920.	1921.	1922.	1923.	1924.	1925.	1926.	1927.	1928.	1929.
Sulphite	92,299	68,502	86,894	99,878	89,839	92,514	108,381	119,005	120,413	112,925
Sulphate	16,380	6,519	9,674	9,932	14,403	16,856	15,000	13,700	15,050	15,647
Ground wood	108,665	89,725	100,759	107,266	112,001	121,363	136,123	163,548	170,005	151,066

PAPER (IN TONS).

Product.	1920.	1921.	1922.	1923.	1924.	1925.	1926.	1927.	1928.	1929.
Newsprint	136,832	110,176	124,639	142,928	136,281	148,201	176,924	214,010	225,477	201,009
Other papers	9,792	6,934	7,945	7,709	9,653	9,261	10,389	13,745	15,960	19,492

TIMBER ADMINISTRATION.

The general work of the Branch in timber administration is shown by the following tables more clearly than by any general description. It only remains for me to comment on some of the outstanding points by way of emphasis.

The scale of forest products increased by about 5 per cent. This increase was almost wholly from Crown-granted lands, thus indicating a still greater concentration of operations. This condition is due to the fact that these lands contain the better fir stands, to the economic condition of the times which forces the cutting of the most accessible stands and the most popular species, and probably to some extent to the fact that taxation places a much heavier carrying charge on these lands than on timber held under licence. Good forest practice requires the distribution of the cut over the whole forest area, in accordance with the growing capacity of the forest. We can only accomplish this objective when market conditions are such that timber from our remote valleys will pay the cost of extraction, manufacturing, and marketing.

Timber scaled in British Columbia in 1929. (By Months and Districts.)

		Cariboo.	Kamloops.	Fort George.	Southern Interior.	Prince Rupert.	Vancouver.	Total, F.B.M.	Total Lineal Feet.	Total Cords.	Total Hewn Ties.
January	F.B.M.	31,580	714,744	4,635,484	9,042,873	1,313,539	95,971,270	111,709,490	.....	.....	.....
"	lineal ft.	2,750	24,016	3,600	1,003,610	58,640	401,962	.....	1,494,578	.....	.....
"	cords	119	66	192	4,901	127	13,245	.....	.....	18,650	.....
"	hewn ties	3,599	5,600	37,857	61,802	16,438	.....	.....	.....	.....	125,296
February	F.B.M.	.....	1,825,994	8,224,508	6,010,646	3,544,189	134,501,429	154,106,766	.....	.....	.....
"	lineal ft.	.....	980,030	10,325	484,638	488,078	689,018	.....	2,652,089	.....	.....
"	cords	34	1,977	264	5,166	19	5,637	.....	.....	13,097	.....
"	hewn ties	2,252	27,822	57,968	89,285	74,227	2,956	.....	.....	.....	254,510
March	F.B.M.	165,074	12,209	8,399,314	6,408,525	1,303,347	269,205,421	285,493,890	.....	.....	.....
"	lineal ft.	.....	10,079	8,395	381,034	276,820	865,712	.....	1,542,040	.....	.....
"	cords	.....	64	335	5,281	227	11,435	.....	.....	17,342	.....
"	hewn ties	28,895	105	166,942	108,272	83,225	38,555	.....	.....	.....	425,994
April	F.B.M.	235,136	380,845	14,461,982	12,965,651	6,286,498	196,130,688	230,460,800	.....	.....	.....
"	lineal ft.	.....	138,019	80,175	1,000,100	239,670	689,844	.....	2,147,808	.....	.....
"	cords	40	96	351	7,152	361	9,232	.....	.....	17,232	.....
"	hewn ties	16,032	33,503	186,151	250,011	58,927	5,080	.....	.....	.....	549,704
May	F.B.M.	217,159	474,645	6,190,848	18,352,089	11,157,456	206,363,469	242,755,666	.....	.....	.....
"	lineal ft.	.....	406,432	16,235	1,175,204	394,739	802,425	.....	2,795,035	.....	.....
"	cords	5	48	64	3,418	325	9,567	.....	.....	13,427	.....
"	hewn ties	10,509	4,042	137,054	116,856	74,854	26,508	.....	.....	.....	369,823
June	F.B.M.	449,733	283,257	14,288,552	27,475,124	12,983,529	234,961,774	290,441,969	.....	.....	.....
"	lineal ft.	12,246	246,273	147,990	1,285,769	621,889	1,258,007	.....	3,572,174	.....	.....
"	cords	.....	73	454	5,479	96	5,177	.....	.....	11,279	.....
"	hewn ties	6,961	20,708	74,962	104,300	62,275	6,064	.....	.....	.....	275,270
July	F.B.M.	245,004	5,393,159	9,884,181	27,261,926	12,135,650	207,132,918	262,052,838	.....	.....	.....
"	lineal ft.	.....	1,702,697	184,145	1,022,084	376,380	1,697,163	.....	4,982,469	.....	.....
"	cords	200	1,481	36	4,954	441	5,612	.....	.....	12,724	.....
"	hewn ties	2,991	76,945	8,859	59,489	61,760	2,586	.....	.....	.....	212,630
August	F.B.M.	135,453	809,871	10,823,056	27 147,442	10,238,394	201,958,440	251,112,656	.....	.....	.....
"	lineal ft.	.....	314,027	67,365	751,733	422,207	1,809,949	.....	3,365,281	.....	.....
"	cords	74	62	38	1,697	194	4,988	.....	.....	7,053	.....
"	hewn ties	713	.....	32,533	184,728	182,841	27,130	.....	.....	.....	427,945
September	F.B.M.	4,039	5,429,623	12,419,373	15,836,357	17,622,679	190,531,652	241,843,723	.....	.....	.....
"	lineal ft.	.....	1,764,825	15,890	874,088	184,372	2,086,583	.....	4,925,758	.....	.....
"	cords	.....	1,396	16	1,679	36	6,780	.....	.....	9,907	.....
"	hewn ties	.....	96,279	33,453	52,641	97,743	3,268	.....	.....	.....	283,384
October	F.B.M.	49,175	200,654	9,336,529	21,553,615	13,823,304	311,918,050	356,881,327	.....	.....	.....
"	lineal ft.	15,315	319.255	122,365	1,560,251	109,102	1,845,212	.....	3,971,500	.....	.....
"	cords	.....	40	134	2,065	225	5,784	.....	.....	8,248	.....
"	hewn ties	.....	2,846	11,577	39,978	230,966	.....	.....	.....	.....	285,367
November	F.B.M.	189,220	1,121,163	2,549,079	13,179,569	11,870,129	188,050,233	216,959,393	.....	.....	.....
"	lineal ft.	4,905	1,422,007	101,630	1,111,039	308,792	1,036,623	.....	3,984,996	.....	.....
"	cords	.....	1,665	.....	3,653	230	10,572	.....	.....	16,120	.....
"	hewn ties	....	27,189	62,019	40,287	19,736	11,691	.....	.....	.....	160,922
December	F.B.M.	59,088	107,874	1,766,131	7,310,960	13,442,795	273,802,476	296,489,324	.....	.....	.....
"	lineal ft.	.....	463,754	162,935	702,715	1,934,324	756,033	.....	4,019,761	.....	.....
"	cords	71	88	185	2,840	83	4,740	.....	.....	8,007	.....
"	hewn ties	....	1,876	20,440	33,829	87,804	11,291	.....	.....	.....	155,240
Totals for year	F.B.M.	1,780,661	16,754,038	102,979,037	192,544,777	115,721,509	2,510,527,820	2,940,307,842	.....	.....	.....
"	lineal ft.	35,216	7,791,414	921,050	11,352,265	5,415,013	13,938,531	.....	39 ,453,489	.....	.....
"	cords	543	7,056	2,069	48,285	2,364	92,769	.....	.....	153,086	.....
"	hewn ties	71,952	296,915	829,815	1,141,478	1,050,796	135,129	.....	.....	.....	3,526,085

Total scaled in F.B.M. = 3,346,144,287.

Species cut (in F.B.M.).

Forest District.	Fir.	Cedar.	Spruce.	Hemlock.	Balsam.	Yellow Pine.	White Pine.	Jack-pine.	Larch.	Cottonwood	Miscel.	Totals.
Cariboo	4,406,036	107,900	71,405	.....	.....	.....	.....	.....	.....	.....	.....	4,585,341
Fort George	8,170,005	5,413,175	91,397,399	.....	4,622,063	.....	.....	24,209,525	.....	526,320	606,600	134,945,087
Kamloops	14,311,526	44,136,359	5,025,783	130,432	20,275	154,829	60,503	3,121,830	.....	446	2,963,725	69,925,708
Southern Interior	52,827,009	71,884,912	34,985,100	7,724,410	2,444,087	32,762,286	10,566,515	17,834,056	39,082,808	1,595,304	41,792,615	313,499,102
Totals, Interior	79,714,576	121,542,346	131,479,687	7,854,842	7,086,425	32,917,115	10,627,018	45,165,411	39,082,808	2,122,070	45,362,940	522,955,238
Prince Rupert	2,404,280	46,973,524	50,049,733	28,897,339	14,430,105	.....	91,761	31,867,819	.....	1,092,913	1,481,200	177,288,674
Vancouver	1,578,408,231	578,040,801	39,297,934	357,995,971	50,464,193	.....	11,021,548	.....	.....	1,499,378	29,172,319	2,645,900,375
Totals, Coast	1,580,812,511	625,014,325	89,347,667	386,893,310	64,894,298	.....	11,113,309	31,867,819	.....	2,592,291	30,653,519	2,823,189,049
Grand totals, 1929	1,660,527,087	746,556,671	220,827,354	394,748,152	71,980,723	32,917,115	21,740,327	77,033,230	39,082,808	4,714,361	76,016,459	3,346,144,287
Grand totals, 1928	1,604,941,926	738,626,482	204,110,500	353,268,734	68,264,722	31,919,089	23,073,267	75,567,367	24,386,323	5,234,832	77,512,224	3,206,905,466
Grand totals, 1927	1,411,296,248	656,030,374	188,234,622	306,859,508	70,013,721	34,165,320	35,157,414	63,578,562	27,607,809	1,927,889	58,830,995	2,853,702,462
Grand totals, 1926	1,306,615,563	705,409,476	248,706,996	332,691,280	90,419,605	29,368,123	30,079,384	45,565,603	40,696,415	.....	88,566,757	2,918,119,202
Grand totals, 1925	1,016,931,573	761,424,202	209,036,148	305,659,173	69,757,874	41,116,018	30,653,478	56,350,628	46,715,296	.....	73,622,137	2,611,266,527
Grand totals, 1924	1,036,019,000	610,201,000	267,899,000	322,715,000	66,069,000	38,354,000	25,243,000	75,895,000	56,896,000	.....	50,409,000	2,549,700,000
Grand totals, 1923	1,139,149,000	573,615,000	209,017,000	322,217,000	71,538,000	61,790,000	31,183,000	53,491,000	44,887,000	.....	4,848,000	2,521,735,000
Grand totals, 1922	846,171,000	461,265,000	149,247,000	238,891,000	38,904,000	43,630,000	34,405,000	43,774,000	39,759,000	.....	3,112,000	1,899,158,000

Total Amount of Timber scaled in British Columbia during Years 1928–29.
(F.B.M.)

Forest District.	1928.	1929.	Gain.	Loss.	Net Gain.	Net Loss.
Cariboo	6,596,507	4,585,341		2,011,166		
Fort George	134,503,890	134,945,087	441,197			
Kamloops	56,120,541	69,925,708	13,805,167			
Southern Interior	285,743,482	313,499,102	27,755,620			
Totals, Interior	482,964,420	522,955,238	42,001,984	2,011,166	39,990,818	
Prince Rupert	142,172,853	177,288,674	35,115,821			
Vancouver	2,581,768,193	2,645,900,375	64,132,182			
Totals, Coast	2,723,941,046	2,823,189,049	99,248,003		99,248,003	
Totals for Province	3,206,905,466	3,346,144,287	141,249,987	2,011,166	139,238,821	

Total Scale segregated, showing Land Status. (In F.B.M.)

Forest District.	Timber Licences.	Timber Leases.	Hand-loggers' Licences.	Timber-sales.	Pre-emptions S.R., and Miscellaneous.	Crown Grants.				Dominion Lands.	Totals.
						To 1887.	1887–1906.	1906–1914.	1914 to Date.		
Cariboo				3,604,393	325,990	4,600	1,100	28,400	554,358	66,500	4,585,341
Fort George	44,256,745			57,894,820	8,407,065		29,600	12,981,419	11,375,438		134,945,087
Kamloops	10,027,287			11,678,153	1,198,933		102,349	1,596,852	1,110,537	44,211,597	69,925,708
Prince Rupert	32,311,388	6,576,342	5,863,631	94,973,709	4,749,886	1,788,990	2,394,082	12,981,725	14,818,621	830,300	177,288,674
Southern Interior	72,752,914			80,128,484	3,329,604	2,675,689	107,821,949	31,724,640	10,555,392	4,510,430	313,499,102
Vancouver	415,839,494	367,753,269	49,249	135,096,257	7,106,220	1,219,241,293	176,835,012	40,124,716	20,795,637	263,059,228	2,645,900,375
Totals, 1929	575,187,828	374,329,611	5,912,880	383,375,816	25,117,698	1,223,710,572	287,184,092	99,437,752	59,209,983	312,678,055	3,346,144,287
Totals, 1928	601,586,290	410,384,094	5,249,856	324,618,812	40,523,494	1,103,204,936	264,833,742	89,743,869	63,531,354	303,229,019	3,206,905,466
Totals, 1927	575,430,088	383,905,689	5,195,168	291,505,941	28,844,603	905,838,664	249,714,968	74,197,517	52,915,769	286,154,055	2,853,702,462
Totals, 1926	553,819,858	424,159,254	7,505,570	296,134,949	35,988,023	860,781,276	269,782,298	118,581,259	58,143,748	293,222,967	2,918,119,202
Totals, 1925	530,863,844	342,943,804	10,542,541	315,669,296	60,664,065	615,470,589	281,322,987	106,292,808	44,850,733	302,735,860	2,611,266,527

Logging Inspection.

Forest District.	Operations.				No. of Inspections.
	Timber-sales.	Hand-loggers' Licences.	Leases, Licences, Crown Grants, and Pre-emptions.	Totals.	
Cariboo	94	...	41	135	266
Fort George	293	...	243	536	1,333
Kamloops	96	...	110	206	469
Prince Rupert	640	96	331	1,067	2,029
Southern Interior	435	...	631	1,066	2,425
Vancouver	349	3	646	998	2,990
Totals, 1929	1,907	99	2,002	4,008	9,512
Totals, 1928	1,623	50	2,023	3,696	9,596
Totals, 1927	1,584	133	1,873	3,590	8,661
Totals, 1926	1,475	84	1,921	3,453	7,921
Totals, 1925	1,262	54	1,730	3,046	7,321
Totals, 1924	1,245	69	1,853	3,167	7,466
Totals, 1923	1,010	166	2,140	3,316	6,892
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

Trespasses.

Forest District.	No. of Cases.	Areas cut over (Acres).	Quantity cut.				No. of Resulting Seizures.	Amount.
			Feet B.M.	Lineal Feet.	Cords.	Ties.		
Cariboo	2	3	.....	1,475	4	....	..	$ 30 63
Fort George	15	57	191,635	11,415	40	1,117	1	658 62
Kamloops	12	133	58,147	30,863	....	1,120	..	1,073 64
Prince Rupert	14	55	173,300	8,396	507	1,493	1	908 37
Southern Interior	36	71	245,494	24,858	....	2,176	3	1,429 86
Vancouver	20	51	315,733	11,990	18	....	4	1,329 95
Totals, 1929	99	370	984,309	88,997	569	5,906	9	$ 5,431 07
Totals, 1928	105	878	5,867,052	98,279	4,713	16,599	12	$17,787 10
Totals, 1927	83	399	2,290,926	47,871	2,862	9,660	9	$ 9,097 53
Totals, 1926	84	541	1,972,843	144,357	433	10,233	6	$ 9,457 64
Totals, 1925	87	645	3,486,609	98,456	1,563	16,820	4	$14,534 94
Totals, 1924	68	570	2,182,808	54,068	767	7,646	2	$ 8,539 86
Totals, 1923	105	1,015	6,712,868	121,202	1,598	20,082	8	$27,860 08
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

The average stumpage price shows a decline. This is due to several large sales on more difficult logging-sites made in the Fort George District. Of the Coast species fir, cedar, hemlock, and balsam remain almost stationary. In connection with our timber-sales we must face the fact that in future we will be dealing with areas more and more difficult of access, and this will tend to offset general rises in stumpage.

Timber Sales awarded by Districts, 1929.

District.	No. of Sales.	Acreage.	Saw-timber (Ft. B.M.).	Poles and Piling (Lineal Feet).	No. of Posts.	No. of Cords.	No. of Ties.	Estimated Revenue.
Cariboo	42	4,893.50	3,679,000	3,500	.....	1,583	96,039	$ 15,865 57
Kamloops	58	17,506.00	14,763,000	1,879,328	.....	30	79,783	94,830 50
Fort George	148	55,608.22	326,799,000	1,277,160	54,000	1,135	700,398	818,394 75
Southern Interior	235	49,749.70	53,484,000	3,012,835	309,265	10,993	185,838	212,774 37
Prince Rupert	262	48,221.25	133,697,000	2,610,836	10,800	1,153	412,043	302,956 09
Vancouver	229	40,243.60	159,533,000	573,178	.....	8,303	31,850	463,279 42
Totals, 1929	974	216,222.28	691,973,000	9,356,837	374,065	23,197	1,505,951	$1,908,100 70
Totals, 1928	1,033	194,929.37	525,250,760	6,537,002	880,000	48,728	1,996,457	$1,344,273 93
Totals, 1927	821	258,097.26	1,611,612,079	7,332,939	736,100	22,057	1,380,553	$2,666,678 32
Totals, 1926	687	118,815.23	295,486,743	5,497,707	207,190	13,455	1,044,999	$1,038,536 69
Totals, 1925	613	94,015.25	189,022,314	6,629,449	12,877	40,334	566,142	$ 795,802 20
Totals, 1924	769	146,652	302,813,267	6,336,071	.....	47,640	2,418,633	$1,226,460 87
Totals, 1923	852	163,464	516,397,438	6,234,342	.....	23,150	2,304,161	$1,513,970 84
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 09
Totals, 1918	227	34,257	159,659,000	378,080	20,0000	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	$ 259,765 12

Average Sale Price by Species.

Saw-timber.	Figures for 1929.		Figures for 1928.		Figures for 1927.		Figures for 1926.	
	Board-feet.	Price Per M.	Board-feet.	Price per M.	Board-feet.	Price per M.	Board-feet.	Price Per M.
Douglas fir	100,886,000	$1 65	55,958,000	$1 51	57,144,445	$1 63	57,772,863	$1 67
Cedar	59,142,000	1 62	48,565,266	1 61	30,839,900	1 68	37,147,149	2 01
Spruce	306,370,000	1 25	110,797,541	1 65	146,694,173	1 71	106,636,017	1 76
Hemlock	70,737,000	82	49,423,655	85	26,344,700	96	40,746,817	1 01
Balsam	26,622,000	80	26,034,838	83	31,931,100	66	21,478,293	79
White pine	8,229,000	2 44	4,553,000	2 98	4,992,940	3 15	6,370,450	3 98
Western soft pine	8,949,000	1 47	9,316,780	1 77	12,354,200	1 73	5,225,470	2 04
Tamarack	5,547,000	1 01	6,448,800	1 23	5,617,505	1 07	425,000	1 47
Other species	7,277,000	97	9,917,880	1 09	2,175,116	1 12	10,344,684	1 47
Totals	*593,759,000	$1 29	†321,015,760	$1 40	‡318,094,079	$1 53	§286,146,743	$1 66

* Note.—98,214,000 board-feet pulp saw-timber not included in 1929 totals.
† Note.—204,235,000 board-feet pulp saw-timber not included in 1928 totals.
‡ Note.—1,293,518,000 board-feet pulp saw-timber not included in 1927 totals.
§ Note.—9,340,000 board-feet pulp saw-timber not included in 1926 totals.

Timber cut from Timber-sales during 1929.

Forest District.	Feet B.M.	Lineal Feet.	Cords.	Ties.	Posts.
Cariboo	1,583,445	12,126	464.00	59,932	.....
Kamloops	2,305,643	1,371,140	97.00	81,209	.....
Fort George	43,839,963	343,387	519.00	435,154	48,000
Southern Interior	43,879,175	3,703,380	10,283.41	329,131	279,133
Prince Rupert	56,085,332	2,102,570	479.10	640,684	4,905
Vancouver	118,323,384	433,620	12,820.95	8,760	.....
Totals, 1929	266,016,942	7,966,223	24,663.46	1,554,870	332,038
Totals, 1928	203,208,331	7,672,294	24,389.35	1,714,709	376,253
Totals, 1927	214,209,921	6,368,269	27,508.54	1,359,902	86,109
Totals, 1926	242,973,524	4,974,620	16,676.45	1,198,922	83,763
Totals, 1925	251,141,398	4,885,352	20,808.14	1,077,414	.....
Totals, 1924	230,148,575	4,541,371	17,294.00	1,543,915	.....
Totals, 1923	207,473,848	2,753,532	17,666.55	856,628	.....
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	.....	.....

Areas cruised for Timber-sales.

Forest District.	Number cruised.	Acreage.	Saw-timber (M.B.M.).	Poles and Piles (Lineal Feet).	Shingle-bolts and Cordwood (Cords).	Railway-ties (No.).	Posts (No.).
Cariboo	43	4,516	2,297	3,500	1,583	90,471	.....
Fort George	144	37,794	110,732	1,533,877	1,665	449,394	8,000
Kamloops	61	13,646	17,815	2,196,280	30	63,568	.....
Prince Rupert	281	48,391	137,137	3,949,652	1,478	532,073	10,000
Southern Interior	288	67,969	118,569	4,754,645	10,119	158,544	167,740
Vancouver	244	42,558	113,870	605,649	2,754	11,060	.....
Totals, 1929	1,061	214,874	500,420	13,043,603	17,629	1,305,110	185,740
Totals, 1928	1,111	233,889	754,095	9,623,599	43,266	2,056,604	447,630
Totals, 1927	844	225,191	974,626	7,092,844	21,027	1,747,441	35,600
Totals, 1926	819	142,515	369,717	4,236,881	15,248	1,299,826	20,200
Totals, 1925	819	119,436	353,225	9,113,052	57,441	1,389,604	14,477
Totals, 1924	942	179,609	451,476	8,465,924	41,554	1,873,954	.....

The number of sawmills operated during the year shows an increase, but the rated capacity is slightly less than in 1928. For the year three fewer shingle-mills were in operation, and the rated daily capacity was 400 M.B.M. less than a year ago.

Saw and Shingle Mills of the Province.

Forest District.	Operating.				Shut Down.			
	Sawmills.		Shingle-mills.		Sawmills.		Shingle-mills.	
	No.	Estimated Daily Capacity, M. B.M.	No.	Estimated Daily Capacity, Shingles, M.	No.	Estimated Daily Capacity, M. B.M.	No.	Estimated Daily Capacity, Shingles, M.
Cariboo	14	60	..	....	20	86	..	....
Fort George	23	713	..	....	4	85	..	....
Kamloops	5	83	..	....	5	195	..	....
Prince Rupert	23	445	..	....	17	702	1	200
Southern Interior	98	1,960	3	85	15	250	2	270
Vancouver	191	8,635	50	7,796	34	882	12	1,256
Totals, 1929	354	11,896	53	7,881	95	2,200	15	1,726
Totals, 1928	314	11,919	56	8,280	120	2,459	15	2,710
Totals, 1927	375	12,176	65	12,042	110	2,549	22	2,740
Totals, 1926	391	12,962	87	15,614	102	1,675	6	460
Totals, 1925	363	11,475	82	15,322	109	2,121	9	625
Totals, 1924	359	11,986	78	15,636	103	2,618	20	1,780
Totals, 1923	352	11,273	107	16,144	72	1,493	16	745
Totals, 1922	292	9,683	108	15,544	90	2,054	8	680
Totals, 1921	289	8,912	79	10,885	78	2,029	6	788
Totals, 1920	341	10,729	109	13,426	37	909	2	30

Export of Logs. (In F.B.M.)

Species.	Grade No. 1.	Grade No. 2.	Grade No. 3.	Ungraded.	Totals.
Fir	9,076,604	96,924,452	29,453,144	.....	135,454,200
Cedar	3,916,981	36,903,052	30,415,303	.....	71,235,336
Spruce	21,561	142,091	134,264	.....	297,916
Hemlock	.....	.....	.....	24,578,195	24,578,195
Balsam	.....	.....	.....	3,385,352	3,385,352
Yellow pine	.....	.....	.....	1,519,000	1,519,000
White pine	.....	.....	.....	461,838	461,838
Cottonwood	.....	28,000	.....	.....	28,000
Miscellaneous	.....	.....	.....	33,740	33,740
Totals, 1929	13,015,146	133,997,595	60,002,711	29,978,125	236,993,577
Totals, 1928	20,563,249	106,084,161	47,994,423	37,305,398	211,947,231
Totals, 1927	36,545,972	144,942,558	51,584,928	48,510,833	281,584,291
Totals, 1926	32,195,991	105,322,879	53,113,521	33,845,324	224,477,715
Totals, 1925	34,501,748	96,701,737	40,312,806	38,901,670	210,417,961
Totals, 1924	23,416,816	111,801,016	49,549,135	55,763,860	240,530,827

Shipments of Poles, Piling, Mine-props, Fence-posts, Railway-ties, etc.

Forest District.	Quantity exported.	Approximate Value, F.O.B.	Where marketed.		
			United States.	Canada.	Japan.
Kamloops—					
Poles and piling.....lineal ft.	2,289,780	$275,982	1,912,555	377,225	.....
Mine-props.....lineal ft.	86,175	11,202	.....	86,175	.....
Fence-posts.....cords	32	175	.....	32	.....
Railway-ties.....No.	18,655	13,023	.....	18,655	.....
Fort George—					
Poles and piling.....lineal ft.	921,050	121,710	547,380	373,670	.....
Mine-props.....cords	96	960	.....	96	.....
Fence-posts.....cords	1,175	7,050	.....	1,175	.....
Railway-ties.....No.	829,815	506,134	.....	829,815	.....
Prince Rupert—					
Poles and piling.....lineal ft.	3,218,262	450,556	2,508,600	709,662	.....
Fence-posts.....No.	6,814	1,158	.....	6,814	.....
Railway-ties.....No.	867,603	525,153	.....	867,603	.....
Vancouver—					
Poles and piling.....lineal ft.	9,953,536	1,393,495	9,539,878	.....	413,658
Cordwood.....cords	593	2,372	593	.....	.....
Pulp-wood.....cords	4,963	49,625	4,963	.....	.....
Southern Interior—					
Poles and piling.....lineal ft.	9,092,664	1,434,204	7,900,869	1,191,795	.....
Mine-props.....cords	9,247	101,717	.....	9,247	.....
Fence-posts.....cords	13,939	118,481	3,106	10,833	.....
Railway-ties.....No.	582,375	320,306	22,410	559,965	.....
Total value, 1929.....	.....	$5,333,303	.....	.....	.....
Total value, 1928.....	.....	$4,777,803	.....	.....	.....

PRE-EMPTION INSPECTION RECORDS, 1929.

Pre-emption records examined by districts are:—

Cariboo	438
Fort George	443
Kamloops	115
Prince Rupert	295
Southern Interior	274
Vancouver	217
Total	1,782

ANALYSIS OF ROUTINE WORK.

Draughting Office, Forest Branch.

Month.	Number of Tracings made.						Blue-prints from Reference Maps.
	Timber-sales.	Timber-marks.	Examination Sketches.	Hand-logger Licences.	Miscellaneous.	Totals.	
January	58	119	38	1	12	228	21
February	44	95	20	3	14	176	101
March	49	86	26	16	11	188	4
April	42	121	25	8	14	210	14
May	27	91	25	9	30	182	4
June	24	80	29	2	12	147	6
July	18	70	31	..	4	123	8
August	26	54	30	6	2	118	..
September	19	39	41	..	28	127	4
October	43	50	38	3	12	146	16
November	63	49	41	2	9	164	4
December	33	61	25	2	15	136	4
Totals	446	915	369	52	163	1,945	186

TIMBER-MARKING.

TIMBER-MARKS ISSUED FOR THE YEARS 1927, 1928, AND 1929.

	1927.	1928.	1929.
Old Crown grants	111	108	108
Crown grants, 1887–1906	121	118	120
Crown grants, 1906–1914	138	177	121
Section 53A, "Forest Act"	269	302	290
Stumpage reservations	45	34	35
Pre-emptions under sections 28 and 29, "Land Act"	18	21	13
Dominion lands (general)	23	40	30
Dominion lands (timber berths)	18	22	9
Dominion lands (Indian reserves)	12	13	7
Timber-sales	821	1,033	974
Hand-loggers	8	5	9
Special marks	1	....	....
Rights-of-way	3	3	4
Pulp licences	3	5	9
Totals	1,591	1,881	1,729
Transfers and changes of marks	202	276	238

HAND-LOGGERS' LICENCES.

	1927.	1928.	1929.
Number issued	51	53	51

CROWN-GRANT TIMBER LANDS.

	Area of Private Timber Lands (Acres).	Average Value per Acre.
1919	883,491	$9.48
1920	867,921	11.62
1921	845,111	10.33
1922	887,980	11.99
1923	883,344	11.62
1924	654,668	15.22
1925	654,016	40.61
1926	688,372	39.77
1927	690,438	39.01
1928	671,131	38.62
1929	644,011	38.41

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

Assessment District.	Acreage, 1929.	Increase or Decrease in Acreage over 1928.	Average Value per Acre.	Change in Value per Acre since 1928.
Alberni	96,960	+ 187	$56 09	+$ 1 53
Comox	138,259	- 7,306	46 72	- 66
Cowichan	78,132	- 4,201	65 38	- 1 96
Fort Steele	39,646	- 2,351	9 85	+ 18
Galiano Island	328	.....	14 98	.....
Golden	33,584	- 174	9 51	- 01
Kettle River	7,009	- 120	10 76	+ 12
Nanaimo	80,753	- 1,347	44 08	+ 21
Nelson	12,069	- 571	8 33	- 44
Fort George	7,221	- 3,119	18 02	- 1 27
Prince Rupert	16,561	- 29	22 37	- 01
Revelstoke	37,201	- 5,339	15 23	+ 70
Slocan	60,556	+ 2,516	10 47	+ 35
Vancouver	4,236	- 1,810	100 38	+ 6 64
Victoria	31,496	- 1,858	35 60	+ 34
Totals	644,011	- 27,120	$38 41	- $ 21

FOREST FINANCE.

Details of forest revenue and expenditure are given in the following tables. Revenue shows a drop of $122,000, due very largely to the litigation in respect to the timber-tax imposed under section 58 of the "Forest Act." The case is still before the Privy Council and, in the meantime, moneys collected under this tax are held in escrow and not paid into consolidated revenue. Timber-licence rentals also declined, but this was more than made up from the increased stumpage collected in respect to timber-sales. The total billed for active operations shows an increase of $113,000 and now reaches a total of $2,710,496.50, a new high record.

Administrative expense increased by $8,744. Details of expenditure under Scaling Fund, Forest Reserve Account, and Forest Protection Fund are shown in their respective tables.

FOREST REVENUE.

	12 Months to Dec. 31st, 1929.	12 Months to Dec. 31st, 1928.	12 Months to Dec. 31st, 1927.	12 Months to Dec. 31st, 1926.	12 Months to Dec. 31st, 1925.	12 Months to Dec. 31st, 1924.
Timber-licence rentals	$931,545 72	$1,015,705 19	$892,914 98	$1,063,812 90	$1,130,556 52	$1,180,179 55
Timber-licence transfer fees	1,775 00	4,285 00	2,000 00	2,400 00	3,465 00	4,650 00
Timber-licence penalty fees	23,245 73	33,035 56	27,639 13	32,549 14	28,017 75	64,653 05
Hand-loggers' licence fees	1,300 00	1,400 00	1,275 00	2,250 00	2,775 00	2,450 00
Timber-lease rentals	79,873 89	79,396 72	95,236 93	90,010 89	92,485 38	99,974 25
Penalty fees and interest	901 43	520 70	88 93	254 91	283 33	136 92
Timber-sale rentals	30,162 64	40,649 01	32,494 57	20,537 75	17,045 45	19,943 01
Timber-sale stumpage	634,048 95	551,102 88	608,765 14	572,324 74	512,399 28	537,786 50
Timber-sale cruising	12,844 92	10,943 97	10,936 58	7,173 84	6,296 67	7,491 04
Timber-sale advertising	1,951 28	1,646 65	1,681 85	1,498 82	1,403 43	2,033 96
Timber royalty and tax	1,688,803 67	1,774,417 41	1,825,909 80	1,779,553 60	1,658,043 07	1,521,001 39
Scaling fees (not Scaling Fund)	1,407 92	1,147 84	1,778 02	1,344 75	1,044 25	1,564 85
Scaling expenses (not Scaling Fund)	191 74	103 74	156 75	98 17	253 24	753 27
Trespass penalties	9,161 16	12,058 89	6,481 83	11,677 12	17,841 58	14,685 27
Scalers' examination fees	320 00	275 00	235 00	350 00	160 00	430 00
Exchange	1,711 29	271 09	345 16	693 04	520 12	1,332 26
Seizure expenses	3,152 88	589 71	703 90	300 50	1,097 95	654 92
General miscellaneous	2,754 36	4,444 25	3,767 83	3,651 95	4,699 66	9,392 22
	$3,425,152 58	$3,531,993 61	$3,602,411 40	$3,590,482 12	$3,478,387 68	$3,469,112 46
Grazing fees	10,918 49	12,541 98	16,529 20	12,328 54	14,114 89	14,240 66
Taxation, Crown-grant timber lands	375,923 32	388,860 46	424,023 04	410,684 46	398,393 85	298,973 97
Total revenue from forest sources	$3,811,994 39	$3,933,396 05	$4,042,963 64	$4,013,495 12	$3,890,896 42	$3,782,327 09

Revenue from Logging Operations, 1929.

(Amounts charged.)

Forest District.	Royalty and Tax.	Trespass Penalties.	Seizure Expenses.	Government Scale.		Scaling Fund.		Stumpage.	Total.
				Scaling Expenses.	Scaling Fees.	Scaling Expenses.	Scaling Fees.		
Vancouver	$1,320,602 63	$ 728 77	$ 163 90	$ 66 78	$758 14	$20,989 47	$112,081 45	$225,007 73	$1,680,398 87
Cariboo	3,460 08	21 27	3 00	.....	.....	.....	.....	5,638 06	9,122 41
Prince Rupert	134,104 79	664 83	251 30	36 55	405 93	1,137 96	6,399 73	160,948 32	303,949 41
Southern Int'r	243,064 78	1,506 52	89 42	5 00	51 15	.....	.....	158,905 17	403,622 04
Fort George	126,400 85	887 87	1,047 94	.....	.....	.....	.....	123,067 95	251,404 61
Kamloops	23,902 49	382 58	.....	67 50	.....	.....	.....	37,646 59	61,999 16
Totals	$1,851,535 62	$ 4,191 84	$1,555 56	$ 175 83	$1,215 22	$22,127 43	$118,481 18	$711,213 82	$2,710,496 50
Totals, 1928	$1,794,819 93	$20,867 17	$2,103 57	$ 156 58	$1,194 89	$20,277 64	$123,169 81	$635,292 44	$2,597,882 03
Totals, 1927	$1,767,710 60	$ 7,343 44	$ 789 47	$ 163 57	$2,032 43	$17,169 14	$114,979 79	$631,948 72	$2,542,137 16
Totals, 1926	$1,774,494 75	$ 1,589 83	$1,142 38	$ 98 34	$1,147 41	$17,279 88	$119,704 75	$613,365 09	$2,528,822 43
Totals, 1925	$1,754,605 06	$59,804 57	$ 913 29	$ 197 08	$1,254 80	$18,794 39	$116,682 68	$651,486 17	$2,603,738 04
Totals, 1924	$1,542,070 96	$10,860 22	$ 708 24	$ 548 37	$2,179 42	$14,760 12	$103,691 71	$597,071 65	$2,271,890 69

Forest Expenditures, Fiscal Year 1928–29.

Forest District.	Salaries.	Temporary Assistance.	Expenses.	Total.
Headquarters	$ 88,715 76	$4,232 15	$ 21,999 17	$114,947 08
Cariboo	9,202 95	41 54	4,730 79	13,975 28
Kamloops	7,581 68	.. ..	2,989 88	10,571 56
Fort George	17,072 00	1,497 12	7,687 53	26,256 65
Prince Rupert	22,562 29	... ..	21,720 49	44,282 78
Southern Interior	44,375 84	2,183 66	26,514 35	73,073 85
Vancouver	53,126 77	621 33	49,378 26	103,126 36
Totals	$242,637 29	$8,575 80	$135,020 47	$386,233 56

Lumber-trade extension	14,112 32
Reconnaissance, etc	35,810 86
Insect-control	2,275 84
Grazing: range improvement	4,904 08
Grand total	$443,336 66

SCALING FUND.

Balance brought down, April 1st, 1928	.....	$16,342.39
Expenditure, fiscal year 1928–29	.....	147,601.87
Charges, fiscal year 1928–29	$142,360.23	.....
Balance, March 31st, 1929	21,584.03	.....
	$163,944.26	$163,944.26
Balance brought down, April 1st, 1929	.....	$21,584.03
Expenditure, 9 months, April–December, 1929	.....	108,834.65
Charges, 9 months, April–December, 1929	$112,103.05	.....
Balance	18,315.63	.....
	$130,418.68	$130,418.68

FOREST RESERVE ACCOUNT.

Balance brought forward, April 1st, 1928	.....	$20,222.58
Amount received from Treasury, April 1st, 1928	.....	72,274.97
Expenditure, fiscal year 1928–29	$65,183.90	.....
Balance	27,313.65	.....
	$92,497.55	$92,497.55
Balance brought forward, April 1st, 1929	.....	$27,313.65
Amount received from Treasury, April 1st, 1929	.....	71,828.64
Moneys received under subsection (4), section 30 (*a*)	.....	369.99
Expenditure, 9 months to December 31st, 1929	$57,102.58	.....
Balance, December 31st, 1929	42,409.70	.....
	$99,512.28	$99,512.28

FOREST PROTECTION FUND.

The following statement shows the standing of the Forest Protection Fund as of December 31st, 1929:—

Balance (deficit), April 1st, 1928		$47,783.30
Expenditure, fiscal year 1928–29		529,603.59
		$577,386.89
Collections, fiscal year 1928–29	$165,931.00	
Collections under special levy, 1928–29	8,871.10	
Government contribution	300,000.00	
		474,802.10
Balance (deficit)		$102,584.79
Balance (deficit), April 1st, 1929		$102,584.79
Expenditure, 9 months, April–December, 1929		727,434.31
		$830,019.10
Collections, April–December, 1929	$124,287.16	
Collections, special levy, April–December, 1929	900.23	
Government contribution	225,000.00	
		350,187.39
Balance (deficit)		$479,831.71

There is an amount of approximately $55,000 repayable by Forest Protection Fund to Vote 107 to cover expenses of permanent employees, maintenance of motor-cars and launches, etc.

Forest Protection Fund Expenditure.

	Fiscal Years.							
	1921–22.	1922–23.	1923–24.	1924–25.	1925–26.	1926–27.	1927–28.	1928–29.
Patrols and fire prevention	$227,738	$202,994	$254,792	$334,532	$377,427	$356,462	$358,835	$407,790 94
Tools and equipment.	118,933	91,812	81,408	25,418	33,976	30,663	30,409	31,258 82
Fires..	106,891	508,992	75,503	258,034	650,138	514,845	84,600	75,221 43
Improvements and maintenance	17,779	37,609	21,667	5,690	11,890	14,172	22,482	33,428 67
Totals	$471,341	$841,407	$433,370	$633,674	$1,073,431	$916,142	$496,326	$547,699 86

For expenditures April 1st to December 31st, 1929, please see statement showing standing of Forest Protection Fund.

Expenditure by Districts for Twelve Months ended March 31st, 1929.

District.	Patrols and Fire-prevention	Tools and Equipment.	Fires.	Improvements and Maintenance.	Total.
Cariboo	$ 24,738 27	$ 1,663 35	$ 2,718 73	$ 1,080 02	$ 30,200 37
Kamloops	26,083 43	1,137 23	5,282 65	1,870 40	34,373 71
Fort George	31,233 02	4,693 31	11,432 04	2,403 31	49,761 68
Prince Rupert	26,350 13	2,944 64	13,614 99	120 42	43,030 18
Southern Interior	119,274 08	8,654 99	13,673 96	12,269 49	153,872 52
Vancouver	136,314 03	10,349 48	28,499 06	15,685 03	190,847 60
Victoria	43,797 98	1,815 82	....	.....	45,613 80
Totals	$407,790 94	$31,258 82	$75,221 43	$33,428 67	$547,699 86

FOREST PROTECTION.

The fire season of 1929 was one of great variations in hazard. Two centres of extreme hazard developed in Canada, one in the Southern Interior of British Columbia and the other in Manitoba and Western Ontario. In the latter region aeroplanes were extensively used; yet the losses and costs of control are reported very high, proving that aeroplanes are only a valuable but costly adjunct to other fire-control equipment, and that, given extreme hazard conditions, they fail to eliminate the losses.

To the Southern Interior of British Columbia belong 55 per cent. of all the fires recorded for the Province, 92½ per cent. of the moneys spent on control, and 87 per cent. of the area burned over. On certain days conditions were so bad that had we been able to recruit all the labour in the Province and place them on the fire-line they would have been helpless to control the situation. With a small supervisory force and limited labour on an area difficult of access, it is a noteworthy achievement that even greater damage was not done in this section.

In this section a limited snowfall during the previous winter, an abnormally dry summer, high winds, low humidity, and dry lightning-storms made for an almost unprecedented fire season. The marked deficiency in rainfall is shown in charts below.

Two lookout-men were struck by lightning and severely injured, and one fire-fighter was killed.

Contrary to conditions in the Southern Interior, the northern portion of the Province was favoured with frequent and generous rain and therefore little hazard. On the Lower Coast, while the rainfall was below the ten-year average, during June and July it was well distributed, reducing the danger, and, on the whole, in this section the year was normal. Conditions in September were satisfactory and a large area of logging-slash was disposed of.

Fire Occurrence.

The number of fires recorded shows a sharp increase over the last two years, 2,188 occurring on Provincial lands and 354 within the Railway Belt. Of the Forest Branch fires, 41½ per cent. were confined to areas of less than ¼ acre and 76 per cent. were extinguished before exceeding 10 acres. While this record of control is not so good as in the past two years, when coupled with the conditions existing in the Southern Interior, it is excellent, and great credit is due our fieldmen in maintaining so high a standard. It is to be remarked that lightning caused 638 fires, the greatest number ever assigned to this cause in one year. Smokers were charged with having started 387 fires, which is also a record number from that cause. One hundred and thirty-nine fires are ascribed to incendiarism, the highest number originating from this source. A gradual and satisfactory reduction in the number of fires resulting from industrial operations is noted, only sixty-five such fires occurring. Fires charged to the travelling public, campers, and smokers amounted to 745, or 34 per cent. of the total number. There is apparently much yet to be done in the way of educating the public in the necessity of care with fire. Railway-construction in the most hazardous part of the Southern Interior was responsible for nine fires. This is the first occasion since 1921 that any fires from this cause have been reported.

Fires, 1929, classified by Size and Damage.

Forest District.	Total Fires.		Under 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	110	5.03	42	38.18	4.63	33	30.00	4.38	35	31.82	6.64	104	5	1
Kamloops	125	5.71	81	64.80	8.92	28	22.40	3.72	16	12.80	3.03	120	2	3
Fort George	103	4.70	45	43.69	4.95	38	36.89	5.04	20	19.42	3.79	92	9	2
Prince Rupert	157	7.17	49	31.20	5.40	54	34.40	7.17	54	34.40	10.25	136	17	4
Southern Interior	1203	54.99	479	38.82	52.75	408	33.91	54.19	316	26.27	59.97	1,008	95	100
Vancouver	490	22.40	212	43.26	23.35	192	39.18	25.50	86	17.56	16.32	458	16	16
Totals	2,188	100.0	908	....	100.0	753	....	100.0	527	....	100.0	1,918	144	126
Per cent	100.0	....	41.50	....	....	34.41	....	....	24.09	....	....	87.67	6.58	5.75
Totals, 1928	1,642	100.0	808	....	100.0	564	....	100.0	270	....	100.0	1,508	102	32
Per cent	100.0	....	49.20	....	....	34.35	....	....	16.45	....	....	91.84	6.21	1.95
Totals, 1927	1,284	100.0	716	....	100.0	408	....	100.0	160	....	100.0	1,184	63	37
Per cent	100.0	....	55.76	....	....	31.78	....	....	12.46	....	....	92.22	4.90	2.88
Dominion Railway Belt	354	....	110	31.07	....	152	42.94	....	92	25.99	....	305	24	25

Number and Causes of Fires in Province, 1929.

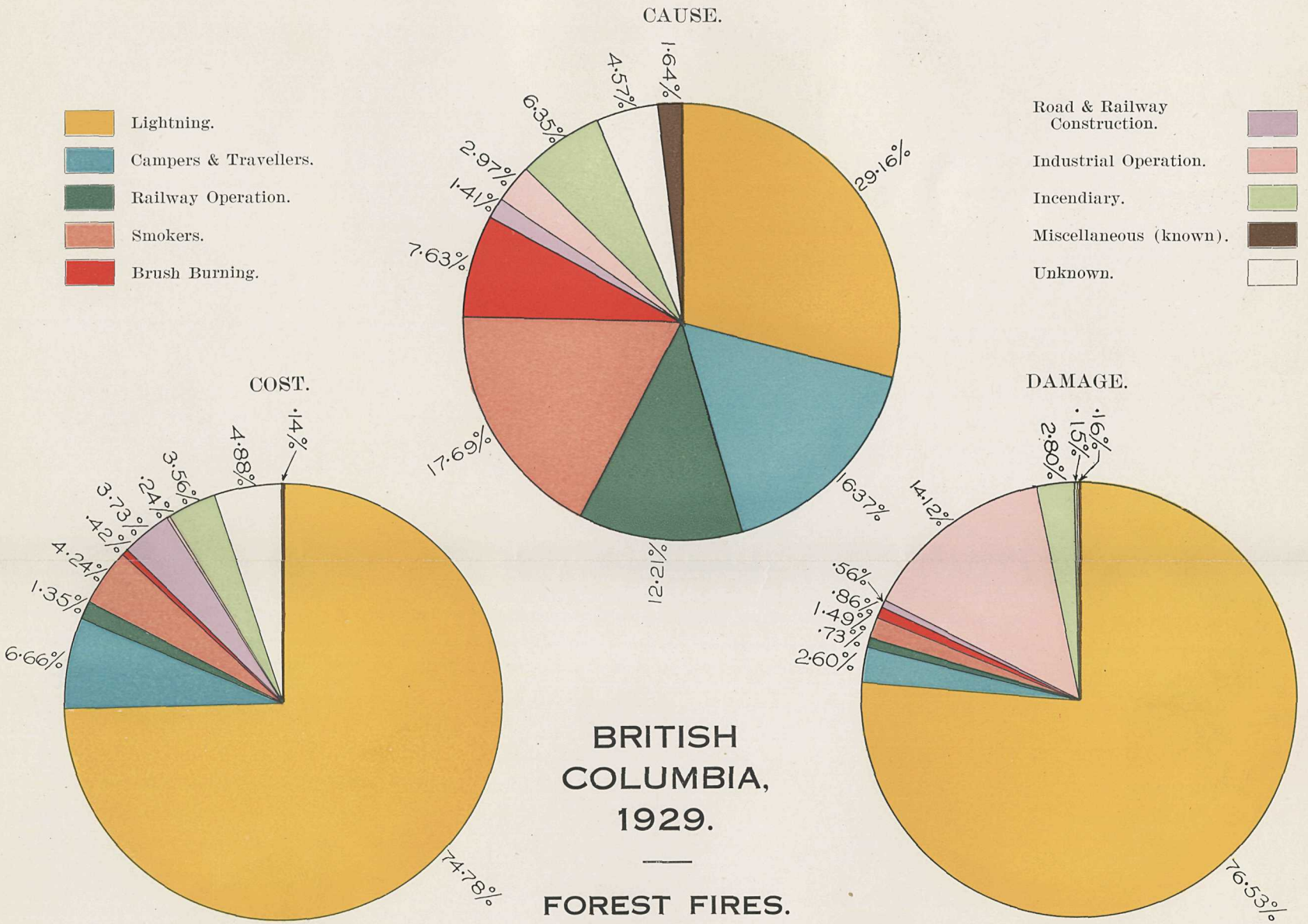
Forest District.	Lightning.	Campers and Travellers.	Railway Operation.	Railways under Construction.	Smokers.	Brush-burning not Railway-clearing.	Public Road-construction.	Industrial Operations.	Incendiary.	Miscellaneous (Known Causes).	Unknown Causes.	Total.	Per Cent. of Total Fires in Province.
Cariboo	12	46	1	..	13	4	..	5	19	3	7	110	5.03
Kamloops	66	10	9	..	14	13	2	2	9	..	..	125	5.71
Fort George	30	32	5	..	8	13	2	6	7	..	..	103	4.70
Prince Rupert	..	59	16	..	24	51	1	1	4	1	..	157	7.17
Southern Interior	512	119	191	9	193	37	5	11	65	47	14	1,203	54.99
Vancouver	18	92	45	..	135	49	12	40	35	49	15	490	22.40
Totals	638	358	267	9	387	167	22	65	139	100	36	2,188	100.00
Per cent	29.16	16.36	12.20	0.42	17.69	7.63	1.01	2.97	6.35	4.57	1.64	100.00	....
Dominion Railway Belt	127	28	*26	..	60	29	5	16	45	4	14	354	....
Per cent	35.88	7.91	7.35	..	16.95	8.19	1.41	4.52	12.71	1.13	3.95	100.00	....

* In addition to the 26 railway fires shown as having occurred in the Dominion Railway Belt, 106 other railway fires occurred, but were handled entirely by the railway organizations.

Fires, 1929, classified by Place of Origin and Cost of Fire-fighting.

Forest District.	Total Fires.	Originated on Vacant Crown Land 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.	Cost less than $100.	Cost $100 to $1,000.	Cost $1,000 to $5,000.	Cost $5,000 to $10,000.	Cost over $10,000.	Dollars.	Per Cent. of Total spent in fighting Fires in Province.	Dollars.
Cariboo	110	97	13	76	69.10	3.47	34	30.90	1.56	28	5	1	..	..	2,724.64	0.55	24.76
Kamloops	125	78	47	60	48.00	2.74	65	52.00	2.97	56	8	1	..	..	4,754.02	0.96	38.03
Fort George	103	59	44	42	40.78	1.92	61	59.22	2.78	46	14	1	..	.	4,536.92	0 92	44.05
Prince Rupert	157	24	133	93	59.24	4.25	64	40.76	2.92	52	11	1	..	..	8,949.14	1.82	57.00
Southern Interior	1,203	765	438	348	28.93	15.90	855	71.07	39.08	554	192	91	8	10	455,766.58	92.53	378.86
Vancouver	490	169	321	212	43.26	9.69	278	56.74	12.72	211	49	16	1	1	15,850.38	3.22	32.34
Totals	2,188	1,192	996	831	....	37.97	1,357	...	62.03	947	279	111	9	11	492,581.68	100.00	225.12
Per cent	100.00	54.48	45.52	37.97	....	....	62.03	....	....	43.28	12.76	5.08	0.41	0.50	.....	....	.....
Totals, 1928	1,642	878	764	794	....	48.36	848	....	51.64	663	163	21	1	....	73,939.02	100.00	45.08
Per cent	100.00	53.47	46.53	48.36	....	....	51.64	....	....	40.38	9.92	1.28	0.06	....	.....	....	.....
Totals, 1927	1,284	694	590	633	....	49.30	651	....	50.70	518	100	31	1	1	81,662.73	100.00	63.60
Per cent	100.00	54.05	45.95	49.30	....	...	50.70	....	....	40.34	7.79	2.41	0.08	0.08	.....	...	.....
Dominion Railway Belt	354	.....	.....	116	32.77	....	238	67.23	....	159	65	13	..	1	63,789.00	....	.....

Cost to Forest Branch $492,581.68; cost to other parties $140,283.79.


CAUSE.
Lightning.
Campers & Travellers.
Railway Operation.
Smokers.
Brush Burning.
Road & Railway Construction.
Industrial Operation.
Incendiary.
Miscellaneous (known).
Unknown.
29·16%
16·37%
12·21%
17·69%
7·63%
2·97%
1·41%
6·35%
4·57%
1·64%
COST.
74·78%
6·66%
1·35%
4·24%
·42%
3·73%
·24%
3·56%
4·88%
·14%
DAMAGE.
76·53%
2·60%
·73%
1·49%
·86%
·56%
14·12%
2·80%
·15%
·16%
BRITISH COLUMBIA, 1929.
FOREST FIRES.

FIRE OCCURRENCES BY MONTHS, 1929.

District.	March.	April.	May.	June.	July.	August.	September.	October.	Total.
Cariboo	...	3	25	10	22	36	14	..	110
Kamloops	....	9	17	1	58	27	12	1	125
Fort George	....	3	41	17	17	15	10	..	103
Prince Rupert	....	50	49	14	17	8	19	..	157
Southern Interior	4	63	88	71	353	477	106	41	1,203
Vancouver	....	7	61	31	115	129	138	9	490
Total	4	135	281	144	582	692	299	51	2,188
Per cent	0.18	6.17	12.84	6.58	26.60	31.63	13.67	233	100.00
Dominion Railway Belt	....	11	35	16	145	111	33	3	354
Per cent	....	3.11	9.88	4.53	40.96	31.35	9.33	0.84	100.00

FIRE-CONTROL COST.

The cost to the Forest Branch this year for fire-fighting was $492,581.68. As before mentioned, 92½ per cent. of this cost was incurred in the Southern Interior District. The cost for the other five forest districts was only $36,815.10, the lowest recorded costs for the same territory since 1921.

The cost of fire control on Railway Belt lands by the Dominion Forest Branch is given as $63,789, and the cost incurred by other fire-control agencies is reported to be $140,283.79, making a total fire-fighting bill of $696,654.00.

FIRE DAMAGE.

The acreage reported as having been burned over was 909,620 acres on Provincial lands and 46,825 acres in the Dominion Railway Belt. The area of merchantable timber damaged or destroyed is stated to be 100,961 acres, on which the net stumpage loss is estimated at $284,571. There were 229,309 acres of valuable reproduction destroyed.

Damage caused by Forest Fires, 1929.

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.		Damage.	
	Area.	Quantity killed.	Quantity salvable.	Net Stumpage Loss.	Area.	Estimated Present Damage.	Area.	Estimated Damage.	Area.	Damage.	Area burned.	Cost to Department.						
	Acres.	M. Ft. B.M.	M. Ft. B.M.	$	Acres.	$	Acres.	$	Acres.	$	Acres.	$	Acres.	Per Cent.	M. Feet B.M.	Per Cent.	$	Per Cent.
Cariboo	1,311	2,653	1,536	1,117	299	1,531	10,938	5,382	4,400	220	22	.....	16,970	1.86	2,653	0.97	8,250	0.87
Kamloops	987	3,800	.....	4,083	961	1,570	7,760	3,629	474	24	221	.....	10,403	1.15	3,800	1.40	9,306	0.98
Fort George	62	189	24	224	405	563	6,706	7,173	2	..	419	.....	7,594	0.83	189	0.07	7,960	0.85
Prince Rupert	158	327	6	553	139	258	51,627	5,111	4,785	164	197	.....	56,906	6.25	327	0.12	6,086	0.65
Southern Interior	97,488	232,101	77,196	265,530	226,095	478,724	442,890	140,690	21,189	1,276	5,374	.....	793,036	87.19	232,101	85.32	886,220	94.11
Vancouver	955	32,954	28,287	13,064	1,410	8,397	11,732	2,351	1,686	104	8,928	.....	24,711	2.72	32,954	12.12	23,916	2.54
Totals	100,961	272,024	107,049	284,571	229,309	491,043	531,653	164,336	32,536	1,788	15,161	.....	909,620	100.0	272,024	100.0	941,738	100.0
Per cent	11.10	100.00	39.35	30.22	25.21	52.15	58.45	17.45	3.57	0.18	1.67	.....	100.0	.....	100.0	.....	100.0	.....
Totals, 1928	2,926	24,069	9,060	18,578	28,836	60,358	47,139	23,570	9,984	495	18,092	.....	106,977	100.0	24,069	100.0	103,001	100.0
Per cent	2.73	100.00	37.64	18.04	26.96	58.60	44.07	22.88	9.33	0.48	16.92	.....	100.0	.....	100.0	.....	100.0	.....
Totals, 1927	11,925	86,176	44,834	77,499	19,532	34,134	58,710	29,354	2,284	115	9,493	.....	101,944	100.0	86,176	100.0	141,102	100.0
Per cent	11.70	100.00	52.03	54.93	19.16	24.19	57.60	20.80	2.23	0.08	9.31	.....	100.0	.....	100.0	.....	100.0	.....
Dominion Railway Belt	22,182	1,137,224	22,104	253,496	11,779	21,247	7,630	.....	5,234	.....	.....	.....	.....	.....	.....	.....	.....	.....

Damage to Property other than Forests, 1929.

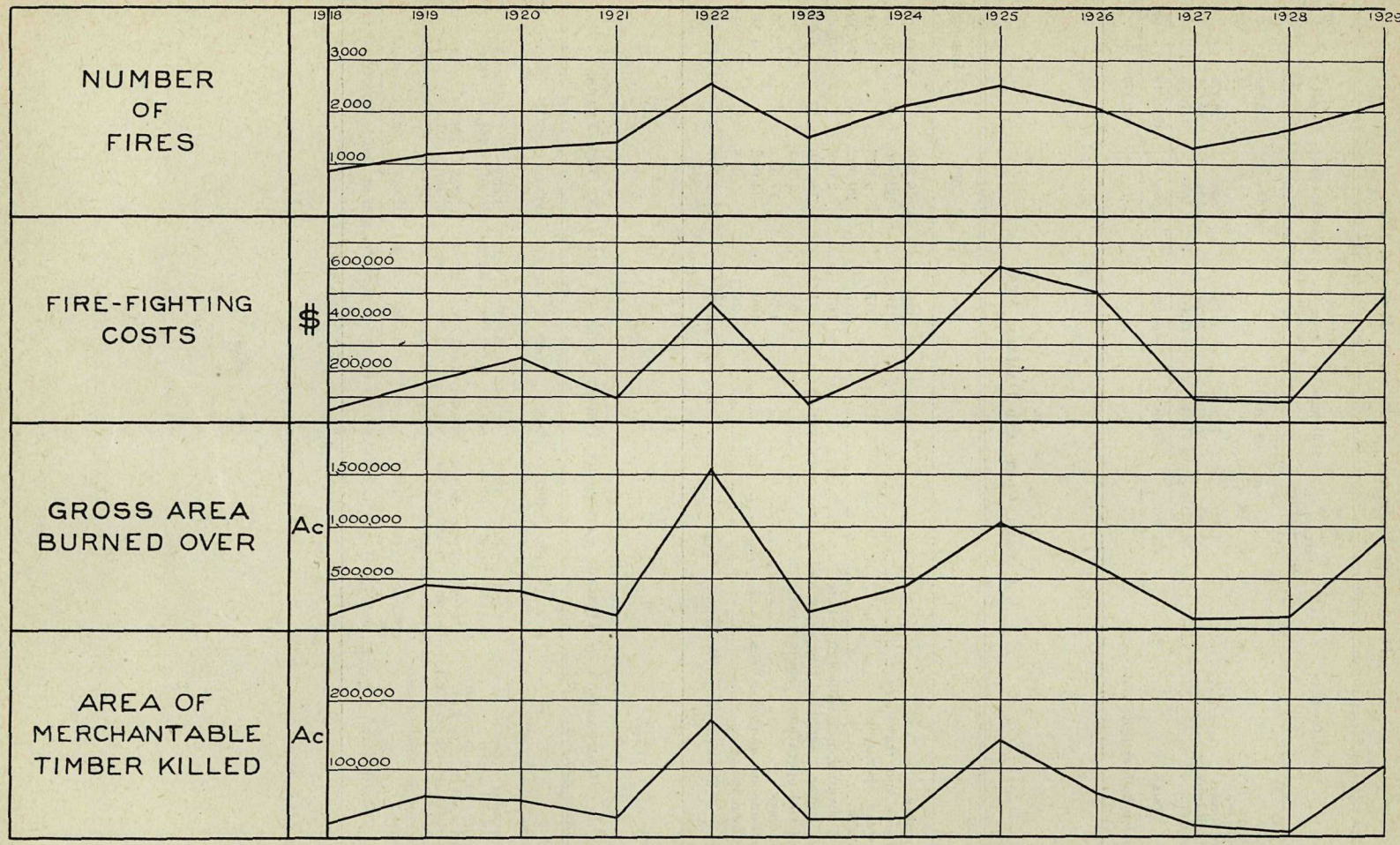
Forest District.	Forest Products in Process of Manufacture.	Buildings.	Railway and Logging Equipment.	Miscellaneous.	Total.	Per Cent. of Total.
Cariboo	.....	$ 940	.....	$2,349	$ 3,289	1.45
Kamloops	$ 14	100	$ 25	2	141	0.06
Fort George	.....	.....	.....	.....	.....	.....
Prince Rupert	1,620	3,292	799	562	6,273	2.76
Southern Interior	18,247	26,010	25,230	16,204	85,691	37.76
Vancouver	56,822	51,345	22,175	1,183	131,525	57.97
Totals	$76,703	$81,687	$48,229	$20,300	$226,919	100.00
Dominion Railway Belt	.....	.....	.....	.....	$30,173	.....

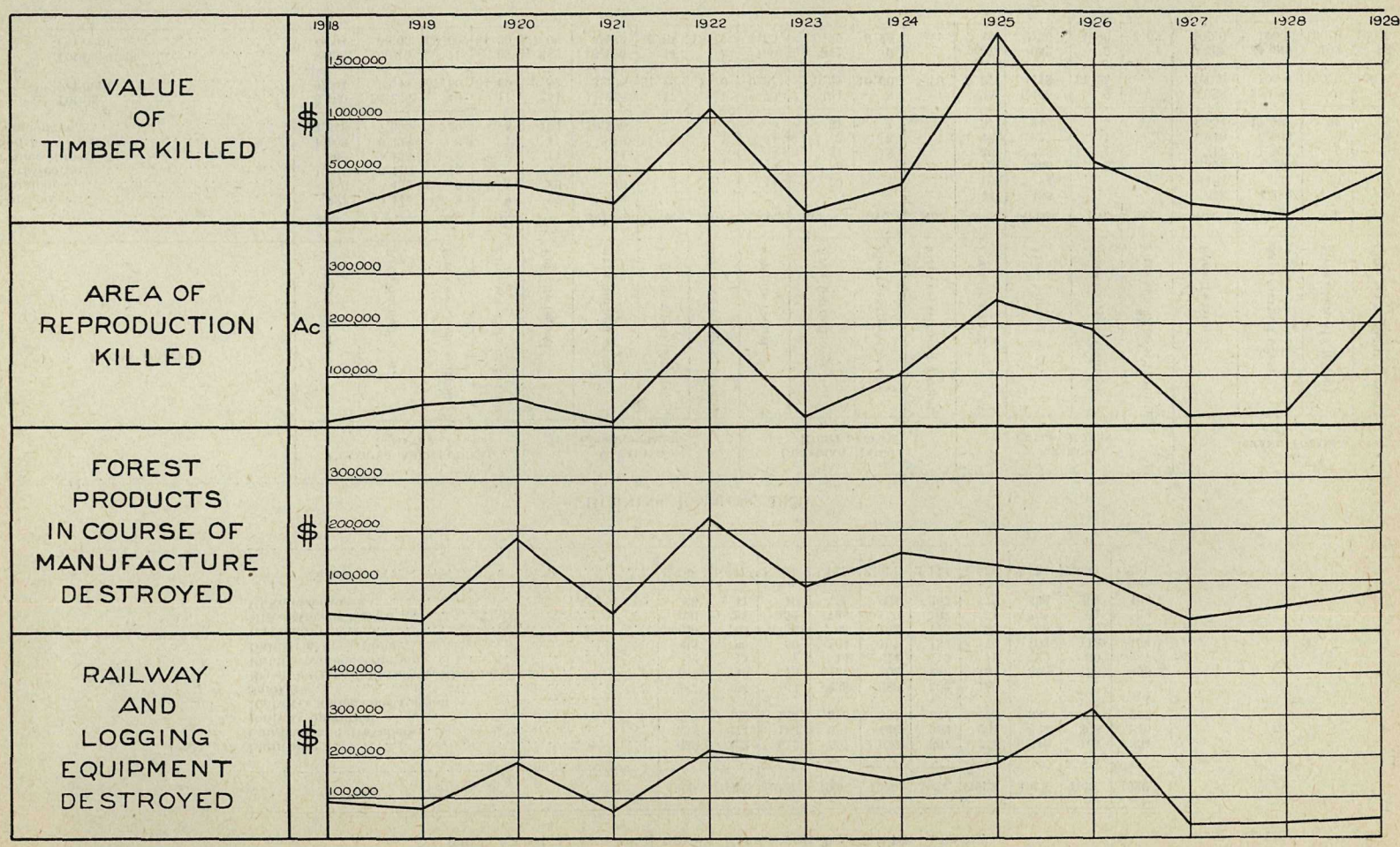
Causes, Cost, and Damage, 1929.

	No.	Cost.	Damage.
Lightning	638	$368,316	$894,323
Campers and travellers	358	32,800	30,348
Railways operating	267	6,625	8,545
Smokers	387	20,902	17,386
Brush-burning, not railway-clearing	167	2,097	10,090
Road, power, telephone, telegraph, and railway construction	31	18,369	6,531
Industrial operations, logging, etc.	65	1,211	164,995
Incendiary	139	17,521	32,659
Miscellaneous known causes	100	24,042	1,861
Unknown causes	36	698	1,919
Totals	2,188	$492,581	$1,168,657

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

	1929.	1928.	1927.	1926.	1925.	1924.	1923.	1922.	1921.	1920.
Total number of fires	2,188	1,642	1,284	2,147	2,521	2,174	1,530	2,591	1,330	1,251
Area burned (acres)	909,620	106,977	101,944	659,871	1,023,789	402,214	157,601	1,568,585	145,838	389,846
Standing timber destroyed or damaged (M. ft. B.M.)	272,024	24,069	86,176	398,694	1,024,508	207,651	87,371	729,941	68,476	229,253
Amount salvable (M. ft. B.M.)	107,049	9,060	44,834	109,385	350,770	102,832	37,891	117,006	39,553	49,575
Damage to forests	$941,738	$103,001	$141,102	$ 930,373	$2,121,672	$ 665,078	$ 74,238	$1,531,300	$ 97,332	$485,963
Damage to other forms of property	226,919	95,534	74,606	749,891	625,518	540,291	617,649	693,016	195,221	473,900
Total damage	$1,168,657	$198,535	$215,708	$1,680,264	$2,747,190	$1,205,369	$691,887	$2,224,316	$292,553	$959,863


NUMBER OF FIRES
1918
1919
1920
1921
1922
1923
1924
1925
1926
1927
1928
1929
3,000
2,000
1,000
FIRE-FIGHTING COSTS
$
600,000
400,000
200,000
GROSS AREA BURNED OVER
Ac
1,500,000
1,000,000
500,000
AREA OF MERCHANTABLE TIMBER KILLED
Ac
200,000
100,000


VALUE OF TIMBER KILLED
$
1,500,000
1,000,000
500,000
AREA OF REPRODUCTION KILLED
Ac
300,000
200,000
100,000
FOREST PRODUCTS IN COURSE OF MANUFACTURE DESTROYED
$
300,000
200,000
100,000
RAILWAY AND LOGGING EQUIPMENT DESTROYED
$
400,000
300,000
200,000
100,000
1918
1919
1920
1921
1922
1923
1924
1925
1926
1927
1928
1929

Number and Causes of Forest Fires for Last Ten Years.

Causes.	1929.	1928.	1927.	1926.	1925.	1924.	1923.	1922.	1921.	1920.
Lightning	638	322	512	557	632	307	274	246	164	304
Campers and travellers	358	274	182	351	426	382	262	626	308	246
Railway operation	267	282	185	376	337	328	199	332	283	227
Railways under construction	9	....	....	....	....	....	....	....	2	1
Smokers	387	294	163	238	286	302	180	....	....	....
Brush-burning (not railway-clearing)	167	149	78	157	202	243	154	355	136	96
Public road-construction	22	13	7	14	14	19	12	22	20	7
Industrial operations	65	80	50	104	137	134	170	203	119	104
Incendiary	139	103	36	68	103	115	35	69	40	32
Miscellaneous known	100	84	52	126	150	107	71	202	64	69
Unknown causes	36	41	19	156	234	237	173	536	204	165
Totals	2,188	1,642	1,284	2,147	2,521	2,174	1,530	2,591	1,330	1,251

Burning Permits, 1929.

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	627	3,444	2	2	27	403	....	....	....	....	....	....	44	433	....	....	698	4,280	2	2
Kamloops	380	452	6	1	26	40	2	....	11	39	2	....	6	4	....	....	423	535	10	1
Fort George	1,280	3,210	13	....	42	89	6	....	4	5	....	....	70	356	2	....	1,396	3,660	21	..
Prince Rupert	662	1,436	2	2	14	14	....	....	5	24	2	....	36	233	1	....	717	1,707	5	2
Southern Interior	1,103	6,298	3	1	41	379	2	1	54	2	3	1	42	227	1	....	1,240	6,906	9	3
Vancouver	4,348	7,395	20	5	104	10,300	7	....	5	31	1	....	97	212	5	....	4,554	17,938	33	5
Totals	8,400	22,235	46	11	254	11,225	17	1	79	101	8	1	295	1,465	9	....	9,028	35,026	80	13
Per cent	93.04	63.48	57.50	84.60	2.82	32.06	21.25	7.70	0.87	0.28	10.00	7.70	3.27	4.18	11.25	....	100.0	100.0	100.0	100.0
Totals, 1928	8,598	20,019	71	32	682	13,186	17	5	150	342	9	....	237	952	5	1	9,667	34,499	102	38
Per cent	88.94	58.03	69.60	84.20	7.06	38.22	16.68	13.17	1.55	0.99	8.82	....	2.45	2.76	4.90	2.63	100.0	100.0	100.0	100.0

Fire Detection.

The lookout system was further extended during the season by the preliminary development of three new points in the Kamloops District, three in Prince George, two in Prince Rupert, one in the Southern Interior, and two in Vancouver. This makes a total of forty-three lookout points used during the season.

An experiment with short-wave wireless telephone for communication between lookout and ranger headquarters was made in the Vancouver District. A small portable sending set operated by dry batteries, together with an ordinary receiving set as already in use by the Branch, was installed at the lookout. A competent receiving set to suit the wave-length utilized at the lookout was placed at the Forest Branch wireless station at Campbell River. Regular and satisfactory communication was established and maintained throughout the season. The results achieved seem to warrant its further use where the location is suitably near the existing wireless system and where ordinary telephone-construction costs would be high.

Hazard Reduction.

September on the Coast was favourable for slash-burning, and intentional slash fires, supervised by forest officers in most cases, successfully disposed of the slash hazard on 17,873 acres of logged-over lands. Accidental fires destroyed the slash on a further area of 15,161 acres, and fires under permit during the close season disposed of the debris existing on 11,225 acres, making a total of 44,259 acres on which the hazard was materially reduced by broadcast burning.

Satisfactory co-operation with the Public Works Department and the railways resulted in disposing of slash on their respective rights-of-way in a satisfactory manner.

Prosecutions for Fire Trespass, 1929.

Forest District.	Information laid.	Contravention of Provisions of Fire Permit.	Contravention of Section 98 of "Forest Act."	Contravention of Section 95 of "Forest Act."	Operating Open Burner without Permit.	Contravention of Section 114 of "Forest Act."	Burning without Permit.	Failure to report Fire.	Incendiary.	Leaving Camp-fire burning.	Refusing to fight Fire.	Contravention of Section 100 of "Forest Act."	Stealing Supplies from Fire Line.	Fines.		Served Sentence in Gaol.	Suspended Sentence.	Cases dismissed.	Cases pending.	Cases withdrawn.
														No.	Amount.					
Cariboo.....	2	..	..	1	..	..	1	..	..	..	..	..	..	..	.....	1	1	..	..	..
Kamloops.....	1	..	..	..	..	..	1	..	..	..	..	..	..	1	$ 25 00	..	..	..	..	..
Fort George ...	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.....	..	..	..	..	..
Prince Rupert .	4	..	..	1	..	1	2	..	..	..	..	..	..	2	60 00	1	1	..	.	..
South. Interior.	16	..	1	2	..	1	2	..	..	..	10	..	..	11	275 00	2	..	1	2	..
Vancouver.....	5	..	..	1	..	..	2	1	..	..	..	..	1	3	100 00	1	..	1	..	..
Totals.....	28	..	1	5	..	2	8	1	..	..	10	..	1	17	$460 00	5	2	2	2	..
Totals, 1928.	31	3	..	11	..	1	9	1	1	2	2	1	..	25	$625 00	1	1	3	..	1

EQUIPMENT, IMPROVEMENTS, AND MAINTENANCE.

Cariboo.

Equipment—

Four Ford cars	$2,896.00
Two fire-fighting pumps	675.00
Fire-fighting hose	495.00
Eight smoke-chasers' outfits	289.00
Miscellaneous	24.00
	$4,379.00

CARIBOO—*Continued.*

Improvements—	
Mouse Mountain Lookout Cabin	$434.00
Strathnaver Trail	125.00
Boss Lake Trail	113.00
	$672.00
Maintenance—	
Quesnel Garage	$65.00
Williams Lake House	227.00
Quesnel Lake Boat-house	51.00
Clinton Garage	73.00
Williams Lake Garage	75.00
Lac la Hache Camp-site	22.00
Cottonwood Camp-site	20.00
Spectacle Lake Portage	106.00
Miscellaneous	144.00
	$783.00

KAMLOOPS.

Equipment—	
Clearwater Lake boat	$190.00
Murtle Lake boat	227.00
One rowboat	35.00
Two fire-fighting pumps	736.00
Fire-fighting hose	146.00
Two outboard motors	380.00
One Ford car	744.00
Smoke-chasers' kits	590.00
Four telephone sets	90.00
Tools and equipment	480.00
	$3,618
Improvements—	
Lemieux–Coldscaur Lake Trail	$405.00
Adams River Bridge and Road	1,367.00
Little Clearwater Cabin	309.00
Seymour River Bridge	1,049.00
Grizzly Mountain Lookout	128.00
Hell Roar Peak Trail	125.00
Thunder River Trail	978.00
Murtle Lake Cabin	314.00
Green Mountain Lookout	54.00
Clearwater Lake Boat-house	197.00
Bonaparte Lake Cabin	420.00
Allan Lake–Bonaparte Lake Trail	216.00
Fadear Mountain Lookout Telephone-line	579.00
Coldscaur Lake Cabin	347.00
Coldscaur Lake–Moira Lake Trail	840.00
Coldscaur Lake–Rioux Lake Trail	332.00
Sock Lake–Grizzley Lake Trail	1,251.00
Adams River–Tum Tum Lake Trail	858.00
Valemont Lookout	104.00
Bonaparte Lake–Boundary Trail	32.00
	$9,805.00

KAMLOOPS—*Continued.*

Maintenance—	
Dixon Creek Trail	$24.00
North Barriere Lake–Adams Lake Trail	116.00
Parky Lake–Hoover Lake Trail	20.00
Allan Lake–Parky Lake Trail	20.00
Garnet Mountain Lookout and Trail	56.00
Baldy Mountain Lookout Telephone-line	182.00
Seymour River West Trail	374.00
Seymour River East Trail	287.00
Celesta Creek–Cayenne Creek Trail	136.00
Barriere Forks–Brennan Creek Trail	275.00
Clearwater River Trail	100.00
Red Top Trail	44.00
Murtle River Trail	28.00
Centre Ridge Trail	84.00
Fishtrap Creek Trail	64.00
Adams River–North Thompson Trail	32.00
Raft River Peak Trail	44.00
Canoe River Trail	32.00
Upper Thompson River Trail	148.00
Blue River–Murtle Lake Trail	32.00
Miscellaneous	188.00
	$2,286.00

FORT GEORGE.

Equipment—	
One outboard motor	$190.00
One fire-fighting pump	375.00
Fire-fighting hose	500.00
Two boats	130.00
Fire-fighting tools, etc.	623.00
	$1,818.00
Improvements—	
Pope Mountain Lookout	$375.00
Longworth Mountain Lookout	695.00
Fort Fraser Lookout	86.00
Pilot Mountain Lookout	897.00
Chow Sunkut–Lily Lake Trail	425.00
Mud River Trail	195.00
Fort Fraser Garage	524.00
Moxley Tool-house	143.00
	$3,340.00
Maintenance—	
Beaver River Trail	$533.00
Buckhorn–Willow River Trail	150.00
Stuart Lake Boat-house	42.00
Clearwater Trail	97.00
Tsinkut Mountain Lookout	33.00
Miscellaneous	13.00
	$868.00

PRINCE RUPERT.

Equipment—	
Three Ford cars	$2,262.00
Two fire-fighting pumps	586.00
Two boats	258.00
Fire-fighting tools, etc.	631.00
Fire-fighting hose, etc.	862.00
One outboard motor	230.00
Cooking outfits	237.00
	$5,066.00
Improvements—	
Black Mountain Lookout	$239.00
Fire-line construction	361.00
Thornhill Mountain Lookout	931.00
Skin Lake Lookout	180.00
Miscellaneous	24.00
	$1,735.00
Maintenance—	
Miscellaneous	$101.00

SOUTHERN INTERIOR.

Equipment—	
Three Whippet cars	$2,988.00
Fourteen Ford cars	10,397.00
One launch ("Conifer")	4,455.00
One rowboat	212.00
Four fire-fighting pumps	1,346.00
One outboard motor	230.00
One "Flato" boat	75.00
Twenty-three "Wajax" hand-pumps	298.00
Thirty "Wajax" water-bags	232.00
Eighty-three electric and carbide lamps	310.00
Fifty smoke-chasers' kits	1,120.00
Seven ploughs and harness	340.00
Fifty-four 6-10-25-men cooking outfits	1,854.00
Thirty tents and twenty-six flys	1,438.00
Fire-fighting hose	992.00
Fire-fighting tools, etc.	12,199.00
	$38,486.00
Improvements—	
70.17 miles of trail	$5,743.00
Caven Creek Lookout	92.00
Main Yahk Emergency Telephone-line	85.00
Summit Creek Telephone-line	25.00
Duncan River Telephone-line	1,557.00
Beaver Mountain Lookout Telephone-line	672.00
Mount Glory Lookout Telephone-line	971.00
White Rocks Telephone-line	1,961.00
Ward Creek Cabin	619.00
Carried forward	$11,725.00

SOUTHERN INTERIOR—*Continued.*

Brought forward	$11,725.00
Improvements—*Continued.*	
Gold Creek Cabin	123.00
Fish Lake Lean-to	38.00
Miscellaneous	29.00
	$11,915.00
Maintenance—	
722 miles of trail	$4,978.00
Swansea Mountain Lookout	37.00
Elise Mountain Lookout	30.00
Goat Mountain Lookout	83.00
B.X. Mountain Lookout	25.00
Little White Mountain Lookout	52.00
Elk Valley Telephone-line	324.00
Cedar Valley Telephone-line	24.00
Wigwam Telephone-line	25.00
Moyie Mountain Telephone-line	64.00
Johnsons Landing–Lardo Telephone-line	26.00
Elise Mountain Telephone-line	109.00
Siwash Mountain Telephone-line	146.00
Wilson Creek Telephone-line	32.00
Little Slocan Telephone-line	97.00
Saddle Mountain Telephone-line	47.00
Kettle Valley Telephone-line	730.00
Baldy Mountain Telephone-line	81.00
Goat Mountain Telephone-line	111.00
Sugar Mountain Telephone-line	86.00
B.X. Mountain Telephone-line	25.00
Snow Mountain Telephone-line	57.00
Little White Mountain Telephone-line	74.00
Aspen Grove Ranger Station Telephone-line	38.00
Bridge Creek Cabin	143.00
Creston Ranger Station	88.00
Salmo Garage	105.00
Nakusp Boat-house	91.00
Mabel Lake Boat-house	100.00
Grand Forks Tool-shed	55.00
Miscellaneous	316.00
	$8,199.00

VANCOUVER.

Equipment—	
Six Ford cars	$4,409.00
Six fire-fighting pumps	2,196.00
7 hand-tank pumps	84.00
One outboard motor	167.00
Fire-fighting hose	582.00
One launch ("Birch II.")	4,099.00
Fire-fighting tools, etc.	2,204.00
	$13,741.00

VANCOUVER—*Continued.*

Improvements—	
Campbell Lake Lookout	$585.00
Cowichan Lake Lookout	527.00
Quatsino Tool-shed	100.00
	$1,212.00
Maintenance—	
South Fork Nanaimo River Trail	$139.00
Big Blackwater Trail	72.00
Mount Benson Lookout	38.00
Mount Shepherd Lookout	29.00
Mount Beecher Lookout	32.00
Squamish Ranger Station	20.00
Douglas Ranger Station	106.00
Pitt River Cabin	30.00
Tool and speeder house	38.00
Powell Lake Boat-house	68.00
Skagit Trail	596.00
Miscellaneous	78.00
	$1,246.00

GRAZING.

GENERAL RANGE CONDITIONS.

The past grazing season may be classed as one of the driest experienced since active control of live-stock grazing on the Crown ranges was assumed by the Government. The rainfall was far below normal and the growth of forage on the lower or grass ranges was retarded to such an extent that growth was meagre. This general condition prevailed early in the season, and in consequence the usual shipments of early beef began at least two weeks later than in normal years.

Early rains in the Chilcotin District held out hope of an excellent season, but the drought experienced later was against the development of the best condition in live stock shipped to market.

As is usual in dry years, the lower ranges were mostly affected and cattle are "forced" to use the timbered areas to a greater extent than usual. This office is consistently preaching the advantage that will accrue to range live-stock interests in the seasonal use of timbered ranges, not only as a measure of range protection and extension, but as the best method to follow in the production of more and better beef. In general, therefore, where an extensive use was had of the timber feed by cattle this year their condition was much better than in those allowed to graze entirely, or nearly so, on the lower dried-up grass ranges. For example, the secretary of the Stock-breeders' Association of Greenwood Riding reported that the only fat cattle coming off the ranges in that district were fed on the timbered ranges, the feed of which proved both nutritious and palatable. The advantages following the use of the "pine-grass" ranges of the Kettle Valley District were particularly stressed at the last annual meeting of the association attended by the Grazing Commissioner.

The fall rains were generally late this year and unless an exceptional precipitation is experienced this winter the outlook will not be bright for 1930. Undoubtedly the usual May and June rains will prevail, but the water-holes and sources of spring-flow are in such a dried-up condition that more than an average precipitation is needed to restore them.

CONDITION OF LIVE STOCK.

In general, cattle have not gone into the winter in the best of condition, due to the scarcity of green forage usually made available by early fall rains. The meagre growth was covered by the heavy snows, which began falling on December 9th of this year, and cattle were forced into the feed-yards.

The fall condition of all breeding ewes was not bad and with reasonable care no difficulty should be experienced in bringing them through a severe winter in good lambing condition. As a rule, sheep do better in severe weather than cattle.

Market Conditions.

Market prices for beef, mutton, and lamb have been good throughout the year. Prices have been at the point and above at which stockmen have claimed reasonable profits could be made. Advantage has not generally been taken of the good prices available for British Columbia beef, mutton, and lamb. The producers must recognize the fact that unless they pay attention to proper feeding in winter, adopt correct turn-out periods in the spring, see to it that the animals destined for the block are on the best of feed before marketing, and arrange shipments to market British Columbia products early to avoid clashing with outside shipments, full advantage of desirable prices cannot be taken.

This clashing was particularly noticeable in lamb shipments this season. Many producers held their lambs too long and finally met with a considerable drop in prices when the Prairie run of lambs was on. There is no reason why the lambs from the Fraser Valley cannot all be on the market before the end of July or the middle of August. In like manner, the general run of farm flocks of the Interior can be bred to place the lambs on the market before the end of August. The range lambs can also be made available for shipment before September 15th, or before the lambs from the Prairies begin coming in. The latter mature a month to six weeks later than the lambs from properly managed British Columbia flocks, and British Columbia is one of the few places in North-western America where fat lambs can be marketed direct from the range.

The same conditions apply to the cattle industry; the correct use of the excellent feed available on all the Crown range will enable the producer to market an earlier and better-quality beef.

There must be more co-operation among the local producers with small herds in order that car-load lots of even-quality live stock may be made available for buyers.

Live-stock Grazing under Permit.

The total numbers of live stock, the grazing of which was authorized for the season of 1929, is as follows:—

District.	Cattle and Horses.	Sheep.
Cariboo	30,000	5,000
Cranbrook	2,500	9,000
Fort George	500	.....
Kamloops	4,000	1,500
Nelson	2,000	500
Prince Rupert	300	.....
Vancouver	200	.....
Vernon	20,000	10,000
	60,000	26,000

While the numbers of cattle grazed do not show any marked increase over previous years, the demand for summer range for sheep has been heavy. For example, during the 1926 grazing season permits for 1,671 sheep to graze on the Crown ranges of the Southern Interior District were issued. This number was increased to 7,215 head in 1929 and there is every prospect of a further increase in 1930. Farm flocks of sheep show a very heavy increase, there being in all about 200,000 sheep in the Province, as against 50,000 five years ago.

The quality of range live stock in the Province is constantly increasing. The annual bull sale and sheep-sale held at Kamloops are the means of distributing desirable sires and breeding stock throughout the range country. The assembling of these high-class animals, together with the fat-stock exhibits, is an excellent educative medium through which the advantages following live-stock improvement can be brought home to the ranchers assembled at the sales.

Demand for Grazing Privileges.

There is an increasing demand for a grazing use of the Crown lands. This is particularly true in districts where the flocks of sheep are increasing. The applications filed indicate that

stockmen realize how dependent their ranches are on the use of adjacent Crown range, which can be had for the small payment of 5 cents per head per month for cattle and 1¼ cents per head for ewes, with a sum equal to one-third of the fee paid returned for range improvements. This means that for every head of cattle carried on the winter ranch 15 acres and more of Crown range per head of cattle and 3 acres and more per head of sheep are available at a very low fee per head. Consequently, all range live-stock men realize the value of the grazing privileges allowed under the "Grazing Act."

In comparison with the low fees charged for a use of Crown ranges in British Columbia, grazing fees on similar public lands south of the International Line run at 15 to 21 cents per head of cattle per month and 3¾ to 5¼ cents per head of sheep per month, with no return for range improvements.

In some districts in British Columbia where crowded conditions are developing strict attention must now be given to the qualifications of permittees, and it is apparent that the grazing regulations must be extended to cope with the problems this condition presents.

Division of Ranges between Different Classes of Stock.

With the increasing demand for sheep-grazing privileges, attention is being given the allotment of suitable ranges for each band or flock. In general, the midsummer range presents no problem, as flocks of sheep can be driven considerable distances to the higher ranges where the best midsummer feed is found. A problem is, however, being met with in furnishing early and late ranges, heretofore included in general cattle allotments. Early allotments are being cut off for individual sheep allotments where possible. So far there has been little difficulty, as most of the men going in for sheep were former cattlemen and their cattle herds are being replaced by sheep; the old allotment being used by the latter class of stock. Lines are drawn, however, beyond which the sheep must not be herded.

Outside of these early and late allotments for sheep the lower ranges in general are allotted as cattle-grazing grounds. The feed is usually not of the type suited to the ewe with the growing lamb, which matures earlier than the calf and needs the succulent type of forage found in the high mountains. To render the ranges, both high and low, being more readily used, considerable stock-trail work has been undertaken.

Live-stock Associations.

Co-operative work in range and live-stock management and protection has been going ahead in the various grazing districts. The activity has been particularly noticeable throughout the Vernon, Nelson, and Cranbrook Grazing Districts, where ten very active associations are operating.

The broader lines of work are dealt with through the British Columbia Stock-breeders' and the British Columbia Sheep-breeders' Associations, both Provincial-wide organizations. Local problems come before the local organizations and a great deal of valuable co-operation is given. This has of late been manifested particularly in the wild-horse and grasshopper control work and in the improvement of the ranges.

Losses of Live Stock.

In general losses have not been above the average. A few cases of blackleg in cattle were reported, but nothing of a serious nature developed. Among undesirable breeding ewes sold to some of our ranchers from outside points considerable loss was experienced, but those going in for sheep now fully understand that, if they discuss their requirements with their Provincial association, arrangements can be made to see that they get good ewes.

Very few cases of loss from poisonous plants were reported. It is seldom that any trouble is experienced from this source because British Columbia ranges are most remarkably free from poisonous plants. Investigation usually shows that losses from so-called poisonous plants are really losses due to bloat following sudden changes from dry to succulent forage.

Losses from predatory animals have been at about an average. Bears, both black and grizzly, were active this year on the high sheep-ranges and did unusual damage among the flocks for a short period or until they were destroyed. Should their depredations occur again it may be advisable to recommend the employment of special hunters.

Range Improvements.

The 1929 range-improvement plan provided for the expenditure of $4,183.23 in the Cariboo, Kamloops, Vernon, Nelson, and Cranbrook Districts for the following projects:—

Cariboo District.—Thirteen mud-holes, four breeding-pastures, one stock-trail, four drift-fences, four holding-grounds, and one maintenance project; cost, $2,508.23.

Southern Interior District, comprising Vernon, Nelson, and Cranbrook.—Two water-development projects, four stock-trails, one reseeding project, one drift-maintenance project, special maintenance projects, Creston flats, fences, and bridges, and emergency mud-holes; cost $1,605.

Kamloops District.—One stock-trail and one dangerous prospect-hole; cost, $70.

The above programme will be about completed by the end of March, 1930.

Emergency projects were authorized during the year, payments for which were made from emergency mud-hole funds and other surplus funds accumulated, due to keeping expenditures as much below estimates as possible.

The total of range-improvement projects constructed to facilitate the handling and protection of stock now existent throughout the various districts are:—

Drift-fences built	81
Mud-holes improved	127
Water-holes and springs developed	23
Corrals built	26
Breeding-grounds enclosed	36
Holding-grounds for beef drives	11
Stock-bridges	9
Stock-trails	27
Range-restoration studies	5

Other works of a nature having direct bearing on the protection and capacity of the ranges have been undertaken, notably wild-horse control, grasshopper-control, and range restoration.

Wild-horse Control.

To date wild and useless horses to the number of 3,700 have been eliminated from the Crown ranges by direct action and the rounding-up and sale of several thousand of the better type and of herds accessible to shipping-points has been very strongly influenced. The destruction of wild and vicious stallions and other wild and useless horses is now under way on two units of the Vernon and on three of the Cariboo Grazing Districts. The maintenance of a "pound" on the White Lake Stock-range during 1929 was productive of much good. Trespassing horses were at once seized and, if not claimed, were sold or destroyed.

Grasshopper-control.

The excellent results following the commencement of poisoning on the ranges in 1925 is evident in districts where the work was done. The local stockmen who co-operate with the Government in this work are as a rule put to considerable expense in protecting their crops. Heretofore, work done by the few has benefited the many. There is, therefore, a movement on foot to secure legislation requiring that all land-holders in defined districts pay their proportionate share of costs on an acreage basis in much the same way as provided by the "Codling-moth Act." This course has been recommended by this office.

Outbreaks of grasshoppers were not serious this year anywhere on the ranges, with the exception of those of the Empire Valley. Provision is made, however, to cope with any outbreak, so that with intelligent co-operation between Government officials and stockmen no serious damage in the future should occur.

Experiments have been carried on in various parts of the range districts in order to determine the economy and value of reseeding burned-over ranges to cultivated grass and other forage-plants. So far little success has followed, as it is not possible under ordinary conditions on such ranges that cultivated grasses or other plants can thrive in competition with native vegetation unless expensive work is undertaken, and which is not warranted under range conditions. An interesting experiment is, however, under way on the Richter Pass Range, where large areas of dense sage-brush are being burned over and sowed down to western rye (*Agropyron tenerum*). The burning and seeding of last year showed a certain degree of success and the work was extended this year. It is noted, however, that live stock so congregated on the seeded area that

serious damage is likely to occur if protective measures are not adopted. These are being arranged. It brings out the point that unless large areas of range can be seeded down the congregation of stock, combined with competition from the native plants, soon destroys the cultivated forage. These things, together with the cost of seed, renders it apparently useless to consider seeding ranges to cultivated plants. With the proper measure of protection, the native vegetation will soon restore itself, as has been clearly demonstrated in the range-restoration experimental areas now under observation on the range.

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