ANNUAL REPORT

OF THE

MINISTER OF LANDS

OF THE PROVINCE OF

BRITISH COLUMBIA

FOR THE

YEAR ENDING 31ST DECEMBER

1918

PRINTED BY
AUTHORITY OF THE LEGISLATIVE ASSEMBLY.

VICTORIA, B.C.:
Printed by WILLIAM H. CULLIN, Printer to the King's Most Excellent Majesty,
1919.

VICTORIA, B.C., February 28th, 1919.

To His Honour Sir FRANK STILLMAN BARNARD, K.C.M.G.,
Lieutenant-Governor of the Province of British Columbia.

MAY IT PLEASE YOUR HONOUR:

Herewith I beg respectfully to submit the Annual Report of my Department for the year ending December 31st, 1918.

T. D. PATTULLO,
Minister of Lands.

VICTORIA, February 26th, 1919.

The Honourable T. D. Pattullo,
Minister of Lands, Victoria, B.C.

SIR,—I have the honour to submit the Annual Report of the Department of Lands for the twelve months ending December 31st, 1918.

I have the honour to be,
Sir,
Your obedient servant,

G. R. NADEN,
Deputy Minister of Lands.

PART I.

DEPARTMENT OF LANDS.

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DEPARTMENT OF LANDS.

REPORT OF OFFICE STATISTICS.

February 28th, 1919.

G. R. Naden, Esq.,
Deputy Minister of Lands, Victoria, B.C.

SIR,—I have the honour to submit report of the administration of lands in the Province during the year 1918, namely:—

(1.) Statement showing the number of pre-emption records, certificates of improvement, and certificates of purchase issued:
(2.) Statement of Crown grants issued, divided into different classes, showing the total acreage of Crown-granted pre-emptions, mineral claims, and purchased lands:
(3.) Statement of coal-prospecting licences, coal leases, and sundry leases issued, showing the approximate area thereof and the fees and rentals collected in connection therewith:
(4.) Statement of land-sales, showing the area of surveyed and unsurveyed lands sold:
(5.) Statement of the number of pre-emptions inspected during 1918:
(6.) Statement showing the revenue received by the Lands Branch, Victoria, from various sources:
(7.) Comparative statement of the various land transactions since the year 1906.

I have, etc.,
H. CATHCART,
Superintendent of Lands.

PRE-EMPTION RECORDS, ETC., 1918.

	Pre-emption Records.	Certificates of Improvements.	Certificates of Purchase.
Alberni	6	7	22
Atlin	....	....	....
Cariboo	67	50	14
Cranbrook	14	12	15
Fernie	2	4	2
Fort Fraser	166	58	23
Fort George	215	83	41
Golden	1	6	7
Kamloops	31	5	8
Lillooet	124	48	24
Nanaimo	3	1	3
Nelson	1	7	18
New Westminster	....	....	1
Nicola	15	13	10
Omineca	29	19	17
Osoyoos	7	5	12
Revelstoke	1	1	....
Similkameen	23	12	17
Skeena	16	20	*63
Slocan	....	2	16
Stikine	....	....	....
Vancouver	84	23	51
Victoria	3	1	228
Yale	16	2	....
Totals	823	379	592

CROWN GRANTS ISSUED, 1918.

Pre-emptions	552
Purchase	92
"Pre-emptors' Free Grants Act"	155
Minerals	301
"Soldiers' Homestead Act"	338
Town lots	39
Reverted lands	4
Reverted mineral claims	15
Miscellaneous	12
"Coal-mines Act"	1
"School Act"	3
Crown grants written up	1,512
Applications for grants	1,530
Certified copies of counterfoil	6

TOTAL ACREAGE DEEDED.

Pre-emptions	105,981.38
Mineral	13,198.43
Purchase surveyed	13,021.77
Purchase unsurveyed	128,119.82
Total acreage deeded	260,321.40

REPORT ON COAL LICENCES, LEASES, ETC., 1918.

COAL-PROSPECTING LICENCES.

Number of Licences issued.	Licence Fees.	Penalties.	Transfer Fees.	Area.
				Acres.
72	$10,337 50	$1,350 00	$25 00	46,080

COAL LEASES.

Number.	Fees.	Rentals.	Total.	Area.
				Acres.
3	$2,990 00	$21,065 42	$24,055 42	1,510

SUNDRY LEASES.

Number.	Fees.	Rentals.	Total.	Area.
				Acres.
83	$415 00	$33,703 68	$34,118 68	5,914

LAND-SALES, 1918.

	Acres.
Surveyed lands sold	3,373
Total lands sold	3,373

PRE-EMPTIONS INSPECTED IN 1918.

Alberni	...
Atlin	...
Cariboo	4
Cranbrook	163
Fernie	30
Fort Fraser	6
Fort George	24
Golden	58
Kamloops	200
Lillooet	...
Nanaimo	...
Nelson	57
New Westminster	...
Nicola	91
Omineca	...
Osoyoos	51
Revelstoke	13
Similkameen	19
Skeena	...
Slocan	16
Stikine	...
Vancouver	62
Victoria	31
Yale	2
Total	827

STATEMENT OF REVENUE.

Months.	Pre-emption Records.	Records.	Certificate of Improvements.	Crown-grant Fees.	Survey Fees.	Rent of Land.	Search.	Coal-prospecting Licences.	Land-sales.	Miscellaneous.	Total.
January	$2 00	....	$4 00	$ 930 00	$392 25	$5,972 00	....	$3,300 00	$ 21,280 72	$2,201 00	$ 34,081 97
February	....	....	....	1,900 00	471 75	2,780 26	....	500 00	81,675 94	243 55	87,571 50
March	2 00	....	....	2,020 00	125 20	5,017 10	....	650 00	134,769 09	605 17	143,188 56
April	....	....	....	850 00	.....	4,532 71	....	200 00	2,019 25	537 55	8,139 51
May	2 00	....	....	700 00	123 00	6,399 90	....	.....	2,915 90	194 00	10,334 80
June	....	....	....	795 00	.....	5,744 20	....	300 00	1,120 00	236 00	8,195 20
July	....	$6 00	....	1,280 00	470 00	5,449 05	....	200 00	350 16	136 15	7,891 36
August	....	6 00	....	1,040 00	28 75	4,671 80	....	650 00	28,485 41	206 48	35,088 44
September	....	4 00	....	920 00	.....	2,273 02	....	950 00	292 58	118 15	4,557 75
October	....	5 50	....	1,385 00	74 50	7,083 41	....	2,187 50	1,051 21	172 35	11,959 47
November	....	5 50	....	1,185 00	14 25	5,910 85	....	350 00	3,380 15	94 55	10,940 30
December	....	12 05	....	680 00	.....	2,339 80	....	1,050 00	3,272 30	89 50	7,443 65
Totals	$6 00	$39 05	$4 00	$13,685 00	$1,699 70	$58,174 10	....	$10,337 50	$280,612 71	$4,834 45	$369,392 51

SUMMARY.

	1906.	1907.	1908.	1909.	1910.	1911.	1912.	1913.	1914.	1915.	1916.	1917.	1918.
Pre-emption records	1,048	936	1,535	1,620	2,049	2,383	3,655	3,855	4,304	2,277	1,167	824	823
Certificates of improve't.	180	262	256	289	439	624	715	962	1,002	665	465	541	379
Certificates of purchase	1,550	3,205	2,438	4,363	9,031	7,141	5,065	3,640	1,805	990	729	778	592
Crown grants	1,124	1,520	1,667	1,714	1,572	2,566	2,757	2,110	1,376	718	847	1,167	1,512
Total acreage deeded	336,145.03	599,419.57	253,541.95	326,229.54	300,587.79	524,325.99	253,143.06	390,036.23	245,244.78	75,225.00	98,452.00	187,111.64	260,321.40
Coal-prospecting licences	286	426	479	692	145	2,223	2,003	1,090	545	198	120	71	72
Sundry leases	294	155	36	83	92	121	47	46	51	38	86	73	83
Coal leases	.....	.....	.....	.....	.....	....	75	207	71	29	31	7	3
Cash received	$1,230,754 07	$2,088,923 79	$3,065,164 43	$4,148,403 44	$3,190,416 21	$3,526,544 61	$2,525,497 29	$946,944 23	$589,687 36	$126,308 28	$159,213 65	$194,435 17	$369,392 51
Letters received	19,661	29,430	33,629	25,798	37,188	41,946	43,302	31,738	30,287	19,151	13,779	15,780	22,500
Letters sent	.....	.....	.....	.....	.....	23,568	21,612	17,305	14,790	10,104	8,432	12,632	12,500

REPORT OF THE COMMISSIONER OF GRAZING.

November 9th, 1918.

The Deputy Minister of Lands,
Victoria, B.C.

SIR,—During the past two months, which have been spent continuously in the range country of the Province east of the Cascade Divide, certain conclusions have been reached regarding the use and management of the vacant Crown lands available for grazing purposes. These conclusions, while no means definite as to the details of local management in the various districts or as to what will be later known as sectional range units of the area covered, embrace principles of range-management which will be closely followed in the future handling of the open range in the development of the live-stock resources of the Province. I have discussed these matters with the stockmen individually and at various gatherings, and the consensus of opinion is clearly in favour of active and effective control of the grazing ranges by the Government.

DESCRIPTION OF RANGE.

From the view-point of range-management there may be said to be two topographic types of range available for use: (1) The vast area lying between the Fraser River on the west, the Similkameen on the south, and the Rocky Mountains on the east; and (2) the more rugged and mountainous areas outside of the approximate boundaries of the first type mentioned.

The first type approaches more closely what is desired for range cattle than for sheep on account of its comparatively level character and general absence of the luscious, weedy annual plants found on the higher and more moist areas of the rugged and mountainous regions.

In general the forage-growth of the first type includes bunch-grass and blue-grass, with scattering bromes and rye-grasses, as the predominating plants on the lower, more open south slopes, with pine-grasses as the main forage in the timber. Scattered lupines and other weed-plants occur in the timber, but in general the pine-grasses are predominant. Although very nutritious, they are of such coarse character that they afford much better feed for cattle than for sheep. Sheep will do well on such range, but cattle will get much more out of it than sheep, as much waste of forage will usually result when it is grazed by the latter. This waste may to a great extent be overcome by careful and systematic burning, but, nevertheless, the pine-grass is not as suited to the needs of the ewe and lamb as to the cow and calf. The growing lamb matures so much more rapidly than the calf, and therefore requires a more tender ration than the pine-grass affords if it is to make its best and most profitable growth.

Scattered throughout this first general type, however, are many areas of comparatively steeper range which cannot be used to advantage by cattle and which afford excellent range for sheep. In some instances there are areas which will afford range for one or more bands of 1,200 head of old sheep to the band. There are many sections where but one band can be accommodated. Areas of this character are to be found in the vicinity of Brookmere, Clinton, Nicola, Pavilion Mountain, and other places.

In the use of this range, however, the desires of the interested settlers will predominate. Many are interested in cattle and many in sheep; whatever class of stock a man desires to run, he can make a success of his venture with reasonably good management in spite of the fact that the summer range he uses is better adapted to the grazing of one class of stock than to another. The raising of various classes of stock in any section of country will have a broadening influence on the general live-stock education of that section, and a more definite stabilization of its prosperity will result than if its operations were confined to the growing of but one class of stock.

The second or more rugged type of range is, as has been stated, very desirable sheep-range. The lower slopes afford the usual bunch and blue grass; the range of medium height, the pine-grasses; while the upper areas closer to the snow-line produce the weedy annuals so essential to the ewe giving milk for a rapidly growing lamb, which a few weeks after birth is eating freely of the herbage on such range. Above timber-line is found, often in dense growth, many of the palatable, low-growing sedges and grasses which are very desirable on any sheep-range. The many meadows available also produce abundantly, and, while in themselves they could be used perhaps as well by cattle as by sheep, they are more suited to the latter, since sheep can use all or most of the surrounding range and cattle cannot. The wet meadows of the upper ranges are often susceptible to damage by cattle on account of the trampling of the moist soil which is not in evidence in sheep-grazing.

In the use of this type, however, the desires of the settler living adjacent, who will make use of it, must prevail. It will no doubt develop, however, that as the stock industry grows, the use of such range will be divided by agreement between cattle and sheep men operating the ranch property adjacent and dependent upon it.

As in other sections of the continent where similar range is available and is being used, the canyon-bottoms and lower benches are devoted to cattle-grazing and the upper and more rugged slopes to sheep-grazing, with areas of low range set aside for the use of the latter class while passing from the winter to the summer range.

CONDITION OF THE RANGE.

As a general statement, it may be said that the condition of the lower or open bunch-grass ranges is bad, while that of the timbered range is good.

The range such as that of the first type referred to as desirable cattle-range is of such comparatively even elevation that areas of open grass lands producing bunch-grass occur throughout it all and at the highest elevations. As this type is in more or less general use without proper system of control, the open grass areas are heavily grazed during the whole of the open season. The consequence is that the grasses have not had an opportunity for years to mature and they are rapidly weakening in growth each year. In some instances the range is in a sadly depleted condition and will require years of careful management to restore it. In other instances where the use has not been very heavy in the past two or three years, proper protection during the growing season will make for a good growth of grass which will be available for fall grazing. Where heavy overgrazing has resulted in an advanced stage of depletion, it will be extremely advisable to protect the grass entirely during the spring or growing season for several years. But where the damage is not great and good results will follow two or three years' protection in the early part of the season, light grazing in the spring, so that not more than 50 per cent. of the growing plants will be consumed, will not retard restoration seriously.

Bunch-grass plants very much weakened by overgrazing seldom produce seed, the viability of which is sufficient to have a marked influence on the restoration of any area. If the plants are given the chance to make sufficient growth so that plant-food for succeeding years of growth can be manufactured and stored away in the root system, the plant will be strengthened and will rapidly increase in size and strength.

The timbered portions of range on areas which are in general use for grazing are but lightly touched. When grazed it is because the only water available is located in the timber and the bunch-grass or open portions are practically denuded of forage. This is to be expected where no system of range-management is practised, because cattle will naturally congregate and graze on areas upon which is found the most palatable and sweeter forage. The bunch and blue grass of open areas are more palatable and sweeter than the coarser and harsher pine-grasses; consequently the stock will graze the former and slight the latter if not induced to frequent and graze the timbered range.

The correction of this uneven use of range requires systematic co-operation between the stockmen who use it and the Government which controls it. The practical management should ultimately devolve upon the stockmen under the direction and supervision of the Government.

When we speak of the open range, reference is made to that which is used by stock turned out to graze from the time the home or winter range pastures are not in use, or from the opening-up of spring until the snow flies and necessitates the gathering-in of the stock on the winter ranch. This open range must furnish forage for spring, summer, and fall, and in general may be said to consist of spring feed on the lower or open areas consisting mainly of grasses, mid-summer feed in timbered areas made up generally of pine-grasses, weedy annuals, and the rushes and sedges of meadows, and fall feed on areas of low or open grass range protected during the spring in order to afford feed for fall grazing. This is the natural and only feasible division of any range to secure good results, and when the division is made a basis for the correct system of management is laid.

RANGE IMPROVEMENT.

The systematic management of a range, therefore, requires: (1) Its division into spring, midsummer, and fall range as nearly as possible; and (2) the even grazing of stock over its area. The latter case can be accomplished in the case of cattle by: (*a*) The development of

watering-places; (*b*) the correct distribution of salt; and (*c*) the construction of drift or division fences. And in the case of sheep: (*a*) By development of watering-places when necessary; and (*b*) the application and adoption of a grazing plan for each allotment.

All of the ranges examined are not alike in their make-up. Many are ideal; that is, they furnish enough spring and fall range, if properly protected, to balance the midsummer range available. Others are unevenly made up, having, perhaps, too little or too much of spring, midsummer, or fall range, and, as is often the case, the available open range on Crown lands is midsummer range only. They must therefore be managed somewhat differently, although the same principles will apply to all. For example, a range which furnishes only midsummer range and which can only be used during that period without damage resulting to the forage would require that the stock be kept on other lands until the forage is ready for use. Again, a range which had but little true midsummer range of the weed and browse type, but had plenty of the open or actual spring and fall range, would necessitate more grazing on dry range during the summer period than best results in beef or mutton products would ordinarily call for.

The improvement of ranges by water-development contemplates the development of springs and seeps by digging out, fencing, and troughing, so that the water will be evenly distributed over the range, and stock will consequently not have to travel far to and from water. Where watering-places are widely scattered there results heavy grazing near the water and light or no grazing at all at a distance from the water, or, in other words, an uneven use of the range.

This condition can be remedied to some extent by the proper placing of salt on the range, but it is always essential, if the most beneficial results are to follow, to plan for the development of springs and seeps not now affording adequate water for the surrounding range, and in this way cut down the distance of travel between water and salt.

The use of more salt on the open ranges is important, as well as its proper distribution. I find that it is the general practice to throw down the salt at the most convenient place on the range. This is generally along roads and trails, and particularly in the vicinity of water and at places where cattle are in the habit of congregating. Years of such practice has, of course, developed these congregating grounds, so that the habit of hauling the salt to these places year after year is generally well established, with the natural result that overgrazing around the watering-places is well developed, to the injury of the stock and range. There is also a heavy loss of good forage through lack of use of the range at a distance from the water.

In many cases I find this unsystematic use is retarding seriously the development of the stock industry. When but a portion of the range is being used the balance must necessarily be counted out of capacity estimates, and when the used portion is being seriously overgrazed and decreasing in carrying capacity each year there is a tendency to cut down the herds rather than to increase them and slacken up in the hay-producing development of the winter ranches. There are in the aggregate thousands of acres of undeveloped hay lands on a great majority of the ranches which will raise hay sufficient for many thousands more head of stock that can be more than well provided for with summer range. It can be said that the summer ranges of the Province are unlimited so far as they relate to the capacity of the winter ranches.

To develop a correct use of the summer ranges, therefore, all users must realize that the placing of salt in the vicinity of watering-places is a great mistake. Salting-grounds should be established at a distance from the water. An ideal range should have watering-places not more than a mile apart, with salt-troughs between them. Thus the salt-troughs would also be not more than a mile apart, and there would result a quiet feeding between water and salt which would so evenly distribute the cattle that the maximum in improvement and in carrying capacity will be attained. Practice and observation will enable the men in charge of the stock on the range to improve preliminary plans.

The construction of drift and division fences on cattle-ranges is often important, especially on those ranges where the topography permits the wandering of cattle from one division to another or on to adjacent sheep allotments. They are important in that they assist in the round-up by confining the cattle to designated ranges and preventing loss from straying.

The drift-fence is that which marks the exterior limits of the range unit, and the division-fences are those constructed to divide spring or fall from midsummer range, or, perhaps, the beef from the cow range. They are variously used, and in the protection of much of the lower or grass ranges of the Province on the more level types may eventually be very necessary. Areas like the Lumdum and Hamilton Commonages require drift and division fences to make adequate provision for their restoration.

Generally speaking, however, the development of water resources where possible and the correct distribution of salt may be relied upon to bring excellent results in developing a use of the now neglected timber areas and the protection of grass-producing range.

Referring in particular to the use of sheep-range, it may be said that water and adequate plans will accomplish all that is necessary in the protection of the allotments. Sheep are herded and the application of any plans for the use of an allotment should be easy, and little excuse can be made for not following the broad requirements of any plan.

The sheep industry is so small in the Province that but little range has suffered from overgrazing by sheep. As the industry develops and new range is opened up, the chief concern will be the prevention of heavy grazing on areas where herders as a rule find it easy to feed the sheep, and forcing a use of areas supporting excellent feed, but upon which it appears to be more difficult to herd. Each plan as compiled will contemplate, as in the plans for the use of cattle-range, the grazing of low range early, the higher and more remote range in midsummer, and a return to the protected fall range of the lower slopes, alternate grazing on the grass ranges to be practised to ensure maximum production.

ALLOTMENT.

The careful and correct management of the range will require its division between the two principal classes of stock, cattle, and horses in the one, and sheep and goats in the other. Cattle and horses can be more economically and successfully managed in allotted community ranges instead of individual allotments. They are turned loose to graze, and there is always an intermingling of stock on each distinct unit of range, which, for best results, will necessitate co-operative management by the owners of such stock working together as an association.

These associations for range-work may comprise two or more owners. Individual cattle-ranges will not be the general rule, and should not be sanctioned in any plan of range-management unless there is such isolation in evidence that the cattle cannot mix with others and friction over boundary-lines is not possible. Individualism in allotments may be considered so far as the salting and development-work on a portion of a range unit is concerned, but not to the extent of giving one man absolute control of a particular area upon which his neighbour's cattle will stray, and from which his own will drift, that he will feel called upon to complain about drift upon his allotment. Absolute isolation should be apparent before the individual cattle allotment is considered. Where one man is in the habit of turning his cattle on one portion of a range unit and another on a separate portion and they intermingle, the proposed permits should cover in their description permission to use the whole unit, and no friction arising between the users because of rights claimed to any portion of the units should be considered as ground for a just complaint.

In the allotment of sheep-ranges it is evident that applications will come from owners who have small bands of sheep of 200 to 600 head each and on up to 1,200 head to the band. I anticipate that the small flock will be very much in evidence in British Columbia in the future, even in the range country. Where such a condition results the sheepmen will experience difficulty in securing herders for small bands unless they are willing to pay good wages. With a heavy expense in this way, the raising of sheep by those who would like to do so, but who cannot see their way owing to the expense, will be prevented. The Department should therefore encourage the runinng of co-operative bands.

This plan contemplates the setting-aside of adequate allotments for each band of approximately 1,200 ewes with lambs, and encouraging several owners to pool their flocks for the summer. The expense of the herding can then be shared on a *pro rata* basis, the sheep being divided in the fall when they leave the summer range and the losses shared proportionately. Each man can attend to the breeding, wintering, and lambing of his own sheep. In some instances the possibility of running co-operatively, except as to winter feeding, may appeal to the owners, the group owning the necessary rams. Many, of course, probably most of the growers, will prefer to run their sheep apart from others, in which case adequate individual allotments should be provided.

It will be found sheep-ranges must necessarily be set aside within units of ranges of which the majority of users are cattlemen. This can be successfully accomplished by confining the sheep to a distinct allotment, but allowing the cattle to graze over the entire unit, sheep-range and all. The sheepmen will be compensated for this drift by having an adequate allotment.

The sheep being herded can be confined to lines, but the cattle grazing loosely cannot, and it would not be advisable to put the cattlemen to the expense of herding to lines when it is not necessary.

CO-OPERATION.

As stated before, proper management will require co-operation between the Government and the stockmen. Co-operation with individuals regarding individual allotments is brought about through the compilation and application of individual allotment plans.

Co-operation with groups of users, however, will depend upon their organization in an association, with an elected or appointed range committee or advisory board to manage the range in accordance with the suggestions and plans of the Department. The possibilities in this respect are remarkable, and are largely the basis for all progressive work expected to be accomplished in correcting evils in range-management and promoting the general welfare of the stock industry.

SURPLUS SUMMER RANGE.

While I have not yet had an opportunity to examine into this phase of the range question, I have reason to believe there exists in British Columbia very large areas of summer range for sheep in the higher Cascades and in the Rockies which local growers cannot hope to use with local-grown sheep.

It seems clear to me, therefore, that a large field is open to the local man who cares to go outside of the Province in the spring to buy sheep, shipping them in for summer grazing, and thence on to the local or Eastern markets in the fall. This phase of the sheep business has developed in other sections of the continent and will also develop here, and forage resources, which otherwise might be wasted, will be developed and put to profitable use.

Another line of profitable endeavour will develop in the purchase of sheep on the outside and the wintering of them on the heavy-producing hay lands and crops of the Province, and their marketing during the winter months or possibly after shearing in the spring. Many sheepmen who do not care for the expense and hazards of summer grazing on the range will follow this business, which can be made a very profitable one.

PRIVATE LANDS.

In any system of allotment of the Crown lands the scattered nature of the unfenced private lands will be a factor to be considered. These lands are so numerous within the areas of range used by cattlemen in the more heavily stocked districts that in some cases only a fraction of the range unit is Crown land. This will necessitate a form of permit which may be designated the "on and off permit."

This permit would be issued where the applicant for range does or does not own or control through lease the unfenced private lands in the unit, and the owner of such lands does not object to his use of them. The permit as issued would give permission to graze so many cattle on a unit of range a certain percentage of which is Crown lands.

For example, the percentage of the Crown lands in the unit is fifty, and the applicant desires to graze 100 head of cattle. The permit as issued would cover fifty head of stock, for which he would pay the Government, but should contain a clause reading: "This permit allows the grazing of 100 head of cattle on range 50 per cent. of which is Crown land."

Where the applicant does not own or control the lands and objection is raised to the use of the private lands by the owner or a lessee, the clause would be discontinued and a straight paid permit for fifty head issued, the applicant and the party controlling the private lands settling the use of such lands among themselves without involving the Government.

In all cases where the lands involved are owned or leased by the applicant, the same clause may be included in the permit each season that evidence is filed to prove such ownership or control.

Areas of private lands suitable for grazing may be owned or controlled by an applicant who desires to graze his stock on range at a distance from that in which his private lands are located. If advisable, and he waives the exclusive use of it to the Government and agrees to its use by any one to whom the Government allots it, he could be given a free permit for the number of stock his private lands would carry and be allowed to graze them on an allotment of Crown lands in some other portion of the district, or on the range for which he makes application.

BURNING RANGE.

I have examined many portions of range with the end in view of determining the possibility of the improvement through burning. Many old and recent burns, particularly in lodge-pole pine areas near Clinton, have been examined, and my conclusions at this time are that it will be unwise to undertake severe burning for the purpose of removing the timber.

The stockmen, as a rule, hold the opinion that the lodge-pole or jack-pine areas should be burned, because, as they say, the stock will not eat the pine-grass, which is the principal forage-crop under the pines, and they believe that if the timber is burned the stand will improve on account of the range being more open and exposed and the old grasses, etc., removed. It is true that burning will improve the grass range if wisely done, but it is a mistake to assume that because the pine-grass is not used it is not palatable. It has been pointed out in this report why cattle prefer not to use pine-grass if bunch-grass and other sweeter grasses are available, and it has also been pointed out how cattle can be made to use the pine-grass.

There are very few areas of lodge-pole pine range which cattle are prevented from using on account of the density of the timber. As a general thing, it is not necessary to burn the timber to secure this use. If water is available, the use of salt will accomplish it.

It is clear to me, however, that intelligent burning will assist in a more vigorous growth of pine-grass through the ash-deposit and the removal of the humus with its humic-acid deposit. From a range view-point it destroys the small seedlings which grow and restrict grazing. All burning, however, should be light burning; that is, sufficient only to destroy the old grass without injuring its root system, and to destroy the small seedlings only. The larger trees will be left to grow, thinning themselves out in a natural way, the result being park-like areas of good grazing-grounds, affording the proper shade for cattle in the hot weather, as well as for the character of grasses and forage peculiar to the various lodge-pole or jack-pine ranges.

Indications are that light burning can be accomplished more readily in the early part of the year or about June or early July. It seems unwise, therefore, to consider at this time burning during portions of the year when conditions are such that severe fires will occur and destroy the trees, both large and small. Severe fires seem to destroy the root system of the grass very extensively, and while there is a spotted growth of grass following the fire, in a few years the dead trees fall in until there is an impassable mass of tree-trunks, necessitating a second and even a third burn to open the range again. It would appear useless to burn a second time until practically all dead trees are down.

Observations on second burns in most cases convinces me that severe fires promote the growth of brush, which in a few years grows beyond the reach of the grazing animals. If burning is to be undertaken, it should be light burning only and carried out at a season of the year when only the dead grasses and small seedlings will be destroyed.

It is proposed to burn an area of range north of Clinton next June or July to determine particularly what effect it will have on the growth of the kinnikinic. Instances have been noted where this plant is growing so abundantly that it appears to be having the effect of preventing the growth of palatable forage. White clover and some tame grasses will be sown on a portion of the burn as an experiment.

An area in a 1917 burn near the 59-Mile House was sown with pine-grass to determine the fertility of the soil after a severe fire which in places appeared to destroy all vegetation.

The following tame grasses were sown by Ranger Geo. H. Stevenson on areas of the zone of the 51-Mile fire: Brome-grass and cocksfoot.

It is planned to totally protect portions of these areas to determine the effect of total protection from grazing as compared with the effect of grazing on other portions, and also to find out what will be the result in choking out the tame grasses, if any, by the native herbage under conditions attending total protection, as well as grazing.

Some bunch-grass was sown on a sample area on the Hamilton Commonage as an experiment, and a sample plot was fenced on the Lumdum Commonage to determine the rapidity of recovery of bunch-grass on the most denuded areas of that range.

COYOTE MENACE.

A few of the sheepmen have complained to me that the coyote was a great menace, and that some measure in the way of putting on Government hunters and trappers should be adopted to cope with the evil. Others do not seem to think the coyote is to be greatly feared or to be

considered as an influence sufficient to deter one from entering the sheep business. It is apparent that the man who runs a few sheep or small flock on his ranch and those who use the open range with poor herders in charge are the sufferers. The former does not realize that sheep cannot be allowed to graze under inadequate fences practically without protection in a country where coyotes abound without loss occurring. In such cases the coyote soon becomes familiar with the surroundings and practises on the range and kills sheep whenever he needs a meal. In the latter, careless herding and the bedding of the sheep too long on the same bed-ground is responsible for the loss.

The farm flock should be under a good, well-kept, woven-wire fence. A barbed wire strung along the ground will be very effective in preventing the coyote from digging under the fence. On the range, coyotes can be kept from the sheep if a few shots are fired around the bands during the day and bed-grounds are not established too long at the one place.

I have, etc.,

THOS. P. MACKENZIE,

Commissioner of Grazing.

REPORT OF THE SUPERINTENDENT OF BRITISH COLUMBIA SOLDIER SETTLEMENT.

February 24th, 1919.

The Honourable the Minister of Lands,
Victoria, B.C.

SIR,—I have the honour to submit herewith my report of the administration under the "Soldiers' Land Act," being chapter 80 of the Statutes of British Columbia for the year 1918, as required by section 6 thereof. The above Act was assented to on April 23rd, 1918, and my appointment as Superintendent of British Columbia Soldier Settlement dates from September 26th, 1918, approved by Order in Council dated October 8th, 1918, notice of which appeared in the British Columbia Gazette on February 27th, 1919.

Below follows a summary of proceedings under the Act previous to my appointment:—

(1.) By Order in Council approved on June 8th, 1918, and notice appearing in the British Columbia Gazette on June 13th, 1918, the reserve on land covered by Expired Timber Licence No. 33923, situate at Porpoise Bay, near Sechelt, which is about thirty-five miles from Vancouver, which had been subdivided as Lots 4679, 4680, 4681, 4682, 4683, 4684, 4685, 4686, 4687, 4689, and 4690, Group 1, New Westminster District, consisting of eleven parcels ranging in size from about 40 to 60 acres, was cancelled for the purpose of making the same available for soldier settlement. Applications were received between the 14th and 21st days of August, and the allotment of the lands was made on August 29th by drawing. There were twenty-two applicants for this land and eleven records were granted to returned soldiers.

(2.) By Order in Council approved on June 19th, 1918, and notice appearing in the British Columbia Gazette under date of June 26th, 1918, the reserve on land covered by Expired Timber Licence No. 34578, situate at Agamemnon Bay, which is about sixty-five miles from Vancouver and about nine miles from Pender Harbour, which had been subdivided as Lots 4584, 4585, 4586, 4587, 4588, 4589, and 4590, New Westminster District, consisting of seven parcels averaging in size about 40 acres, was cancelled for the purpose of making the same available for soldier settlement. Five applications were received in respect of Lot 4584 and two applications in respect of Lot 4585. No applications were received for the remaining lots, and at the present time the only lot covered by record is Lot 4584.

The requirements as to residence and improvements in connection with these lots were the same as the pre-emption regulations under the "Land Act," except that no fees were charged or will be charged and the land is exempt from taxation under the "Taxation Act" for a period of five years from the date of the record.

While not directly under the "Soldiers' Land Act," an Order in Council was approved on June 26th, 1918, and notice appeared in the British Columbia Gazette on June 27th, 1918, providing that no fees chargeable under the "Land Act" would be collected in respect of a pre-emption record issued under the "Land Act" to a returned soldier as defined by the "Soldiers' Land Act," and also that the land covered by the record should be exempt from

taxes under the "Taxation Act" for a period of five years from the date of the record. This Order in Council is being ratified by an amendment to the "Land Act" now before the Legislature.

It may be noted in this connection that by Order in Council approved on June 4th, 1918, the interest due the Crown in respect of an agreement to purchase town lots held by a person on active service is waived from the date of his enlistment to a date one year after the date of his discharge. This Order in Council is also being ratified by an amendment to the "Land Act" now before the Legislature.

(3.) By Order in Council approved on June 17th, 1918, and notice appearing in the British Columbia Gazette under date of June 27th, 1918, Lots 1346, 1347, 1348, 1349, 2909, and 2910, Kamloops Division of Yale District, comprising an area of approximately 3,800 acres, were reserved for the purposes of the "Soldiers' Land Act." These lands have not yet been opened for soldier settlement and are held pending the completion of survey and the collection of certain data in connection with them.

(4.) By Order in Council approved on August 7th, 1918, and notice appearing in the British Columbia Gazette under date of February 27th, 1919, an area of land situate at the south end of Stuart Lake and extending along the Stuart River was reserved or set aside for settlement by returned soldiers. This land was resurveyed into areas of approximately 160 acres each and comprises a total area of 61,276 acres, being 39,982 acres of first-class land, 16,512 second-class land, and 2,900 acres which has been rated as third-class, also 1,882 muskeg land. The report of the surveyor who performed these surveys is included in the report of the Survey Branch and is published on page 72.

The administration or opening to settlement of these lands is being held in abeyance pending the reaching of a satisfactory agreement between the Province and the Dominion Government in respect of loans to the soldier settlers. It may be that it will be found more advantageous to the soldiers to have this land transferred to the Dominion Government under the authority of the "Soldiers' Land Act," and administered by them through their Soldier Settlement Board. It will, of course, be impossible to complete these arrangements until after the proposed Dominion Legislation becomes law.

Several other areas in different parts of the Province at present under reserve have been examined and are in the process of being examined. With particular reference to logged-off and expired timber licences which have already been subdivided, there are approximately 200 such parcels situate in the Coast districts which will be thrown open for entry in the near future, and the applications of returned soldiers will have preference. Preference is given to the applications of returned soldiers for all lands that are now thrown open for pre-emption entry.

Since my appointment the Government has:—

(1.) By Order in Council approved December 23rd, 1918, and notice appearing in the British Columbia Gazette under date of January 16th, 1919, this Government has acquired from the South Okanagan Land Company, Limited, some 22,000 acres of land situate along the Okanagan River, extending from a point sixteen miles south of Penticton on both sides of the river to the boundary-line, and having an average of two miles in width. This land is acquired with the object of making all or a portion of it available for settlement by returned soldiers.

Owing to the large extent of preparatory work that is necessary in the way of subdividing, building of roads, installing an irrigation system, soil examination and analysis to determine the suitability of various parts of it for different undertakings, it will most likely be the spring of 1920 before it is possible to open this land for settlement. Needless to say, the work of examination and survey is being proceeded with as rapidly as possible under the supervision of the Consulting Engineer of the Lands Department. Returned soldiers are given the preference in employment in connection with all work under the project.

By Order in Council approved on December 14th, 1918, and notice appearing in the British Columbia Gazette under date of December 19th, 1918, Lots 71 and 72, Group 1, New Westminster District, containing 300 acres and situate near Burnaby, were reserved under the "Soldiers' Land Act." The preparation of this land includes the clearing and subdividing, and is receiving the attention of the Department at the present time with a view to making it available in lots of a suitable size for returned soldiers.

While section 6 of the "Soldiers' Land Act" calls for a report of the operations under the Act for the calendar year only, it is worthy of note that:—

(2.) Under Order in Council approved on January 8th, 1919, and notice appearing in the British Columbia Gazette under date of January 16th, 1919, the Government purchased under the "Soldiers' Land Act" from the Municipality of South Vancouver some fifty lots which had reverted to the municipality for non-payment of taxes, for the purpose of providing free homesites and to erect dwellings for returned soldiers, in connection with which, by Order in Council approved on January 13th, 1919, and notice appearing in the British Columbia Gazette on January 23rd, 1919, the following regulations were approved:—

RULES AND REGULATIONS GOVERNING THE GRANTING OF HOMESITES AND THE BUILDING OF DWELLINGS FOR RETURNED SOLDIERS.

1. "Homesites" are residential lots not less titish Columbia soldiers who follow industrial occupurpose of affording free homesites to returned Br also to the dependents of those who have been pations in or near existing centres of industry, andhan 50′ x 120′ which have been acquired for the killed and to returned soldiers who have been disabled.

2. For the purpose of these rules and regulations the interpretation of "soldier" shall be as set out in subsections (*a*) and (*b*) of section 2 of chapter 80, Statutes of British Columbia for 1918, being the "Soldiers' Land Act."

3. The allotment of homesites shall be made by drawing in a manner to be determined by the Minister of Lands; but priority will be given to the applications of widows and disabled returned soldiers according to the degree of disability or dependents of soldiers who have died in or on account of their service, according to degree of dependency.

4. Each applicant for a homesite shall deposit with his application a fee of $10, which fee should the applicant be successful, will be credited to the first deposit when the contract or agreement is signed, or forfeited should the applicant fail to comply with or enter into the agreement.

5. Should an application for a homesite be refused for any reason the fees paid in connection herewith shall be promptly returned to the applicant.

6. Dwellings of a maximum value of $2,000 will be built on a plan to be selected by the soldier from the approved plans of the Department of Lands on each homesite upon the entering into of a contract or agreement by the successful applicant and the payment of $50 less the $10 already paid as a first deposit, for the payment of the balance by monthly payments as amortized in accordance with the table of the Department of Lands. The said table is based on 5 per cent. interest per annum and a 10 per cent. administrative charge added spread over 20 years. A large initial payment or deposit may be made or any number of instalments of the principal at any monthly date. Should any soldier settler desire to erect a dwelling exceeding $2,000 in value he may do so upon having the plans thereof approved by the Minister of Lands, but the cost of such dwelling in excess of $2,000 shall be met by the soldier settler, the equity of the Government remaining as a first charge against the property.

Facilities will be afforded men possessing the necessary ability to do the individual work themselves under supervision.

7. The first deposit shall be payable within three months from the date of the allotment of the homesite.

8. The soldier settler shall enter into occupation of the dwelling and commence the monthly payments as set out in clause (6) of these regulations on a date not less than thirty (30) clear days after the date of mailing or delivering to him a notice in writing that the dwelling is ready for occupation.

9. When the purchaser has made such payments as shall leave a balance due to the Government equal to the amount charged for the homesite, exclusive of the dwelling, such balance shall be rebated to the purchaser, provided that ten years' residence has been met and all other conditions have been complied with.

10. All dwellings erected on "homesites" shall be insured by the Department of Lands.

The soldier settler shall pay each month in addition to the payment under the amortization table an amount equal to one-twelfth of the premium of the policy or proportion of the policy, as the case may be, insuring his dwelling.

11. Occupation by the settler, personally or by his family, shall constitute residence. Leave of absence may be obtained on application to the Minister of Lands. Two months' absence without the Minister's approval will constitute forfeiture, and all payments theretofore made shall be deemed to be rental paid for occupancy.

12. If it becomes necessary for the settler to move before the contract or agreement has been completed, he may for sufficient reason be permitted to dispose of such land on obtaining the consent of the Minister of Lands. When any homesite is so resold by the Government to another soldier settler the time of residence of the preceding purchaser may in the discretion of the Minister be credited to the subsequent purchaser.

If a sale be made of the said property to any other than a soldier settler the balance remaining unpaid to the Government shall be paid by the purchaser on such terms as may be decided upon by the Minister of Lands, provided that the first payment shall be not less than 25 per cent. of the balance remaining unpaid.

13. Non-compliance with any of the above regulations will forfeit all claim to the property, but the Minister of Lands is hereby empowered to grant such extensions of time for payments as may in his

discretion seem just, and to grant reasonable requests for removal, exchange, or withdrawal according to the merits of each particular case, and to make such disposal or settlement as may be deemed just and equitable.

14. The agreement may contain such other terms and conditions as are considered necessary.

15. Such forms as may be necessary for the information of intending applicants and the proper carrying out of these regulations shall be prepared under the direction of the Minister of Lands.

The following are given as examples of payments:—

Example—House, $1,700, less $50=$1,650. Annual payment, $132.40, or $11.04 per month. Ten per cent. administrative charge=$170, or $8.50 yearly or 71 cents monthly.

End of	Repayment of Principal.	Interest.	Repayment of Principal.
1 year	$ 49 90	$ 82 50	$1,600 10
2 „	52 40	80 00	1,547 70
3 „	55 02	77 38	1,492 68
4 „	57 77	74 63	1,434 91
5 „	60 66	71 74	1,374 25
6 „	63 69	68 71	1,310 56
7 „	66 88	65 52	1,243 68
8 „	70 22	62 18	1,173 46
9 „	73 73	58 67	1,099 73
10 „	77 42	54 98	1,022 31
11 „	81 29	51 11	941 02
12 „	85 35	47 05	855 67
13 „	89 62	42 78	766 05
14 „	94 10	38 30	671 95
15 „	98 81	33 59	573 14
16 „	103 75	28 65	469 39
17 „	108 94	23 46	360 45
18 „	114 38	18 02	246 07
19 „	120 10	12 30	125 97
20 „	126 11	6 20	*Nil.*
	$1,650 14	$997 86	.....

Amortized payment	$11 04
Administration	71
Total monthly payment	$11 75

Example—House, $1,870, less $50=$1,820. Annual payment, $146.04, or $12.17 per month. Ten per cent. administrative charge=$187, or $9.35 yearly or 78 cents monthly.

End of	Repayment of Principal.	Interest.	Balance of Principal.
1 year	$ 55 04	$ 91 00	$1,764 96
2 „	57 79	88 25	1,707 17
3 „	60 69	85 35	1,646 48
4 „	63 74	82 30	1,582 74
5 „	66 89	79 15	1,515 85
6 „	70 24	75 80	1,445 61
7 „	73 74	72 30	1,371 87
8 „	77 44	68 60	1,294 43
9 „	81 34	64 70	1,213 09
10 „	85 39	60 65	1,127 70
11 „	89 60	56 40	1,038 10
12 „	94 14	51 90	943 96
13 „	98 84	47 20	845 12
14 „	103 79	42 25	741 33
15 „	108 99	37 05	632 34
16 „	114 44	31 60	517 90
17 „	120 14	25 90	397 76
18 „	126 14	19 90	271 62
19 „	132 44	13 60	139 18
20 „	139 18	6 86	*Nil.*
	$1,820 00	$1,100 76	.....

Amortized payment	$12 17
Administration	78
Total monthly payment	$12 95

These homesites were opened to application for two weeks previous to February 10th, 1919, at the office of the Government Agent at Vancouver, and on February 20th homesites (double lots) were allotted to fourteen applicants. As soon as possible after the plans are selected, construction of the dwellings will proceed under the direction of the Public Works Department.

While not under the jurisdiction or administration of the "Soldiers' Land Act," the following items should be noted in this report:—

(*a.*) Lands in the settlement areas in the Bulkley and Nechako Valleys have been opened for sale by the Land Settlement Board, and in the case of the purchaser being a returned soldier he is allowed a rebate of $500 on the purchase price. Up to the present eight parcels in the Bulkley and five in the Nechako have been purchased by returned soldiers.

(*b.*) Pre-emption records issued under the "Land Act" to returned soldiers since September 1st to date are as follows:—

Land Recording Division—

Ashcroft	1
Clinton	1
Fairview	2
Fort Fraser	1
Fort George	2
Hazelton	2
Kamloops	2
Nanaimo	1
Prince Rupert	2
Quesnel	1
Vancouver	19
Total	34

(*c.*) Under the "Pre-emptors' Free Grants Act" and amendments, 248 free Crown grants of their respective pre-emptions have been issued to returned soldiers.

(*d.*) Under the "Relief Act," which is administered by the Department of Lands, on receipt of an application for relief in respect of the fees of a coal and petroleum licence or lease in the name of a man on active service I find it is the practice to recommend to the Executive Council that all fees in connection therewith be stood over for a period ending six months after the end of the present war.

(*e.*) Under the "Forest Act Relief Act," administered by the Forest Branch, a man on active service is exempt from the payment of annual fees on timber licences until six months after the end of the present war, when payment without interest or penalties is to be made.

In the amendments proposed this year it is provided that the back payments can be made in instalments beginning on the first annual renewal date six months after the termination of the present war.

I wish to extend my best thanks to my staff, which is composed of an assistant (J. Mavor, a previous official in the Lands Department, recently returned from France) and two stenographers.

I have, etc.,

J. W. CLARK,

Superintendent, B.C. Soldier Settlement.

PART II.

SURVEY BRANCH.

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REPORT OF THE SURVEYOR-GENERAL.

The Hon. T. D. Pattullo,
Minister of Lands, Victoria, B.C.

SIR,—I have the honour to submit the following report of the Survey Branch of the Department of Lands for the year ending December 31st, 1918:—

The appropriation for Crown land surveys for the current year was $70,000, being lower than that for any year since 1907. In consequence it has been necessary to further curtail field operations and to confine the work to only the most necessary surveys.

As in the previous year, the greater portion of the field-work was confined to the survey of lands already held under pre-emption record. Among these are included records held by men in military service, who will be entitled, on discharge from the army, to free grants under the provisions of the "Pre-emptors' Free Grants Act." As the amendment to the "Land Act" of 1918 has abolished the pre-emption of unsurveyed land, it has been possible to survey this year a large proportion of the unsurveyed land held under pre-emption record, and in another year it will probably be possible to survey practically all such lands, which are more or less close to transportation, leaving only the isolated parcels which the Department does not propose to survey, and the owners of which will necessarily be required to have surveyed by private arrangement with the surveyor. It will be seen, therefore, that with practically all timber licences and pre-emptions surveyed and outstanding applications to purchase cancelled, there should be at the end of 1919 very few unsurveyed alienations on record in the Department.

This condition will considerably facilitate the administration of Crown lands, and avoid many complications due to conflicting interests which this Department has been called upon to deal with in the past.

The work of triangulating and traversing portions of the coast-line has also been continued. This work was commenced in 1916 and continued in 1917 and 1918, on account of the numerous applications for timber-sales and hand-logger licences along the Coast. The Admiralty charts which constituted practically the only information available with regard to the greater portion of the coast-line were found to be in many instances not sufficiently reliable for our purposes. The fact that the end of a large inlet was found this year to be about twelve miles out of place on the chart is quoted as an example of the necessity for this work. The work in the field consists of triangulations between points on opposite sides of inlets and tying in the corners of existing surveys. Where triangulations are impracticable, stadia traverses are resorted to. While this method does not give accurate details as to the sinuosities of the shore-lines, it is sufficient for our purposes, and has the advantage of furnishing the greatest amount of necessary information at a minimum cost.

The scheme of continuity in this work prepared in the spring was unfortunately interfered with to some extent by a drowning accident, in which J. E. Laverock, B.C.L.S., in charge of a party, and one of his assistants, J. Griffiths, lost their lives in Dean Channel.

Mr. Laverock and Mr. Griffiths were last seen on August 31st, on their way from Ocean Falls to the survey camp, and it is presumed that their boat was overturned in the storm which prevailed on the Coast that day. Mr. Laverock had been employed on Government work annually for several years, and his field-work and returns were always highly satisfactory. It is felt that his unfortunate and untimely death has removed one of the most efficient men of his profession in the Province.

Specially reserved lands for returned soldier settlement were surveyed in the vicinity of Merritt and at Stuart Lake. In the former locality twelve parcels containing 1,770 acres were surveyed. At Stuart Lake a large area of lands which reverted to the Crown under the provisions of the "Soldiers' Homestead Act" were subdivided into parcels of 160 acres approximately. About 61,000 acres of land were thus made available for soldier settlement. Detailed reports on these areas will be available in due course.

The surveys for the year include 283 parcels under pre-emption record, 68 parcels of Crown land, and 387 miles of coast-line traverse.

This must be considered satisfactory considering the adverse conditions prevailing during the season, such as the unusually wet weather in July in certain portions of the Province, the difficulty in obtaining competent and experienced labour, and the necessity of a large amount of moving from one piece of work to another.

The *following is a summary of the field operations carried out during the season* in the various portions of the Province:—

CENTRAL AND NORTHERN INTERIOR.

For the purposes of this report the Central and Northern Interior are defined as that portion of the Province lying north of the Dominion Government Railway Belt and east of the Cascade range of mountains. Ten surveyors were employed in this portion of the Province in the localities indicated:—

A. J. Campbell .....Swan Lake, Peace River District.
H. C. Black .....Rose Lake, Coast District, Range 5.
F. P. Burden .....Moose Springs, Cariboo District.
R. W. Haggen .....Fraser River Valley, between Quesnel and Chimney Creek, Cariboo District.
F. Butterfield .....Horsefly River and Quesnel Lake, Cariboo District.
F. Tupper .....North-western Lillooet District.
W. S. Drewry .....Eastern Lillooet District.
G. S. Boulton .....Anderson and Seton Lakes, Lillooet District.
W. G. McElhanney .....Upper North Thompson River, Kamloops District.
J. E. Ross .....Lower North Thompson River, Kamloops District.

SOUTHERN INTERIOR.

In that portion of the Province lying south of the Canadian Pacific main line of railway five parties were employed, as follows:—

F. H. Latimer .....White Valley, Osoyoos District.
B. A. Moorhouse .....Vicinity of Summerland, Osoyoos District.
C. A. E. Shaw .....Vicinity of Fairview, Similkameen District.
O. B. N. Wilkie .....Vicinity of Merritt, Kamloops District.
P. W. Gregory .....Vicinity of Princeton, Kamloops District.

Practically all the arable lands in this portion of the Province have been surveyed. The work this year consisted principally of the survey of pre-emptions located on the outskirts of the valleys, and while they contain some land which can be brought under cultivation, the majority of them contain a large proportion of high bench or more or less steep hillside. Being situated in the Dry Belt and, generally speaking, at too great an elevation for irrigation, these pre-emptions are generally conceded to be suitable only for the raising of a limited amount of stock, commensurate with the amount of winter feed which the pre-emptor may be able to grow in those portions of his land which can be cultivated, and possibly, if fortunate enough in location, augmented by wild meadow-hay.

Mr. Wilkie also surveyed into suitable parcels some lands a short distance south-west of Merritt, which have been reserved for returned soldier settlement.

MAINLAND COAST.

Five surveyors were employed on the Coast between Vancouver and Prince Rupert, as follows:—

H. H. Roberts.....Cortes and Redonda Islands, etc., New Westminster and Coast Districts.
Jno. Elliott.....Queen Charlotte Sound, Coast District, Range 2.
C. C. Smith.....Rivers Inlet and Burke Channel, Coast District, Ranges 2 and 3.
J. E. Laverock.....Dean Channel, Coast District, Range 3.
A. E. Wright.....Cumshewa Inlet, Queen Charlotte Islands District, and Roscoe Inlet, Coast District, Range 4.

Mr. Roberts's work consisted mainly of pre-emption surveys, and Mr. Elliott surveyed a few pre-emptions at Blunden Harbour after traversing the north shore of Queen Charlotte Sound

from where he left off work last year to a point where a previous traverse had been carried to from the North.

Messrs. Smith, Laverock, and Wright were employed exclusively on triangulation and the traverse-work in various inlets, and considerable progress was made on this work.

MISCELLANEOUS SURVEYS.

L. S. Cokely was employed on small scattered surveys on Vancouver Island, the Lower Mainland, and Gulf Islands.

TOPOGRAPHICAL SURVEYS.

The photo-topographical survey of the Okanagan Lake basin, which was completed in 1917, was this year extended to cover the eastern watershed of Okanagan River between Penticton and the International Boundary, including the greater portion of the lands recently purchased by the Crown for development with a view to soldier settlement. An area of about 325 square miles was covered and the mapping of this work is now being proceeded with. R. D. McCaw has, as in former years, been in charge of this work.

ALBERTA-BRITISH COLUMBIA BOUNDARY.

The Commission appointed in 1913 for the definition of the boundary between the Provinces of Alberta and British Columbia continued operations during the year; A. O. Wheeler, the British Columbia Commissioner, working in the vicinity of Howse Pass, and Mr. Cautley, representing both the Alberta and Dominion Governments, established a portion of the 120th meridian of longitude in the vicinity of Swan Lake, Peace River District.

The report of the Commission for the survey of that portion of the boundary between Kicking Horse Pass and the International Boundary was published during past years, having been prepared under the direct supervision of the Surveyor-General of Dominion Lands at Ottawa.

SURVEYOR'S REPORTS.

The general reports of the various surveyors employed during the season are appended to this report.

PRIVATE SURVEYS.

Surveys of Crown lands made at the instance of and paid for by private parties, such as surveys of pre-emptions, applications to purchase or lease, coal licences, timber licences, mineral claims, etc., are known departmentally as "private surveys." There has been a decrease in surveys of this nature from year to year since 1912, and the past season shows a decrease from 1917 in all classes of this nature, with the exception of mineral-claim surveys, which again show a small increase.

With reference to timber-licence surveys, the Statute provides that all licences must be surveyed by November 30th, 1919, leaving only one surveying season for the survey of the remaining unsurveyed licences. According to the Chief Draughtsman's report, there are 3,006 licences reinstatable under the "Forest Act" and amending Acts, and which are still unsurveyed. It is anticipated, however, that only a comparatively small fraction of these are likely to be surveyed, as a large number are known to be of no value as timber holdings owing to faulty location by the original applicants.

OFFICE-WORK.

The details of the work of the office are covered by the report of the Chief Draughtsman submitted herewith.

The organization of the staff has been maintained with very few changes during the year. The end of the war and the return of those members of the staff who have been serving in the Army will, however, necessitate some changes and reorganization during the coming year. It is gratifying to know that of the twenty-three members of this staff who enlisted, not one was called to pay the supreme sacrifice, and only four or five, as far as known at present, have been casualties.

Enlistments during the war almost depleted the staff formerly employed on geographic work, and only two men have been available for mapping during the past two years. However, as the demand for maps fell off somewhat during the war and as less field-work was being done, it has been possible to fill the most urgent requirements in this connection. Many of our maps

are now, however, getting out of date and out of print, and with the return of peace and increasing demand for maps of all descriptions it will be necessary to again increase our facilities for map production.

The most important map completed during the year is one of the northerly portion of Vancouver Island, which is now in the hands of the printers and will be available for distribution shortly. This map, on the scale of four miles to an inch, will show all surveys as well as geographic information, and will include a large portion of the Mainland adjacent to this portion of Vancouver Island, as well as the intervening smaller islands.

It will fill a long-felt want, as the area covered has hitherto been only more or less indifferently mapped. It is hoped also to republish shortly a new edition of the map of southerly Vancouver Island, published in 1913. On the completion of this work the mapping requirements as far as Vancouver Island is concerned should be satisfied for some years to come.

GENERAL.

In my report for the year ending December 31st, 1917, I ventured to predict that the work of the Branch would show a considerable increase during 1918. While the statistics would appear to show that this prediction has not eventuated to any appreciable extent as far as the routine work of the office is concerned, the special work of various natures dealt with during the year would indicate considerable expansion, which will be reflected in the next annual report of this Branch.

The recent successful conclusion of the great world war prompts me to here pay a tribute to the part played by British Columbia land surveyors in the great military struggle. According to available information, 122 surveyors enlisted for overseas service during the war. Of these, twenty-three have laid down their lives, two have been prisoners in Germany for about three years, and many others will return with wound stripes.

The rapid promotion of many of these men, in some instances from the ranks, is evidence that the contribution of the profession of land surveying from British Columbia to the nation's cause was one of quality as well as quantity.

I have the honour to be,
Sir,
Your obedient servant,
J. E. UMBACH,
Surveyor-General.

REPORT OF THE CHIEF DRAUGHTSMAN.

December 31st, 1918.

J. E. Umbach, Esq.,
Surveyor-General, Victoria, B.C.

SIR,—I have the honour to submit the following report on the work of the Survey Branch for the year ending December 31st, 1918:—

OFFICE-WORK.

The general work carried out has been similar to that done in previous years, while the volume of work handled has been about the same as that in 1917. At the present date the staff numbers twenty-eight in all. During the year three men resigned and one man enlisted. A returned soldier formerly in the Department was taken on the staff and one junior was appointed.

FIELD-NOTES.

During the year 762 field-books were received, containing notes for 766 lots. During the same period 1,346 lots were plotted and gazetted. Tracings of these lots were prepared and forwarded to the Government Agents in whose districts they were located.

The following table gives an analysis of the acreages of the various kinds of surveys gazetted during the year:—

	Acres.
Pre-emption surveys	10,835
Purchase surveys	1,634
Mineral-claim surveys	9,247
Timber-licence surveys	223,768
Coal-licence surveys	953
Lease surveys	2,342
Government surveys	60,311
Total	309,090

A comparison of these figures with those of previous years, as far back as 1900, may be found by reference to Table A attached to this report. It will be noted that there has been a fair increase over the year 1917 in the number of mineral surveys dealt with.

Table B attached to this report shows that proportion of Government surveys made in relation to the total land surveys for each year since 1900.

TIMBER SURVEYS.

Field-notes covering the survey of 296 licences were received during the year, as compared with 424 during 1917. It is estimated that of the timber licences in good standing, or renewable under the Statute, 10,687 have been surveyed, leaving 3,006 still unsurveyed.

RAILWAY PLANS.

During the year plans covering 290 miles of railway right-of-way have been finally dealt with and cleared for Crown-granting purposes.

CLEARANCES.

As in previous years, clearance reports have been furnished by this Branch on all applications for lands dealt with by the Lands Department. These include 823 applications for pre-emptions and 12 applications to purchase. The corresponding figures for 1917 were 822 and 19 respectively. These applications, together with those dealt with by the Forest Branch, including 226 timber-sales, are all plotted and noted on the departmental reference maps. Suitable notations are also made on these maps as to the cancellation of pre-emptions, applications to purchase, timber-sales, etc.

DEPARTMENTAL REFERENCE MAPS.

The work of keeping these maps up to date and compiling new ones has been proceeded with as heretofore. Ten maps were recompiled and drawn on projection, while one was retraced. The method of compiling these maps on projection enables the joining-up of adjacent maps to be made correctly, and avoids overlapping and at the same time adds greater accuracy to the map itself.

INFORMATION SUPPLIED TO SURVEYORS AND OTHERS.

A nominal charge is made for the preparation of copies of field-notes, blue-prints, etc., required by surveyors and others. The revenue derived from this source amounts to $1,479.82, as compared with $1,327 for 1917. This work entailed the copying of 150 sets of field-notes, 1,171 tracings, and 950 letters.

The following is a statement of the number of blue-prints made:—

Mail and counter orders	1,496
Surveyor-General's Branch	1,400
Forest Branch	6,425
Other branches of Government service	6,795
Sundry	2,210
Total	18,326

There were also prepared 1,512 tracings (in duplicate) to be attached to Crown grants, and 84 tracings (in duplicate) to accompany land leases.

CORRESPONDENCE AND ACCOUNTS.

During the year 2,465 letters were received and 2,350 sent out, which does not include interdepartmental memoranda.

Accounts amounting to $75,038.47 have been checked and dealt with by the Accountant.

Table C attached to this report gives a summary of the office-work for the year 1918 and comparative figures for 1917.

WORK DONE FOR THE WATER RIGHTS BRANCH.

The chief work done in this connection includes the clearance of 257 applications, the preparation of plats for 334 conditional licences, and 633 Board orders. In addition, 30 revised water-rights maps have been redrawn and a new set of reference maps statused to show all the water reserves, water rights, and miscellaneous applications.

WORK DONE FOR THE FOREST BRANCH.

The general draughting-work for this Branch has occupied practically the whole time of one draughtsman. The chief work done has been in connection with aeroplane-spruce permits, and has included more or less clerical work. In addition, a portion of the draughtsman's time has been occupied in the compilation of 40-chain-to-the-inch maps for the use of the Grazing Commissioner.

GENERAL.

In addition to the above, the preparation of instructions for both Government and private surveys, including the copying of information from official records, forms a considerable portion of the work of this office.

As in previous years, the staff has also been called upon to attend to various draughting-work for other departments of the Government.

During the year a "photostat" was installed in the Department, which enables the reproduction in facsimile of all kinds of plans, field-notes, documents, etc., and is available for work of this nature for all departments.

The limit of size of prints is 18 x 22 inches. The limit of enlargement is about 2 to 1, and the limit of reduction is governed only by the nature of the original. The machine turns out copies with the work in white on a black background. By a second operation the work comes out black on a white background.

In connection with the above machine, it was found necessary to construct a dark room, which room is available for other work of a photographical nature, and it has been found possible to make enlargements of the photographs taken in connection with the photo-topographical survey carried out during the year. These enlargements were formerly made elsewhere at a considerably greater expense.

The work in connection with this machine occupies practically the whole time of one of the members of the staff, and after its utility becomes more generally recognized it will no doubt require the undivided services of one man.

GEOGRAPHIC SUB-BRANCH.

As in 1917, only two draughtsmen have been available for the compilation and preparation of maps for reproduction by lithography during the past year. Only one map was actually published during the year—namely No. 3E, known as the "Peace River Pre-emption Sheet."

The compilation of Map No. 2c, "Northerly Vancouver Island," was completed and is now in the hands of the printer.

Corrections to Map 2A, "Southerly Vancouver Island," were made, and it is hoped to republish this map very shortly.

A reissue of Map 3L, "Graham Island, Queen Charlotte Islands Pre-emption Sheet," is also in the hands of the printer.

Sketch-maps for the preparation of blocks were also prepared for the Mines Department and Lands Settlement Board. In addition, the above Branch supervised the publication of a small map of British Columbia to accompany Bulletin No. 23.

Of the various lithograph maps available for distribution by this Department, some 14,726 were issued during the past year.

A list of lithograph maps and a list of departmental reference maps are attached to this report as Tables D and E respectively.

I have, etc.,
F. O. MORRIS,
Chief Draughtsman.

APPENDIX TO REPORT OF CHIEF DRAUGHTSMAN.

TABLE A.—SHOWING ACREAGES OF EACH CLASS OF SURVEYS GAZETTED EACH YEAR SINCE 1900.

Year.	Pre-emptions.	Purchases.	Mineral Claims.	Timber Limits.	Coal Licences.	Leases.	B.C. Govt. Surveys.	Totals.
	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.
1900.....	22,873	4,419	33,441	59	.....	664	10,057	71,513
1901.....	26,493	16,401	33,400	2,027	.....	593	.....	79,094
1902.....	35,297	29,652	31,057	1,040	626	1,026	.....	98,698
1903.....	37,615	26,787	18,115	127,992	....	2,003	800	213,312
1904.....	48,124	36,468	20,549	155,279	48,670	3,009	179	312,278
1905.....	42,660	58,705	15,535	214,841	137,218	806	107	469,872
1906.....	33,573	66,668	9,894	77,829	41,312	9,566	.....	238,842
1907.....	50,460	162,218	10,017	83,016	20,367	4,387	113,968	444,433
1908.....	66,788	147,980	14,607	167,925	9,821	2,580	97,072	506,773
1909.....	71,316	145,325	10,744	426,121	8,310	15,239	512,373	1,189,428
1910.....	79,273	455,356	12,499	509,201	43,363	5,864	302,536	1,407,912
1911.....	89,485	1,352,809	21,325	686,909	120,938	6,500	948,644	3 226,610
1912.....	99,461	1,011,934	16,645	804,730	99,236	8,560	826,362	2,866,997
1913.....	55,202	508,062	18,043	1,181,355	72,719	4,740	1,014,366	2,854,487
1914.....	45,551	234,580	7,546	1,105,635	36,098	4,209	1,078,579	2,512,198
1915.....	22,746	41,551	8,339	512,628	29,245	841	705,170	1,320,520
1916.....	14,335	8,771	7,677	302,903	10,983	5,145	124,953	474,767
1917.....	12,632	802	8,386	275,538	2,843	2,960	111,256	414,417
1918.....	10,835	1,634	9,247	223,768	953	2,342	60,311	309,090

TABLE B.—SHOWING PROPORTION OF GOVERNMENT SURVEYS TO TOTAL LAND SURVEYS SINCE 1900.

Year.	Total Surveys.	Govt. Surveys.	Proportion of Govt. Surveys to Total.
1900 to 1906.....	907,373	11,143	0.012
1907 to 1911.....	4,901,984	1,974,593	0.403
1912.....	2,062,267	826,362	0.401
1913.....	1,673,132	1,014,366	0.606
1914.....	1,415,186	1,078,579	0.762
1915.....	807,892	705,170	0.872
1916.....	171,864	124,953	0.727
1917.....	138,879	111,256	0.801
1918.....	85,322	60,311	0.707

TABLE C.—SUMMARY OF OFFICE-WORK FOR THE YEAR 1918 AND COMPARATIVE FIGURES FOR 1917.

	1917.	1918.
Number of field-books received	914	762
„ lots surveyed	1,083	766
„ lots gazetted and tracings forwarded to Government Agents	1,497	1,346
„ miles of right-of-way plans received	73.5	290
„ applications for purchase cleared	19	12
„ applications for pre-emption cleared	822	823
„ reference maps compiled	10	10
„ Crown-grant applications cleared	1,167	1,512
Total number of letters received by Branch	3,893	2,465
„ „ Crown-grant and lease tracings made in duplicate	1,187	1,593
„ „ blue-prints made	10,435	18,326
Total revenue from information, blue-prints, maps, etc.	$1,327.00	$1,479.82

TABLE D.—LIST OF LITHOGRAPHED MAPS.

Map No.	Year of Issue.	Title of Map.	Scale.	Per Copy.	Per Dozen.
		GEOGRAPHIC SERIES—			
1A	1912	British Columbia. In four sheets. Showing roads and trails, railway systems, etc.	17.75 m. to 1 in.	$1 00	$10 00
1B	1913	British Columbia. In one sheet. Showing Land Districts	30 m. to 1 in.	25	2 00
1C	1913	British Columbia. In one sheet. Showing Land Recording Divisions	30 m. to 1 in.	25	2 00
1D M	1913	British Columbia. In one sheet. Showing Mining Divisions (Amended 1917)	30 m. to 1 in.	25	2 00
1E R	1915	Kootenay, Osoyoos, and Similkameen. Showing Mining Divisions	7.89 m. to 1 in.	25	2 00
1E	1915	Kootenay, Osoyoos, and Similkameen. Showing Land Recording Divisions	7.89 m. to 1 in.	25	2 00
1F	1915	British Columbia. In one sheet. Showing Electoral Divisions	30 m. to 1 in.	25	2 00
1G	1916	Cariboo and Adjacent Districts. Showing Land Recording Divisions	7.89 m. to 1 in.	25	2 00
1H	1917	Northern British Columbia	17.75 m. to 1 in.	25	2 00
		LAND SERIES—			
†2A	1913	Southerly Vancouver Island	4 m. to 1 in.	25	2 00
2B	1914	New Westminster and Yale Districts	4 m. to 1 in.	25	2 00
2C	1919	Northerly Vancouver Island	4 m. to 1 in.	25	2 00
		PRE-EMPTORS' SERIES—			
3A	1916	Fort George	3 m. to 1 in.	Free	1 00
3B	1917	Nechako	3 m. to 1 in.	Free	1 00
3C	1914	Stuart Lake	3 m. to 1 in.	Free	1 00
3D	1915	Bulkley Valley	3 m. to 1 in.	Free	1 00
3E	1918	Peace River	4 m. to 1 in.	Free	1 00
3F	1915	Chilcotin	3 m. to 1 in.	Free	1 00
†3G	1915	Quesnel	3 m. to 1 in.	Free	1 00
3H	1915	Tete Jaune	3 m. to 1 in.	Free	1 00
3J	1917	North Thompson	3 m. to 1 in.	Free	1 00
3K	1915	Lillooet	3 m. to 1 in.	Free	1 00
3L	1919	Graham Island, Queen Charlotte Islands	3 m. to 1 in.	Free	1 00
3M	1916	Prince Rupert	3 m. to 1 in.	Free	1 00
		DEGREE SERIES—			
*4A	1912	Rossland Sheet	2 m. to 1 in.	$0 10	..
*4B	1912	Nelson Sheet	2 m. to 1 in.	10	..
*4C	1912	Cranbrook Sheet	2 m. to 1 in.	10	..
4D	1913	Fernie Sheet	2 m. to 1 in.	10	..
4E	1913	Upper Elk River Sheet	2 m. to 1 in.	10	..
4F	1913	Duncan River Sheet	2 m. to 1 in.	10	..
4G	1914	Windermere Sheet	2 m. to 1 in.	10	..
†4H	1915	Arrowhead Sheet	2 m. to 1 in.	10	..
		TOPOGRAPHICAL SERIES—			
5A	1916	Omineca and Finlay River Basins, Sketch-map of	5 m. to 1 in.	25	2 00
		MISCELLANEOUS—			
48	1913	Sayward District, Sketch-map of	3 m. to 1 in.	10	..
33	1912	Yale District and Portion of Adjacent Districts	8 m. to 1 in.	25	2 00
27	1912	Rupert and Coast Districts, Portions of	3 m. to 1 in.	10	1 00
22	1912	Northern Interior	17.75 m. to 1 in.	10	1 00
18	1912	British Columbia, South-west Portion of. (Second iss.)	12 m. to 1 in.	25	2 00
9	1907	Northern Interior. (A. G. Morice.)	10 m. to 1 in.	10	50
7	1903	British Columbia. In two sheets	20 m. to 1 in.	..	5 00
5	1898	Kootenay District, East, Triangulation Survey of	6,000 ft. to 1 in.	10	50
4	1897	Osoyoos District, Portion of	2½ m. to 1 in.	10	50
3	1897	Kootenay District, West Division, and Part of Lillooet, Yale, etc., Mining Recording Divisions	8 m. to 1 in.	10	50
2	1896	Kootenay District, West, Portion of	1 m. to 1 in.	10	50
1	1895	Vancouver Island, West Coast, Portion of; Clayoquot District	½ m. to 1 in.	10	50

† In course of recompilation. * Out of print.

NOTE.—To avoid misunderstanding, applicants for maps are requested to state the "Map Number" of map desired.

Table E.—Departmental Reference Maps.

Price-list of Blue-prints.

		Scale.	Price
1.	West Coast, V.I. (Barkley Sound, Southerly)	1 inch to 1 mile	$1 00
1A.	West Coast, V.I. (Barkley Sound, Northerly)	" "	1 00
2.	West Coast, V.I. (Nootka District)	" "	1 00
3.	Belize and Seymour Inlets	" "	1 00
3A.	Quatsino Sound and West Portion of Rupert District	" "	1 00
3B.	Gilford, Cracroft, and Broughton Islands	" "	1 00
3C.	Nimpkish River Valley and Lake	" "	1 00
3D.	Central Portion of Rupert District	" "	1 00
4.	Knight, Bute, and Toba Inlets	" "	1 50
4A.	Sayward District, Thurlow, Valdes, and Redonda Islands and Powell Lake	" "	1 00
5.	Texada Island and West Portion, New Westminster District	" "	1 00
5A.	Jervis and Sechelt Inlets	" "	1 00
5B.	Howe Sound and Cheakamus River Valley	" "	1 00
5C.	Harrison Lake and Lillooet River Valley	" "	1 00
6A.	Nicola District	" "	1 00
6B.	Princeton and vicinity	" "	1 00
6C.	Ashnola and South Similkameen River Valleys	" "	1 00
7.	North Okanagan and Mabel Lake	" "	1 00
7A.	South Okanagan Lake and Kettle River Valley	" "	1 00
7B.	Similkameen District (Keremeos, Fairview, and Greenwood)	" "	1 00
11.	Clearwater and Murtle River Valleys	" "	1 00
11A.	North Thompson River Valley	" "	1 50
12	Dean and Burke Channels and Rivers Inlet	½ inch to 1 mile	1 50
12A.	Bella Coola Valley	1 inch to 1 mile	1 50
14.	Banks and Pitt Islands and vicinity	" "	1 00
14B.	Gardner Canal and vicinity	½ inch to 1 mile	1 00
15.	Moresby Island, Northern Portion	1 inch to 1 mile	1 00
15A.	Moresby Island, Southern Portion	½ inch to 1 mile	1 00
16.	Graham Island, North-east Portion	1 inch to 1 mile	1 00
16A.	Graham Island, South-east Portion	" "	1 00
16B.	Graham Island, West Portion	" "	1 00
17.	Portland Canal and Observatory Inlet	" "	1 00
17A.	Skeena River Valley (Mosquito Creek to Kispiox River)	" "	1 00
17B.	Nass and Kitwancool River Valleys	" "	1 00
18A.	Tete Jaune Cache and Upper Fraser River Valley	" "	1 00
19.	Lower Skeena and Zymoetz River Valleys	" "	1 00
19A.	Skeena and Kitsumgallum River Valleys	" "	1 00
19B	Prince Rupert, Mouth of Skeena and Nass Rivers	" "	1 00
20.	Bulkley River Valley (Hazelton to Moricetown)	" "	1 00
21A.	Fraser Lake and Nechako Valley	" "	1 00
21B.	Francois and Ootsa Lakes	" "	1 00
21C.	Douglas Channel and Kildala Arm	" "	1 00
22.	Bowron River and Upper Fraser River Valley	" "	1 50
22A.	Fort George and vicinity	" "	1 00
22B.	Portion of Nechako River Valley and Cluculz Lake	" "	1 00
22C.	Blackwater and Mud River Valleys	" "	1 00
22D.	Fraser River Valley, vicinity of Quesnel	" "	1 00
22E.	Goat River and Upper Fraser River Valleys	" "	1 00
23.	Quesnel Lake (East Arm)	½ inch to 1 mile	1 00
23A.	150-Mile House, Barkerville and Quesnel Lake	1 inch to 1 mile	1 50
24A.	Anderson and Seton Lakes, Lillooet District	" "	1 50
24B.	Lillooet District (Clinton, Big Bar, and Bridge River Valley)	" "	1 50
25.	Mainland Coast, Hecate Island to Princess Royal Island	" "	1 00
26.	Porcher and Adjacent Islands	" "	1 00
27.	Fraser River Valley (Williams Lake, Soda Creek, and Alexandria)	" "	1 00
27A.	Fraser and Chilcotin River Valleys, Dog Creek	" "	1 00
27B.	Lac la Hache and Northern Lillooet	" "	1 00
28.	North Part of Babine and Takla Lakes	½ inch to 1 mile	1 00
28A.	Stuart and Babine Lakes	1 inch to 1 mile	1 50
29.	Chilcotin, West 124 Meridian	" "	1 50
29A.	Anaham and Abuntlet Lakes	" "	1 50
29B.	Nazko and Chilcotin River Valleys	" "	1 50
30.	Bonaparte River Valley and Canim Lake	" "	1 00
31.	Bulkley Valley	" "	1 50
31A.	Francois and Babine Lakes	" "	1 50
32A.	Tatlayoko Lake	" "	1 50
32B.	Homathko and Klinaklini River Valleys	" "	1 50

TABLE E.—DEPARTMENTAL REFERENCE MAPS—*Concluded.*

Price-list of Blue-prints—Concluded.

		Scale.	Price.
34.	Lot 4593, Kootenay District, West Portion, Flathead River	2 inches to 1 mile	1 00
34A.	Lor 4593, Kootenay District, East Portion, Flathead River	" "	1 00
35.	Saltspring, Gabriola, and Adjacent Islands	1 inch to 1 mile	1 00
38A.	Groundhog Coal Area, East of Meridian	" "	1 00
38B.	Groundhog Coal Area, West of Meridian	" "	1 00
38C.	Upper Nass River Valley	" "	1 00
39.	Euchiniko Lake and Upper Blackwater River Valley	" "	1 00
40.	Tetachuck and Euchu Lakes	" "	1 00
42.	Big Bend, Kootenay District	" "	1 00
42A.	Adams Lake and River	" "	1 00
42B.	Canoe River Valley	" "	1 00
42C.	Columbia River Valley (vicinity of Bush River)	" "	1 00
43.	Peace River, South of Dominion Government Reserve	" "	1 00
45.	Foreshore of Vancouver Island (E. & N. Railway Belt)	" "	1 00
46.	Saanich District and Islands	" "	1 00
47.	Peace River Valley, West of Dominion Government Reserve	" "	1 50
48.	Crooked and Parsnip River Valleys	" "	1 50
49.	Pine River Valley, Peace River District	" "	1 00
50.	Parsnip and Peace River Valleys	" "	1 00
51.	Finlay River Valley	" "	1 00
52.	Atlin Lake and vicinity	½ inch to 1 mile	1 00
53.	Telegraph Creek and Stikine River Valley	" "	1 00
54.	Upper Nass River Valley and Meziadin Lake	1 inch to 1 mile	1 00
18-9S.	Rossland and South End of Lower Arrow Lake	" "	1 00
17-9S.	Nelson and Salmon River Valley	" "	1 00
16-9S.	Moyie River Valley	" "	1 00
15-9S.	Elko vicinity	" "	1 00
15-9N.	Fernie and Crowsnest vicinity	" "	1 00
16-9N.	Cranbrook and Kootenay River Valley	" "	1 00
17-9N.	Kaslo and Kootenay Lake	" "	1 00
18-9N.	Edgewood and Lower Arrow Lake	" "	1 00
15-0.	Elk and White River Valleys	" "	1 00
21-23.	Duncan Lake and Columbia Lake	" "	1 50
18-20.	Nakusp and vicinity	" "	1 50
27-29.	Columbia River Valley, Wilmer and Spillimacheen	" "	1 50
30-32.	Trout and Upper Arrow Lakes	" "	1 50

NOTE.—These reference maps show lands alienated and applied for, "Timber Limits," "Coal Licences," etc., surveyed and unsurveyed. They are compiled from all available data and are constantly being amended, and their accuracy is therefore not guaranteed. They were prepared originally for departmental use, and, having proved of value to the public, blue-prints of same are now on sale.

Victoria, January 1st, 1919.

VICINITY OF SWAN LAKE, PEACE RIVER DISTRICT.

BY A. J. CAMPBELL.

December 30th, 1918.

J. E. Umbach, Esq.,
Surveyor-General, Victoria, B.C.

SIR,—In accordance with your instructions, I proceeded to the Peace River District by way of Edmonton and Grande Prairie. The longitude of a point near Pouce Coupe, in the Peace River Block, had been determined in 1917 by telegraphic observations. From this point R. W. Cautley, D.L.S., of the Interprovincial Boundary Commission, located the position of the 120th meridian. He produced this meridian south, past Townships 25 and 26, of the British Columbia surveys in that district. This position of the 120th meridian, which is the east boundary of British Columbia, lay between 18 and 19 chains east of the east boundaries of Townships 25 and 26. These had formerly been known as the British Columbia boundary. Thus this strip of land was added to the Province. My instructions were to survey this strip into lots and also to complete the survey of Townships 26 and 27.

We left Grande Prairie with an incomplete party in the hopes of being able to obtain men from among the settlers around Swan Lake. Men were secured and the work was proceeding with the greatest possible dispatch, when a member of the party was taken ill with the Spanish influenza. This dread disease spread through the party until, finally, every member except one was either down with it or convalescing from it. I was thus compelled to cease operations with the work allotted to me in an incomplete state.

The country in the vicinity of Swan Lake is rolling, with long even slopes. From Swan Lake, which lies in the northerly part of Township 26, a long gentle slope rises to the south boundary of the township. This elevation holds, generally, through Township 27 in a gently rolling series of low hills, practically all of which could be put under cultivation. A few small creeks of good water were found, and these probably contain running water throughout the year. Several dry creek-beds were crossed.

The district is served by a good wagon and motor road from Grande Prairie, which is the present terminus of the Edmonton, Dunvegan & British Columbia Railroad. This road enters into British Columbia from Alberta in the southerly part of Township 26, passing to the south of Swan Lake, at a distance of approximately seventy-two miles from Grande Prairie, and follows on to Pouce Coupe, in the Peace River Block, which is about eighteen miles from Swan Lake. The main line of travel serving Pouce Coupe and Swan Lake Districts is along this road. Railroad surveys have been made from Grande Prairie, and it is possible that the district will have the advantages of the railroad before many years. From Spirit River to Pouce Coupe the Edmonton, Dunvegan & British Columbia Railroad has a line partially constructed. The great hope of the settlers in the vicinity is that the railroad surveyed from Fort George to Pouce Coupe will be constructed in the near future. This will bring the district into very much closer relation with the Province to which it belongs.

There is a weekly mail service from Grande Prairie to Pouce Coupe, which is the nearest post-office. It is possible that a post-office will be established in the vicinity of Swan Lake at an early date. The settlers generally have an arrangement with the driver of the stage to leave their mail at their residences or at some convenient point along the route. A Government telegraph-line follows along the road from Grande Prairie to Pouce Coupe, which is the nearest telegraph-office. At present the closest connection to the outside markets for the disposal of grain, cattle, etc., is by way of Grande Prairie, but it is very possible that before long settlers will be able to dispose of their produce without the disadvantage of such a long haul.

The soil generally is a rich loam over clay or sandy clay subsoil. In places that have been visited by several forest fires the surface soil has been burnt to the clay or sand, but in time such places will return to their original condition, due to the extremely heavy growth of rich grasses and peavine. The district is primarily a cattle country. Good grasses, peavine, and vetch grow luxuriantly. The cattle run out through the winter, but of necessity require to be fed through the midwinter months. Two tons of hay per head of stock is considered sufficient. Garden produce, such as potatoes, turnips, parsnips, cabbage, etc., of an exceedingly good quality can be grown. While up to the present not much has been done with grains in the immediate vicinity, there is no doubt that wheat and oats can be raised with great success. The Pouce

Coupe District, which is subject to practically the same climatic conditions, is becoming famed for its yields of grain.

The greater part of the district under discussion is covered by small poplar and willow-brush more or less dense. Considerable open stretches are found in the neighbourhood of the road and Swan Lake. Some spruce and tamarack of good size grows on the north of the lake. To the south through Township 27 the growth becomes more dense, thick willow, and in places alder-brush is seen. In the southerly part of this township there is larger timber in clumps and in stretches along ridges and low-lying lands. Jack-pine, spruce, and poplar to a diameter of 18 inches, with an average of 6 to 8 inches, is found in these places. There is exceedingly thick windfall in this part. The country has all suffered from forest fires and in places has been burnt over several times. In these the old growth has completely vanished and a new growth of small poplar and willow has sprung up.

As we went into the country in the fall of the year, I am not in a position to speak from a personal observation concerning the rainfall and other climatic conditions. From reports received the summers are bright and warm, with sufficient rain. The ice leaves Swan Lake early in May and generally commences to freeze over about the middle of October. This year ice commenced to form around the shore of the lake on October 20th, and the lake was completely frozen over early in November. Summer frosts are likely to occur, but generally early in the season. This year there was a heavy frost over the greater part of the Peace River District early in July, but the grain apparently was not greatly injured, as good yields were harvested in most parts. In this connection the experience of one settler in the vicinity of Grande Prairie can be mentioned. He had 100 acres of wheat and after the frost decided to cut it for green feed. For some reason 5 acres were left and these later gave a yield of 30 bushels to the acre.

Moose, deer, and bear are numerous. Few were seen by members of the party, but numerous tracks were found in the new snow, particularly those of moose. Grouse and some prairie-chicken were noted, but reports say it was an exceedingly poor year for these. Rabbits are very scarce, but from indications have been very numerous and will probably be so again. Swan Lake is famed for the quantities of ducks and geese that rest there and thousands of them were seen. Whitefish and pike are plentiful in the waters of the lake.

I have, etc.,

ALAN J. CAMPBELL, B.C.L.S.

ROSE LAKE, COAST DISTRICT, RANGE 5.

BY H. C. BLACK.

December 14th, 1918.

J. E. Umbach, Esq.,
Surveyor-General, Victoria, B.C.

SIR,—I have completed the surveys mentioned in your instructions of October 30th in the vicinity of Rose Lake. The country in this district south of Rose Lake and west of Palling is timbered mainly with poplar and jack-pine, with some spruce. The timber is open and suitable for grazing, the undergrowth containing a good percentage of peavine. As the railroad has been fenced in this danger to stock has been removed. There are also some pieces of willow bottom scattered about which when cleared up should make good hay land.

There are some ten settlers here, some of whom have brought in a little stock, and others are expected in in the spring. They have already cut out two roads, one to Rose Lake and the other to Palling, but these need improving. They are in communication with the Dominion Government and hope soon to have a post-office established at Rose Lake. The present post-office and Government telegraph-station are at South Bulkley. A small store has also been started at Rose Lake, where the necessaries of life may be obtained.

I have, etc.,

H. C. BLACK, B.C.L.S.

MOOSE SPRINGS, CARIBOO DISTRICT.

BY F. P. BURDEN.

October 10th, 1918.

J. E. Umbach, Esq.,
Surveyor-General, Victoria, B.C.

SIR,—I have the honour to submit a general report on the country surveyed by me during the present season. The portion surveyed lies about twenty-five miles from the City of Prince George in a southerly direction, and is traversed by the Fort George-Blackwater Road. The immediate vicinity in which most of my work was done is known as Moose Springs, a name derived from a large spring of excellent quality situated beside the road in the pre-emption of O. B. Hughes.

Generally speaking, this is a rolling country, having low-lying hills or ridges, usually running from north to south, with level benches or level depressions between. As before stated, the Fort George-Blackwater Road runs through this region and provides the only means of access thereto. For a road in a new country it is in reasonable shape and is being improved from year to year. Cars can now run over it, though it can hardly be called a motor-road. Branching off from this, about two miles south of Twenty-one Mile, is a settlers' road, built by pre-emptors to enable them to reach their locations. It extends south-easterly for about eight miles, but is barely passable in spots and is built with but little attention to grades. The nearest post-office and market is at Prince George, reached by the wagon-road above referred to.

During the summer considerable prospecting has been done in this vicinity, and a number of claims having good copper-showings have been located. No development-work has yet been done, but interest is being aroused in this part of the district, and it is only a question of time until systematic prospecting and development will prove or disprove the presence of minerals in paying quantities.

The soil on the ridges is usually a sandy loam or gravel. On the level benches or valleys it is a black loam or chocolate-coloured loam.

Very little farming has been done, but excellent results have been obtained in gardens, all manner of vegetables being produced, and of fine quality. Remarkably fine sugar-beets were growing in Duncan MacKenzie's garden, while the potatoes in O. B. Hughes's garden were unsurpassed by any I have seen this season. Small fruits also flourish, but fruit-trees have not yet been tried, although a few miles east, on the shores of West Lake, I believe apples have been grown.

This area, with the exception of a few wet meadow-like spots, is thickly wooded, with jack-pine and poplar predominating. In some places the jack-pine is large enough for tie-timber. Under the ordinary methods of first-hand clearing the cost would run from $40 up to $75, but doing this on a large scale with the proper equipment, this could be reduced 50 per cent.

During spring and summer there is sufficient rainfall to ensure a good growth, and there is a heavy snowfall in winter, lasting usually until May, and beginning to fall in November. Summer frosts are still a detriment, but I have no doubt the clearing and cultivation of fair-sized areas will do away with these to a great extent.

Game is fairly plentiful, moose and deer being the most important. Fair-sized catches of fur are still made every winter. This includes beaver, lynx, fisher, marten, and mink.

Altogether, this area compares very favourably with other portions of this district now being settled.

I have, etc.,
F. P. BURDEN, B.C.L.S.

VALLEYS OF BAKER, NARKOSLI, AND MAKIM CREEKS, CARIBOO DISTRICT.

By R. W. Haggen.

December 20th, 1918.

J. E. Umbach, Esq.,
Surveyor-General, Victoria, B.C.

Sir,—I beg to submit the following report on the surveys made by me during the past season:—

The territory covered was the Fraser River Valley between Soda Creek and Kersley and the valleys of Makim, Narkosli, and Baker Creeks, in addition to which two pre-emptions were surveyed at Goose Lake, on the Quesnel-Fort George Road. All the outlying lots in this section were tied in, with one exception, and twenty-six pre-emptions surveyed; while data was gathered as to topography throughout the section, so that the new issue of the Quesnel Sheet of the pre-emptors' maps may be the more complete.

The first work undertaken was the survey of pre-emptions in the valley of Baker Creek, between fifteen and thirty-two miles west of Quesnel. Three of these were taken up with the intention of farming rich bottom lands, while the others cover swampy areas which may, after drainage, be converted into hay meadows. On four of the places hay was cut this year, but I was disappointed in the quantity per acre; it is all sedge, but will doubtless fulfil the purpose of keeping stock alive during the winter. However, I should judge that it is necessary to cut at least 2 acres of hay per head of stock. The meadows as a rule do not lie along creeks, but around small lakes. When drained, it has been the experience in other parts of the country that such meadows cannot be depended upon. In wet seasons they will produce a good crop, while a dry spring, or light snowfall in winter, will result in a very slim crop. The past season was not favourable, and this doubtless accounts for the light crop. However, I think there is feed and range available for 300 head of cattle in the district near Puntchesakut and Puntataenkut Lakes.

There is considerable good range available for several miles up the valley of the Middle and South Forks of Baker Creek, in pot-holes and in poplar, where peavine grows well. On some of the fire-killed areas there is a good growth of summer feed; others are barren.

On the bottom lands the cost of clearing would probably be $40 to $60 per acre. On these timothy grows well, and probably clover would yield a good crop. On account of the altitude and frequency of summer frost only hardy vegetables can be grown. Potatoes are grown for the use of the settlers, but they are, naturally, not of a marketable quality. Root-crops, cabbage, and cauliflower, however, grow well.

Most of the settlers have been on their places for several years and seem well pleased with their progress, though none could make a living off their pre-emptions alone until considerably more improvement has been made; in fact, most of the places contain so small an area of land that could be made productive that they never would support a family. However, each settler has some stock that is increasing and produces some revenue; he has a comfortable home, can live economically, and by means of trapping in the winter and working out in spare times he is enabled to make a comfortable living, and is probably better off than many a man in the cities. They at least have their living, and their stock would represent savings, apart from the value of the improvement of their holdings, which has a certain selling value. No doubt in a year or two there will be a school in the settlement. There is no post-office yet, but the places lie along the mail route from Quesnel to Nasko, where there is a monthly mail service.

The settlers tell me that they rarely feed their stock before Christmas, and turn out in April. In the winter there is rarely 2 feet of snow. I presume that the low temperature in winter would probably be about 60 degrees below zero.

During the trapping season the settlers arrange among themselves for the feeding of their small bands of stock together. Each season the fur-catch contains a fair number of fox, chiefly cross, but some silver and black, which have a good selling value. The other fur is beaver, weasel, musk-rat, and an occasional fisher or lynx.

The locality seems to be poor for game. There are few deer and grouse. In the fall there are quantities of ducks and geese. I also saw a rather rare sight in the district, a flock of pelicans. In the marshes around the lakes there are some of the despised "sand-hill cranes," which are really excellent to eat, though not easy to shoot. In Baker Creek and Puntataenkut Lake there are trout of various sizes.

About twenty-five miles to the west of this settlement, in the lower end of the Nasko Valley, there are some good herds of cattle.

VICINITY OF GOOSE LAKE.

On completion of the work in this locality I moved to Goose Lake, on the Fort George Road, and twenty-five miles from Quesnel. Here two pre-emptions were surveyed, one containing a portion of the meadow around Goose Lake and the other containing some meadow land along West Creek, the holder being absent on military duties. The first of these pre-emptions contains only a few acres of very poor meadow, and the balance of the land is of poor quality, but would afford some pasture. The place on West Creek contains the best land in this locality, but is not large. By clearing willows 40 acres of hay land might be utilized. Lying along a creek, this meadow has not the drawback of meadows around the lakes. By damming the creek the ground can be flooded each year, then drained off so that it is dry in haying-time; thus a more reliable crop is secured. If worked to its capacity this place would probably carry thirty-five or forty head of stock. The climate, however, is rather more severe than that of the Baker Creek Valley, and undoubtedly there are severe summer frosts. Outside the hay meadow there is no agricultural land, the sides of the valley being rough and stony, with a dense growth of jack-pine.

There are plenty of beaver along this creek, and the fur-bearing animals are doubtless to be found in the vicinity. It is ten miles north of the Baker Creek Valley, but there is a high ridge between. There are ducks and geese on the lakes in the fall.

During the days of heavy travel on the Fort George and Fraser Lake Roads Goose Lake was a regular stopping-house, and it was at this time that settlers went to this locality, and also farther to the north along the road in the vicinity of Swan Lake. All these places are, however, deserted. There is usually an operator at the Blackwater Telegraph-office, on the Yukon Line, and one at Bobtail Lake, forty miles westerly; apart from these, the country is absolutely deserted after one passes Bouchie Lake, six miles from Quesnel. In the winter the Inland Express Company keeps a man at Goose Lake to look after horses. It is rather a change from the days, a few years ago, when I have been one of twenty paying 50 cents for the privilege of sleeping on the dirt floor in the old Goose Lake Cabin, and glad to get shelter; and memory also reverts to a night in a cabin at Blackwater when it was 35 degrees below. That cabin was not chinked, a folding stove was intended to provide warmth against a wind that blew the snow clear through the cabin, while we tried, unsuccessfully, to thaw bread broken into fragments with an axe. Now the cabins are comfortable but deserted; then they were incomplete and crowded.

In these days, with numbers of horses on the road, any kind of hay was valuable on account of the demand, which accounts for the meadows being taken up. Most of the places have been Crown-granted and abandoned, but as other portions of the district are settled up some settlers will probably again be found along the road with small bunches of stock.

NEAR MOUTH OF NARKOSLI CREEK.

The next work done was on the west side of the Fraser River, between Higdon and Narkosli Creeks. Two of the parcels, the owners of which are overseas, are, I think, about the poorest pre-emptions I have ever seen, and I am at a loss to understand why they were ever recorded. One consists of a rocky hillside along the Quesnel-Alexandria Road, and the other of a swamp, that shows no sign of producing hay, on the summit of the plateau. Of the other parcels, one contains a little flat near the mouth of Narkosli Creek sufficient for a settler with other means of support to raise a garden and sufficient feed for his stable. He has raised excellent vegetables during the past season. The other parcels were on a bench above the road, ten miles from Quesnel; they contain some good land, which is now covered with a growth of birch and cotton-wood, which could be cleared at a cost of $25 to $40 per acre. A good spring provides domestic water. As a general rule this bench would, I think, be immune from summer frost, and good crops of roots and grain should grow without irrigation. From the nature of the vegetation I should judge that clover would also grow well. A rough road from the Quesnel-Alexandria Road runs through this land.

This locality has good access to Quesnel. The main road to Narkosli Creek is suitable for motoring, and the creek is only fourteen miles from Quesnel. A steamer on the Fraser River

provides freight and passenger service during the summer months. Quesnel is the post-office for the locality. There is no school. The benches along the Fraser suffer from an occasional summer frost, but generally crops do well. Irrigation is necessary for hay-crop, but not for grain. Generally speaking, the soil is a sandy loam, but there are patches of sand and gravel. There are some clumps of fir timber, but the vegetation generally consists of jack-pine and aspen.

The benches along the river here vary in width up to one mile; then a steep hillside rises to the plateau above. This plateau in general consists of rolling land, wooded with jack-pine, and somewhat stony; the soil is hard-pan to near the surface. There are scattered hay meadows small in extent; through the jack-pine the grass is generally of a poor feeding quality, but in open patches there is good range.

Messrs. Baker, Higdon, Wright, and Roddie are running cattle in this locality, probably 220 head altogether, and there would be summer feed for a larger number. Mixed farming is the industry to which the lands along the Fraser River are best adapted.

ALEXANDRIA, EAST SIDE OF FRASER RIVER.

Three pre-emptions were next surveyed in the vicinity of the Cariboo Road, in the Alexandria District, between twenty and thirty-five miles south of Quesnel. Two of these were owned by soldiers. The first lot lies in a draw about a mile from S. Hilborn's ranch, at the 201-Mile post, Cariboo Road. In this draw there is some very nice land, where the soil is a deep loam, the arable land being some 30 acres in extent. The vegetation consists of a rather dense growth of cottonwood and willow, and would cost at least $50 per acre to clear. There would also be considerable probability of summer frost. Root-crops and oats should grow, however.

Lot 9527, the next lot surveyed, is, I should say, useless as a pre-emption, though the settler probably thinks otherwise. It is hilly, dry, and wooded with fir which is not of good quality. There might be 500,000 feet of merchantable timber available on the whole area. There is fairly good range on the side-hills. The land lies to the south of Cuisson Creek and about a mile and a half up the hillside from the 190-Mile post, Cariboo Road.

The other pre-emption surveyed in this locality contains a fraction along the Fraser River, immediately south of the Alexandria Indian Reserve. There is some good land in the flats, but it is dry, and without irrigation the crops raised are very poor. A portion is open and grassy; the balance is wooded with cottonwood, willow, and brush. Near the river a considerable portion has been hydraulicked, and is in consequence of no agricultural value. This lot is near the 185-Mile post, Cariboo Road.

From Cuisson Creek, at the 190-Mile post, to this place there is a wide bench along the river, and it has been settled for years. Portion of the bench is owned by the Indians, and some under old pre-emptions, the owners of which are dead. Without irrigation the crops raised are very poor, and with such an excellent water-supply as Cuisson Creek available one cannot understand why irrigation systems were not constructed years ago. It is probable that sufficient water is available for the whole bench, as there are excellent storage-basins in the creek-valley, and the creek always has a good volume. Thirty years ago Chinese miners built ditches and dams and utilized the water. The ditches extend the full length of the bench. It is probable that lack of ambition and co-operation account for the state of affairs that has been allowed to exist. One man told me he "always had a good half-crop." In the seasons I have seen these crops I should say that through lack of proper farming methods the land has become so run out that it does not raise one-fifth of what it should. One field has been in oats each year for a quarter of a century, and the crop this year did not yield more than 100 lb. of oats per acre, and these were mostly wild oats. Windt Bros., who recently purchased the old Cuisson Ranch at the mouth of the creek, are installing an irrigation system. The line of the Pacific Great Eastern Railway passes along this bench, and probably, when that line is complete, new owners will have the other ranches, and one may hope, in the future, that the "Alexandria Flats" will do their duty as they should.

UPPER NARKOSLI VALLEY.

I next surveyed two pre-emptions in the Narkosli Valley, about eight miles west by road from the Alexandria Ferry, on the Fraser River. This creek runs through a fairly open, grassy valley, and along the creek there are some good flats on which timothy will grow well. In many places there is a dense growth of willow. There are a number of unsurveyed Indian allotments along the valley, and four white settlers have also located.

The valley is here at an altitude of some 2,500 feet. There is considerable summer frost, and the hay-crop is, I think, the only crop that would be reliable. The soil is a sandy loam, and the flats along the creek are free of rocks. There is some range along the valley, where the cattle from the ranches near Alexandria feed. The Narkosli is a large creek, with three branches which rise some twenty miles from Alexis Creek. I have measured the stream in October, when it is probably at its lowest, and it then had a flow of 60 cubic feet per second. A portion of the water is now diverted to irrigate the Sunnyside Ranch at Alexandria. I hope to see the day when it will also be used to irrigate the benches between its mouth and Higdon Creek, and when the present system to Sunnyside Ranch will be enlarged to include a goodly portion of the benches on the west side of the Fraser Valley at Alexandria.

On the South and Middle Forks (Twan and Webster Creeks) there are some excellent hay meadows, from 10 to 80 acres in extent, on which a good crop of "sugar-cane" hay it cut, two hundred and fifty head of cattle are now wintered on these meadows, in addition to horses.

I tied these lots to Lot 9494, Tingley Creek, which had previously been tied to surveys in the Fraser Valley. On this tie there are a couple of swamps that may possess possibilities as hay meadows. I am also informed that there are other meadows to be found in the district. This tie did not pass through any agricultural land.

The next tie was from the most southerly lot on Twan Creek to Lot 433, an old Crown-granted hay meadow which was not made use of for several years. Much discussion had arisen as to the creek on which this meadow lay, whether on Twan or a fork of Makim Creek. It is actually on a branch of Tingley Creek. Several people have staked it during the past few years, and various descriptions of its location were given. In these cases, with Gazette notices before me, I am reluctantly bound to conclude that the stakers were badly lost in the woods.

A road to this meadow leads by way of McRae's meadows to Riske Creek, some thirty-six miles distant. An old trail also leads to Twan's meadows, five miles, and another, which is almost undiscernible now, to Lot 102, Yorston's meadows, on Makim Creek.

This meadow, on Lot 433, is now owned by P. D. McRae, a stockman of Riske Creek. I have seen few meadows which equal it in yield per acre. While the meadow is scarcely more than 80 acres in extent, the crop is nearly 120 tons. It has a good bottom and is easy to flood and drain.

At this time I was compelled to suspend the field-work for a month and pass the time in the unpleasant precincts of an isolation hospital; the "flu" germ was very active in Cariboo.

MOUTH OF HAWKS CREEK.

Upon resuming work I surveyed a pre-emption at the mouth of Hawks Creek, three miles below Soda Creek, and, incidentally, made a tie between lots along the Fraser River. The pre-emption contains about 25 acres of bench, which would be productive if irrigated. In its present condition grain and vegetables can be raised. The timber is fir, small in size, and there is some open bench. The cost of clearing the timber would be $40 to $50 per acre. There is a good road to Soda Creek. Along the river, on either side of this lot, the land is very rough and wooded with scrubby fir.

MELDRUM CREEK, NEAR CALLANAN LAKE.

Some outlying lots on Shell and Meldrum Creeks were next tied to the surveys at Callanan Lake, which had been tied previously to the Chilcotin township surveys. On Shell Creek there is no land that is of any value, with the exception of small meadows which were taken up a number of years ago.

The valley of Upper Meldrum Creek is generally rolling and wooded with jack-pine and poplar. There are numerous lakes, the largest being Callanan, Meldrum, Natsy, and Dester. The only land that is at all suitable for farming is on the shores of Callanan Lake, and that is not of very good quality.

The meadows along Meldrum Creek are also disappointing, the hay being of a very poor quality. However, it brings the stock through the winter.

The road from Riske Creek, thirteen miles from Callanan Lake, to Makim Creek follows the valley for some distance, and trails lead to Meldrum Creek Settlement, on the Soda Creek-Chilcotin Road.

MAKIM CREEK.

The last work of the season consisted in tying in some lots to Lots 102 and 109, Makim Creek. Between Lots 109 and 9181 the country is swampy and of no value. Between Lots 102 and 242 there is a small meadow which has been staked as a lease; the balance is mostly rolling, stony, jack-pine country, with a few grassy pot-holes. Lot 242 appears to be a miserable meadow, and, so far as I know, it has never been utilized.

Along Makim Creek there are some excellent meadows, held by Messrs. Yorston, Cotton, Arthur Bros., and Moon. About 1,800 head of cattle from the Chilcotin District are wintered on the meadows of Makim and Meldrum Creeks; the Makim Creek hay is of good quality.

MAKIM CREEK TO ALEXANDRIA.

Lots 102 and 103, Makim Creek, were originally taken up by William Adams in connection with Sunnyside Ranch, Alexandria, and a road was built between the places. Until a few years ago this road was considerably travelled. This season, when returning to Quesnel, I came out over it, but it is badly covered with windfalls and will hardly be of use as even a trail now. In one place we spent three hours making one mile of headway, and only travelled twenty miles in ten hours.

The old Hudson Bay Trail from Narkosli Creek to Alexis Creek is also badly covered with fallen timber, and it is practically impossible to follow it now. As this trail provides an excellent short route from the Upper Chilcotin to Alexandria and the Fraser Valley, it is a pity that it is not kept open.

INDUSTRIES.

The chief industries of the Cariboo District at the present time are farming, stock-raising, and mining. The farming is chiefly confined to the Fraser River Valley. Excellent root-crops are grown and various grains. Wheat is milled at Soda Creek and local flour used throughout the greater part of the district. The vegetables will compare favourably with those raised in any part of the Province. Several of the farmers have good dairy cattle, and a fair proportion of the butter used is made in the district. Most settlers have a few hogs and there are small flocks of sheep.

The stock-raising industry is the mainstay of the Chilcotin, Alkali, Lac la Hache, and 150-Mile House localities. Individual ranchers have herds varying in number up to as high as 1,700 head. In the fall the cattle are driven to the Pacific Great Eastern and Canadian Pacific Railways, at 59-Mile and Ashcroft respectively. This is a flourishing industry at the present time owing to the high price of beef.

Mining is at present confined to placer-grounds in the Barkerville and Horsefly, while one claim is operated at Cottonwood Canyon, on the Fraser River, twenty miles above Quesnel. However, the output this year is disappointing. Low values of platinum have also been found. Whether there is "pay" in the district will be found out in the future. Scheelite containing tungstic acid occurs at Hardscrabble, near Stanley. In the range to the east of the Fraser River there are several outcrops of copper which may be of value when the railway is completed. At Birrell Creek, Quesnel River, gold and platinum are being obtained. There is a large coal-body at Australian Creek. In addition to the foregoing, there are good deposits of diatomaceous earth, carbonate of lime, and clay, which may form the basis of some future industry. Kaolin is reputed to have been found near Sheep Creek, but I have not seen the samples.

TRANSPORTATION.

The main artery of transportation in the district is still the old Cariboo Road, and it will continue so to be till the Pacific Great Eastern Railway is completed. From this road branches run to various parts of the district. On the Fraser River there is a steamer service between Soda Creek and Fort George, and freight is carried at very reasonable rates. There is, however, one bad drawback to a river-steamer service in the northern waters, so far as the farmer is concerned. About the middle of September, before his crop is ready to market, the water is so low that the service becomes erratic, and by the first of November the steamer is unable to operate at all; the steamboat service is from May 1st to October 31st. This involves the holding-over of practically all freight for the outside until the following summer. However, there does not usually seem to be much more produce raised in the district than the local market demands; though, with transportation and an outside market assured, there is no reason why much more produce could not be raised. This year there is reported to be a surplus of wheat.

SETTLEMENT.

Owing to conditions incident to war, cessation of railway-work, and enlistments, a number of settlers have left the district. In one locality there were over sixty settlers in 1914; to-day there are not over ten. Many of these obtained Crown grants before leaving for other fields. No doubt some will now return to these places, but many are permanently abandoned so far as the original locators are concerned. This condition occurs largely throughout the district. At present there is little demand for the land, and the settlements will doubtless fill up again when development is renewed in the district. Some localities are good settlement areas.

GAME.

As the district is large, it contains many varieties of game and fur-bearing animals in the different localities. The big-game hunter can find much enjoyment in the Barkerville region, where the moose considers himself monarch; at least, one sees him frequently along the margins of the lakes and rivers, and he is the picture of open defiance, ready to fight when molested. The grizzly bear is also at home in this region, and some splendid specimens have been obtained. On the hills caribou are numerous, and to the north-east one enters the mountainous country where the goat has elected to live. Of fur-bearing animals, marten, beaver, and lynx are the principal. In the Quesnel Valley and along the Fraser and west of the Fraser there are some deer. Fair catches of fur are made all over the district. On the large creeks and in Quesnel River there is excellent fishing.

I have, etc.,
R. W. HAGGEN, B.C.L.S.

HORSEFLY RIVER AND QUESNEL LAKE, CARIBOO DISTRICT.

BY F. BUTTERFIELD.

October 23rd, 1918.

J. E. Umbach, Esq.,
Surveyor-General, Victoria, B.C.

SIR,—I have the honour to submit the following report on territories covered during the past summer:—

These territories contiguous to Horsefly and Quesnel Rivers comprise one of the oldest portions of our Province. History affirms that Peter Dunlevy, whilst at the mouth of Chilcotin River searching for gold, was directed by an Indian to meet him at a certain time and place. The appointment was kept and Dunlevy was introduced to what ultimately became the famous Horsefly mines. This was in 1858. For years afterwards there was a rapid influx of people to the Cariboo; indeed, the 1859 rush was directly responsible for the foundation of New Westminster. From Horsefly the miners extended energetic operations northerly, and Quesnel River (remarkable rather for inactivity at present) in 1860 gave employment to "600 miners, who earned from $10 to $25 per man per day." Since the decay of mining there has developed apparently an agricultural effort, sometimes more and very often less successful. The amount of success depends upon the varying conditions the individual farmer is called upon to contend with, and I believe, to a greater extent than in most places, upon his wisdom and foresight.

Every year he has to prepare for a five-month winter siege, during which time he must feed his stock; and every summer he hopes, against all expectations, the frost will spare his crops. The inevitable summer frost is a source of torment to the agriculturist. Unfortunately, owing to the high altitude of the district in general, it is problematical if the farmer can ever be immune from its scourges, as is the case in some of the "muskeg" districts, where clearing and drainage have been so beneficial. Here, as in all ranching localities at the present time, much difficulty was experienced during the past summer in obtaining hired help for haying. At the time of my leaving this had developed a serious aspect owing to exceptionally heavy precipitations and the necessity, in consequence, of handling hay rapidly. I understand, however, that September proved as exceptionally fine as August had been wet, so it is not expected there has been an undue depreciation in the hay-crop.

On account of so much moving over long distances at a time it was impracticable to keep records of temperatures and rainfall, and likewise, unfortunately, only a very rough idea could be gleaned of the adaptabilities of soil and climate to crops. However, notes were made of all noticeable points of this nature likely to be of worth and interest. These are embodied in this report under their suitable headings.

CHARACTERISTICS.

Horsefly River flows into Quesnel Lake about sixteen miles from the lower extremity. In its course it drains probably 600 square miles of territory, flowing westerly and then northerly and discharging into Horsefly Bay. Quesnel River, or at least that portion of it with which I have to deal, drains Quesnel Lake, making its confluence with the North Fork at Quesnel Forks about seven miles and a half distant from the lake. The only tributary to these waters of any importance in this report is Moffat Creek, which flows northerly, uniting its waters with those of Horsefly River at the big bend. The creeks flowing into the included section of Quesnel Lake are insignificant; the largest is only a few links in width.

The most notable characteristics of the country are its narrow valleys and usually high hills. These are more marked on approaching Quesnel Lake and Quesnel Forks. Indeed, the old mining town of Quesnel Forks is literally hemmed in. There is much available grazing territory above Horsefly Bay, but little or no agricultural land of any description from there to Quesnel Forks.

Harpers Camp, the most populated settlement, is situated near the junction of Moffat Creek with Horsefly River. It marks to all intents and purposes the end of communication and the Horsefly Road. The other six or seven miles of the old Horsefly Road, which was built, as the name implies, for the benefit of Horsefly Mine, has seen very little travel for a number of years. The whole district is liberally supplied with roads, but, alas! most of them are in poor shape, as the travel does not now warrant their upkeep.

ACCESSIBILITY.

At the present time the most important of these after leaving the Cariboo Road is the Horsefly. I refer to the road between the 150-Mile House and Harpers Camp. The road running from the 108-Mile House to Harpers Camp bears the same name, though locally it goes under the name of the 108 Road to distinguish between the two. As I have only been over a portion of the latter I can only speak from hearsay, but I understand it is an impossible route for the greater part of the year. The 150 Road, however, is in very fair condition, excepting very wet periods, when it has a tendency to develop "chock-holes." A weekly mail stage (horses or auto, according to road condition) carries passengers between the 150-Mile House and Harpers, while occasionally one of the several automobile companies operating out of Ashcroft send in a car. Any small party will find this by far the cheapest form of transportation.

About fourteen miles of new road has recently been completed from Harpers Camp up the north side of Horsefly River to some distance above Wood Jam Ranch. This is quite good for motor traffic, but its continuation (the old road) is in miserable condition. Harpers Camp is the junction of several roads in addition to these—Beaver Valley Road, in good condition; the old Wood Jam Road, now practically out of use, rocky, steep, corduroy, and culverts decayed; and also there is the continuation of the old Horsefly Road, the usual route to Quesnel Lake. This latter is in surprisingly good condition considering the small amount of traffic which goes that way, and could be made perfectly good should circumstances ever warrant a small expenditure. From Horsefly Mine to Squaw Flats the road is of the roughest description for any kind of vehicle, but yet provides a means of transportation far superior to pack-train.

It is really a settler's road, having been built partially over one of the cordwood roads originally cut to convey wood to Horsefly Mine, and partly, I believe, cut through the timber by Mr. Hooker, a settler at the mouth of Horsefly River. A great amount of laborious grading for one individual to accomplish has been performed on the last half-mile. Here the road follows side-hills on a very fair grade down to the river-level at Squaw Flats. From Squaw Flats it is possible with some manipulation to travel by boat the remainder of the distance to Quesnel Lake, but the labour involved on returning, lining up and dragging over bars, rather mars the advantage of water over land transport. Mr. Hooker's road extends some two miles beyond Squaw Flats, but here had to be abandoned, the nature of the country involving very heavy grading. From here, however, he built a pack-trail terminating on the bank of Horsefly River about half a mile

from the bay of the same name. This latter portion of the river is quite smooth and presents no difficulties. Although wagons and pack-horses are readily obtainable at Harpers Camp, it is a distinct advantage to procure the services of some one who has a working knowledge of road and trail. There are some three or more boats on Quesnel Lake fitted with engines of varying types, as also several craft without motors, but communication with the owners is commonly a lengthy process. From Quesnel Dam (at the foot of Quesnel Lake) one road runs to Little Lake, while a second connects via Quesnel Forks with 150-Mile House. As this road is largely cut in the rock, much of it will stand the wear of ages. One rock-slide, which could be remedied in a few hours' work with the shovel, is the only obstruction between the dam and the forks. A network of highways are open from Quesnel Forks to the many points in the mining district. Inquiries made of an authority elicited the information that the Polley Lake Trail was impassable even for a saddle-horse.

	Miles.
Distance from 150-Mile House to Harpers Camp	38
Distance from 150-Mile House to Quesnel Lake	55
Distance from 150-Mile House to Wood Jam Ranch	50
Distance from 150-Mile House to Quesnel Dam (via Horsefly)	71
Distance from Quesnel Forks to Quesnel Dam	7½
Distance from Quesnel Forks to 150-Mile House	68

While accessibility at the present time is no great problem, the matter of handling freight would be a serious one were there a sudden need for large quantities. The Pacific Great Eastern, which is located within easy distance of the Horsefly, will be a great benefit in the future.

TIMBER.

There is no lumber industry in any part of the district, to my knowledge; none is imported, as, when needed, boards can be whipsawn from convenient local timber. Although no merchantable timber came under personal observation, I am informed there are several good tracts that could be profitably cut were export facilities improved. Tracts of timber are reported to exist on Quesnel Lake. The lower end of the lake, however, suffered from fires some years past, leaving little but the stubs of what has at one time been a good stand of fir. Ninety per cent. of the remaining cedar, it might be said, is hollow.

MINING.

A more comprehensive knowledge than I possess is necessary to do this subject justice. There are still men in the district of clear memory who can look back to the days of '63 and converse on minutest details. Most of these, in company with other younger men, are of opinion Cariboo has yet much gold in store. At the present time mining is very quiet. Assessment-work, which usually means minimum work, is carried on as a matter of course. A company operating at Harpers Camp, which only recently put its plant in working-order, is using an ingenious dredge calculated to handle most dirt in least time. Up to present date its energies have been expended on old tailings, but results, as yet, have not been disclosed. It is rumoured that the Bullion, a well-known mine on Quesnel River, will be working again when conditions are favourable. Gold appears to be the only mineral which receives any consideration, although it is well known the mountains contain much of the baser metals. Prospectors are scattered here and there searching the creeks and old beds for new finds, while a limited number of older men content themselves with washing on their old claims. It would be pure presumption, however, to say they earn a living thereby. Horsefly gold is of the flour variety, while that of Quesnel River is said to be of a coarser nature. Shortage of water is somewhat of a handicap to the gold-miner. Many of the creeks emanating from small lakes have to furnish miners with this essential. Only too often these fail and operations cease in consequence. While the small watercourses are so uncertain, the large waterways are of a precipitous character and could be utilized as extensive power sources.

FARMING AND AGRICULTURE.

A dearth of vegetables in the Horsefly District, a condition which I am told prevails annually, this summer unmistakably pointed out the enormity of the summer-frost detriment. During June and July the only means of acquiring potatoes was that of having them brought in from 150-Mile House. On July 24th, when all truck-crops were promising very favourably,

the district was visited with 10 degrees of frost. Needless to say, this had temporarily a disastrous effect, more especially on potatoes. However, in the latter end of August, although their crops had been considerably retarded, farmers congratulated themselves on an improvement over recent years. Truth to tell, most agriculturists look upon the successful growth of truck-crops as the impossible, and therefore take no means to circumvent the ravages of frost. Usually they plant a small patch and leave its future for Providence to decide. I did see smudges in use on two occasions, but Jack Frost had already done his worst. As there is some local market for potatoes, etc., it would probably be worth some enterprising farmer's while to install an overhead irrigation system of sufficient height to permit ordinary agricultural operations. This might be used as a frost-preventive by employing a fine spray set in operation nightly, and would provide a readily available supply of water in case of an exceptionally dry season. I noted at various places much "common scab" amongst potatoes, in most cases traceable to seed, continuous cropping, or wood-ashes of bush fires. Old potatoes were hard to acquire and worth 5 cents per pound in July, and earliest new potatoes came in at the end of the month.

Crops are all late, due to late springs and insufficient heat in the soil for seed-germinating. This tardiness is unduly enhanced in some localities by wet soils with insufficient drainage. Drainage requirements are very marked in all lowlands, and the soils are usually sour in consequence. There appears to be a prevailing desire to create swamps rather than drain them, in order to have swamp-hay for cattle-feed; not that timothy will not grow—as a matter of fact, precisely the contrary is true. With a little care at the beginning one or two farmers have obtained luxuriant stands. Nevertheless, timothy is very scarce in a country well adapted for hay. If the past season was at all typical of a Horsefly summer, there should be no need for irrigation. The months of June and August were much too moist to suit survey-party tastes, while July, although drier, had quite an ample precipitation. Still some of the residents possessed of garden-patches complained of "drying out." Possibly this was true where the soil was of a coarse texture and friable nature, but the hillsides with their deep green appearance bore no supporting evidence. As stock-raising gives little trouble and good grazing can be found almost anywhere along the Horsefly or on neighbouring hills, it is the most remunerative and satisfactory form of agriculture practised. The stockman needs large enough holdings to guarantee sufficient range, an ample supply of water, and somewhat extensive hay meadows.

Having these assets, together with reasonable luck, he ought to be successful. The hay meadows are absolutely essential. As already stated, calculations have to be made for provision for five months' winter feeding. Vetches and some form of clover resembling alsike grow luxuriantly, the latter especially needing only the encouragement of a little clearing. Beef is seldom consumed locally, mutton and bear-meat being the common viands of the district. Beef was recently sold at 11 cents on the hoof, but I think 10 cents is the more general price paid. Beef, hides, and furs, I believe, are the only commercial articles exported to the outer world. Demand for these as well as local consumption products exceeds the supply. Altogether there must be several hundred sheep in the district, and it is very gratifying to note, while coyotes are plentiful, they do not interfere with their successful increase. As small tracts of land will not furnish a living, the entertainment of communistic-settlement ideas is out of question here. Some complaints are heard of "winter killing." As this is a direct consequence of excessive moisture, adequate drainage ought to be provided wherever it applies.

SOILS.

In a district whose soils are of different origins, or at least whose soils have undergone many different changes, it would be impossible to classify them without exhaustive study. No attempt has therefore been made, but some little notice was taken of soils in vicinities where surveys were in progress. Generally speaking, there appears to be some shortage of bases as is indicated in the higher lands; where, though, there may be little organic matter or moisture, soil shows slight acidity. This may account to some extent for the beautiful wild fruit gathered each year by residents of Harpers Camp.

FISH AND GAME.

The district of Horsefly and Quesnel Lake can only be described as a paradise for hunter and trapper. The large numbers of fur shipped annually, the beautiful heads of moose, caribou, and deer to be seen in settlers' cabins, and the tales that are told, all testify to this. Several

families rely absolutely on trapping to earn their daily bread, while many are to a greater or less extent dependent on the same source of livelihood. Amongst animals trapped are bear, beaver, coyote, fisher, lynx, marten, mink, musk-rat, otter, and weasel. Big game, comprising black and grizzly bear, moose, caribou, and deer, is most plentiful in the region of Quesnel Lake. Coyotes are responsible for the destruction of many deer, if the observations of residents are a base for calculations. Five deer were seen at one time last winter, driven down by coyotes and slaughtered on the ice of Quesnel Lake. Game birds are decidedly scarce, and rabbits, once so plentiful, are now seldom seen. This is attributed locally to the exceptionally severe winter of three years ago.

The fish-supply is quite on a par with that of game. Practically all lakes and creeks are well stocked with trout of varying sizes up to 10 lb. Quesnel Lake far exceeds this, rainbow weighing up to 16 lb. and char even to 40 lb. The largest fish taken by us measured 35 inches in length.

Moffat Creek and along Old Wood Jam Road.

In the vicinity of Moffat Creek there are suitable lands available for settlement in small scattered areas. A large proportion of the lower lands, flooded by beaver and overgrown with a dense underbrush, carry a black muck soil, usually underlaid with sand of varying texture. The ground rises from the creek in benches, where a medium sandy soil of yellowish appearance with a fine whitish to yellowish-grey sandy clay subsoil is usual. Stony, even rocky lands are quite common, and above only applies to the better portions of a naturally broken territory. What has been said of Moffat Creek applies to lands to which the Old Wood Jam Road is tributary, only the proportion of rock to soil is greater in the latter. Soils formed by weathering of rocks on the innumerable small hills have through centuries been washed and deposited in the hollows. In addition, often small lakes and ponds have been created in these places. around the shores of which are found soils limited in extent, but rich in humus.

Wood Jam Ranch and Vicinity.

Range lands comprise the prevailing feature in the vicinity of Wood Jam. The ranch itself, which is spoken of almost as a mile-post, consists of about 600 acres, mostly range. At some comparatively recent date, a fire, said to have been caused by lightning, swept the hills west of here and south of the river, leaving little in its wake for the settler to remove. Mr. McKenzie (Wood Jam) has experimented two years with alfalfa, but has only had partial success, although his experiments lead to the belief that, once established, alfalfa will be profitably grown. Hundreds of acres along the Horsefly River are flooded annually, a major cause for delayed spring operations. There has been some desire on the part of local farmers to have investigation made with a view to ascertaining the feasibility of shooting out the so-called "canyon" which is said to be responsible for this backing-up and resulting inundation. It has been said, if this were scientifically and economically performed, Horsefly River ought to pay its way by surrendering sufficient gold from the canyon to deplete expenditure. To say the least, this is very questionable. Such soil as there was a possibility of examining in the very little time at disposal, without interference with customary survey operations, proved to be a silty clay loam with little or no variation to a depth of 28 inches. It displayed slight acidity, no carbonate action, a considerable colloidal content, and in places a decided inclination to bake, though not so cohesive but what it would respond to ordinary cultivation practice. That specie of clover of which mention has already been made is very abundant in places.

The residents of aforementioned districts, in addition to some who reside on the shores of Quesnel Lake, receive their mail at Harpers Camp, where also the majority purchase supplies. Harpers Camp has recently acquired a second store, the proprietor of which, A. Campbell, is expecting a fair business and has made provision accordingly. Freight charge from Ashcroft to Harpers, at the lowest possible rate, is 4 cents per pound. The round freight journey takes approximately one month, and, as there is now only one freighter on this road, it is a slow and tedious freight route. Supplies can be obtained in much less time by Inland Express to 150-Mile House and by stage from that point. This, however, is much more expensive and inadvisable unless in cases of absolute necessity. Mutton is worth 22 cents per pound at Harpers Camp, and whilst beef is not for sale locally, it can be obtained at 150-Mile House, for 16 cents.

QUESNEL LAKE.

Quesnel Lake is remarkable for scenic beauty and notable for historical relationships. Its expansive waters are well stocked with trout and char and its neighbouring hills teem with animal life. Although agricultural land along its shores between Horsefly Bay and Quesnel Dam is practically *nil*, in a few places settlers have established their homes.

These, most of whom make a living through trapping in their endeavour to become to a large extent self-supporting, have grown fruit, beautiful and in quantities far in excess of their needs, while their gardens this summer were a pleasure to gaze upon. Here frost had had no sway, the huge expanse of water no doubt controlling the temperature. The soil is usually of a brownish-yellow appearance, a sandy loam with clay predominating occasionally. All gradations in texture can be found from coarse gravel to silt. Much of the soil at first glance appears to be wholly gravel, but on closer examination much finer material is determined. Although the subsoil is finer, there is still a tendency for the soil to dry out; much therefore depends on rainfall. There are probably 1,000 acres near the mouth of Horsefly River of very good land that should be eminently suited to fruit-growing. This amount might be doubled at some future date should Quesnel Dam ever be removed. Quesnel Dam (at the foot of Quesnel Lake) was originally constructed to retain the waters of Quesnel Lake for brief periods while the gold was being removed from the bed of Quesnel River. From all reports the scheme was an absolute failure, and the dam, which assuredly was a great undertaking for a mining company, remains, serving no purpose, but holding the lake at from 10 to 12 feet above its natural level. The dam itself will resist all nature's attempts at reduction for many years to come, but the gates are already giving, and their entire failure, unless given attention, may be expected any time. In such an event it is difficult to predict the ensuing consequences. It seems highly probable the current will cut away the bank on the north side of the gates (indeed, this is already taking place) and form a new channel. As the bank at this point and for some distance below is high and steep, the wagon-road which traverses the side-hill would naturally be damaged. If the lake should become rapidly lowered it is quite probable the freeing of such a huge volume of pent-up water would do damage at points lower down the river. Evidence of the former lake-level is visible everywhere. Standing dead timber out in the lake (at Horsefly Bay to distance of half a mile), almost total absence of beach where formerly it is said an auto might have been driven, and also Mitchell's Landing on the north side of the lake, where pack-trains were disembarked in early days after being ferried across from Mitchell's Bay, all furnish ample proof. This landing is now observed from a boat submerged in 8 feet of water and some distance offshore. As the dam only adds 12 feet extra head to the river, which itself is a straight run of white water, there seems to be little possibility of the dam ever becoming essential for power purposes.

At various times during the summer, more especially while journeying between Squaw Flats and Quesnel Lake, holes of 20 feet or so in diameter and several feet deep were remarked, as also others of more diminutive dimensions. The larger ones no doubt are of ancient Indian origin, the kind usually known as "kikalie holes," while it is assumed the smaller ones rendered service in the performance of culinary operations. There are now no Indians nearer than the Cariboo Road.

I have, etc.,

F. BUTTERFIELD, B.C.L.S.

NORTH-WESTERN LILLOOET DISTRICT.

BY FRANK TUPPER.

November 23rd, 1918.

J. E. Umbach, Esq.,
Surveyor-General, Victoria, B.C.

SIR,—I have the honour to submit the following report on the work done by me in the Lillooet-Cariboo District during the past season:—

The land surveyed is scattered over a large extent of country and necessitated a considerable amount of travel by wagon and pack-train. Commencing near the west end of Williams Lake and extending southerly along the Fraser River Valley, I surveyed eleven pre-emptions and four

Government lots. Six of these lots lie north of the 52nd parallel in the Cariboo District, and the balance to the south of the said parallel in the Lillooet District. Having completed the survey of all the unsurveyed pre-emptions in this locality, I then moved camp to Brittany Creek, in the Chilko Lake country, Lillooet District, where I surveyed three pre-emptions and two Government lots. From here I moved to the vicinity of the Big Creek Post-office, also in the Lillooet District, where I completed the survey of nine pre-emptions. The total acreage surveyed during the season was 4,944 acres. Owing to the scattered nature of the work a large amount of tie traverse was necessary, and no less than 42.5 miles of such were run.

AGRICULTURAL POSSIBILITIES.

With regard to the land surveyed along the Fraser River Valley, and which consists for the most part of stony hillsides with bunch-grass and elevated benches, I found the soil on the benches to be of good quality, but irrigation is necessary to make a success of farming operations. With water this soil is capable of growing almost anything, as the elevation is comparatively low and summer frosts are not frequent. At Four-mile Creek, on the ranch of Dr. C. Boyd, very fine crops of oats, barley, alfalfa, and vegetables of all kinds, including tomatoes, are being successfully raised under a small system of irrigation.

BRITTANY CREEK.

This country is fairly level and thickly timbered with small jack-pine, and is interspersed with patches of swamp and meadow land of more or less limited extent, from which considerable quantities of wild hay can be cut. Outside of these meadows, however, and extending eastwards, the country is of the poorest possible description. A great deal of it has been swept by a fire in recent years, and in places this burnt country extends for miles where nothing remains but dead jack-pine and bare rock, what little soil there was having been burnt off. The elevation is high, somewhere in the neighbourhood of 4,000 feet, and we experienced severe frost almost every night we were in this inhospitable country. Farming here is an absolute impossibility.

As regards stock-raising, although I saw very little country that could be classed as summer range, I was told by one of the settlers, F. Angers, that there was good range country on the north side of the Chilko River. There is also a strip of fair range country running along the south side of the Chilko River from the mouth of Brittany Creek to Chilko Lake. Mr. Angers plans to put up winter feed at his meadow on Lot 4866 and to run his cattle over the above-mentioned range country during the summer months.

BIG CREEK.

There are quite a number of settlers on Big Creek, in the vicinity of the Big Creek Post-office, where stock-raising is the principal occupation of the settlers, but fair crops of oats and roots are successfully raised. Potatoes are not a regular crop on account of the uncertainty of the season, summer frosts being somewhat frequent. H. E. Church, who owns the ranch at the Big Creek Post-office, goes in for dairying on a somewhat extensive scale, and was turning out about 500 lb. of butter per month at the time of my visit. This butter commands a ready sale at Hanceville, Alexis Creek, etc.

The pre-emptions surveyed in this locality are distant some miles south and south-west of the Big Creek Post-office, where the elevation is somewhat higher. They consist for the most part of isolated patches of meadow land situated usually several miles apart, there being no two claims adjoining. They are all connected, however, by a wagon-road which is rather rough and rocky throughout. The country surrounding these pre-emptions is poor, being of a rolling nature with light soil, very rocky, and timbered with jack-pine. There are occasional open patches of grass land which make fair summer range. It may be classed as fair stock country, but farming is not likely to prove a success and is not likely to be attempted to any extent.

TRANSPORTATION.

The pre-emptions along the Fraser Valley are blessed with a first class road running to 150-Mile House, on the Cariboo Road. This road touches the Pacific Great Eastern Railroad (now under construction) at the west end of Williams Lake, where it is said there is to be a divisional point. Settlers in this locality will, when the line is completed, have easy transportation for their products to the markets on the Coast and elsewhere.

From Big Creek Post-office there is a fair wagon-road to Hanceville, a distance of about twenty-two miles, which is on the main stage road from the Chilcotin country to Ashcroft, etc.

As regards Brittany Creek, the only means of access to this country at the present time is by pack-trail from Newton's ranch, which is situated on the main Chilcotin Road, about twelve miles west of Alexis Creek Post-office. This trail follows up the Chilko River on the left bank to the outlet from Chilko Lake, where there is a canoe crossing. Here it is necessary to take all freight across in canoes and to swim the horses, as the water is of considerable depth and the current very swift. This point is about fifty miles from Newton's ranch.

From here there is a pack-trail known as the "Old Nemiah Valley Trail" which runs in an easterly direction and crosses Brittany Creek in about eight miles.

CLIMATE.

In the Fraser Valley, which is considerably lower than the surrounding country, the summer climate is very favourable for the growing of crops. The winter is cold; occasionally the temperature goes as low as 40 degrees below zero. The annual rainfall is said to be about 15 inches, and 2 feet is about the average snowfall. I was not able to obtain much information about the winter climate at Brittany Creek, but on account of the high altitude the winters, I think, would be very severe. During the summer, at the time of my visit, the days were perfect, but, as I before stated, we had severe frost almost every night. The annual rainfall is said to be about 16 inches. At Big Creek the summer days were perfect weather, with occasional frosty nights. The winters are said to be very cold, with about 2 feet average snowfall.

GAME.

In all the different localities in which I was working this year game was exceedingly scarce. A few ducks and an occasional grouse were about all that were to be seen. In some places deer, I was told, were very plentiful in the fall. Fish, however, were plentiful in all the streams, rainbow trout being the most common variety.

CONCLUSION.

In conclusion, I would say that with irrigation the bench land surveyed in the Fraser Valley is very suitable for farming, and that the settlers here will shortly have transportation and a ready market for all they can grow. As to Brittany Creek, farming is an impossibility, but stock-raising may prove profitable for one or two ranchers, as the amount of summer range appears to be very limited.

Big Creek country may be classed as a fair stock country, but farming is not likely to prove a success and is not likely to be attempted to any extent.

I have, etc.,

F. TUPPER, B.C.L.S.

LILLOOET DISTRICT.

BY W. S. DREWRY.

December 17th, 1918.

J. E. Umbach, Esq.,
Surveyor-General, Victoria, B.C.

SIR,—I have the honour to report that in accordance with your instructions I proceeded to Lillooet District and surveyed a number of pre-emptions.

BEAVER DAM AREA.

Work was first undertaken in what is known as the Beaver Dam section, embracing the basins of 57 and 59 Creeks, west of the Cariboo Road. Much of this area had been previously surveyed, a considerable acreage being apparently held by grant from the Crown. It is an exceptionally fine section of country for cattle; and sheep would probably do well, since there is much open pasture in addition to a considerable number of meadows. The pine and poplar forest is quite open and the surface generally fairly level. At present the range is used almost exclusively for cattle.

Good trout-fishing may be had in both 57 and 59 Creeks; the fish in the former being more numerous, but those in the latter averaging larger in size, some of them reaching a pound in weight. Very little sign of game was observed in the woods, the absence of grouse of all varieties being noticeable, although a few years ago they were quite plentiful throughout the tract.

Deposits of carbonate of magnesia were observed in various localities, but considerable of it appeared to contain so much impurity as to make its value doubtful. In the vicinity of Meadow Lake these deposits are said to be of good grade and marketable.

The Bonaparte Country.

The next section of country visited was east of 70-Mile House, along what is known as the Currie Road, leading to the forks of Bonaparte River. This also is a range country suitable in parts to dairying and grazing, containing numerous meadows and lakes.

The waters of some of the lakes hold upwards of 2 per cent. of soda in solution, and are consequently not suited to human use, although freely partaken of by cattle or horses. It is possible that by pumping and the use of evaporating-pans a considerable quantity of carbonate of soda might be recovered in an inexpensive manner, which would pay settlers who would not be required to devote their whole time to its recovery.

Lying south of Currie Road, toward Bonaparte River, is a considerable tract of country unmapped and only partially explored. A hurried trip seemed to indicate that some good open poplar land lies along the slopes of Bonaparte River. This area could be easily opened by a short road from the bend of the Cariboo Road, north of Chasm Creek, toward the mouth of Fly Creek and the settlement about the forks of Bonaparte River.

The whole Bonaparte country seems to be primarily a grazing and dairying country capable of producing good fodder-crops.

Bridge Creek and Canim Lake Country.

Under your telegraphed instructions a long move was made to Canim Lake, where a dispute had arisen between the Canim Lake Indians and an applicant for land. After retracing a portion of the Indian Reserve boundary, this matter was satisfactorily adjusted by the survey of 160 acres along the north boundary of the reserve, adjoining its north-east corner. The balance of the land in this immediate vicinity was considered unsuitable for settlement, so no further surveys were made.

In travelling through Bridge Creek Valley from 100-Mile House it was noted that while in 1913 there was but one settler between the Cariboo Road and Canim Lake, now a number of families have established themselves, and fields of grain are replacing the poplar and pine. Other later settlers were building comfortable-looking houses and roomy barns; so that with a post-office and school in operation it seems as if permanent settlement had been accomplished. Several good gardens were noted, although in some localities complaint was made that frost had injured potatoes. As is frequently the case, it appeared to have been low-lying places that suffered, while the higher land escaped.

Silver Lake Valley.

Silver Lake Valley, some four miles north-west of the Canim Lake Indian Reserve and three miles from the Canim Lake Road, was then visited and three pre-emptions surveyed. There is a chain of three small lakes, the most westerly of which is Silver Lake, a beautiful sheet of water about three-quarters of a mile long by about one-quarter wide. These lakes are connected by a small creek, the water eventually discharging from Silver Lake through 111-Mile Creek into Lac la Hache. Rainbow trout are plentiful in the upper and lower lakes, and grayling are numerous in the shallow water along the shores.

Bradley Creek Valley.

From the most northerly of the pre-emptions in Silver Lake Valley a meridian tie-line was run northerly over the mountain three miles and a half to Bradley Creek, where two disconnected pre-emptions were surveyed and tied in. This creek is a considerable tributary of Eagle Creek, flowing into Canim Lake from the north, about seven miles from its westerly end. In places the valley attains a width of nearly half a mile and contains a limited amount of very good bottom land and meadows. At present this locality is rather inaccessible, being reached by a rough Indian hunting-trail some six miles long over the mountain from Silver Lake valley. One settler had a very fair stand of several acres of timothy, but no other attempt at agriculture appeared to have been made.

The valley rises on a very gentle grade from Canim Lake to 2,550 feet above sea, and frost ravages were less apparent in late September than on the slightly higher lands along Canim Lake Road.

RUTH LAKE VICINITY.

Having completed our work in the upper section of Bradley Creek Valley, we returned over the mountain to Ruth Lake, an unmapped sheet of water about two miles and a half from Canim Lake Road, north of Lot 2941, and surveyed a parcel of 160 acres containing Becker Lake, which it is proposed to drain. This scheme appears to be feasible, as there is considerable fall to Ruth Lake, which in turn drains into Bradley Creek.

Ruth Lake, about two miles long by three-quarters wide, is an extremely beautiful sheet of water and contains rainbow trout, which were frequently observed leaping from the water in considerable numbers. The lands east and west of the lake are high fir-clad ridges, but there is said to be very good land at its northerly extremity. Along the southerly end are small stretches of poplar-flats lying from 50 to 100 feet above the lake.

On the west side of Becker Lake there is a fine poplar-flat; but to the east the country rises in high granite ridges clad with fir. It was noted that the granite was of unusually fine texture, and if transportation were available would no doubt be of value.

A road has been constructed from Canim Lake Road to Ruth Lake, with the intention of continuing to Bradley and Eagle Creeks, which, when completed, will open up some good country now quite difficult of access.

While in the vicinity of Canim Lake a trip was made to Jim Creek, flowing from the south into Canim Lake, where B. McNeil has a farm of 165 acres cleared and mostly broken. A very fine garden of some 3 or 4 acres was particularly examined as showing what the locality is capable of. At Canim Lake Reserve it was noted that frost had cut down potato-vines; but at Jim Creek there was no indication of frost, most of the garden vegetables common to the latitude being well grown, including tomatoes just beginning to ripen.

Young apple-trees appeared to be thriving, having made good growth during the season. Some varieties of flowers and roses had also been grown. These exceptional conditions at an elevation of 2,550 feet above sea-level possibly arise from the fact that Canim Lake is about three miles wide at this point, and the large body of water may exercise such a tempering effect that frosts experienced in surrounding country away from the water are not felt.

The trip and examination were undertaken because there is a tract of some 2,000 acres near Mr. McNeil's farm, which, although timbered, might well repay the labour of clearing and prove the foundation of a prosperous small settlement.

93-MILE CREEK.

Having completed work in the Canim Lake section, we returned to 93-Mile Creek, on the Cariboo Road, camping at the crossing immediately adjoining, where we surveyed a very excellent pre-emption containing over 100 acres of meadow. The southerly portion is dry, while the northerly portion was wet in spite of a considerable fall to the south. This apparent paradox is perhaps explained by the fact that during part of the year the creek shows running water at the road crossing, but sinks within 100 yards, reappearing probably in the shallow lake on the easterly boundary of the land surveyed, whence it runs as a creek in a well-defined channel for a few hundred yards, and again sinks for a considerable distance. The northerly portion of the meadow is divided from the southern part by a dam partially natural and, it was thought, partly ancient beaver-dam which holds the water back. A channel cut through this dam and a few drains leading to it would render the whole of the meadow good hay land, and make this one pre-emption capable of carrying upwards of 100 head of stock, using surrounding country as summer range.

There are other 160-acre lots unsurveyed along this valley almost equally as good as that above described. The altitude approaches 4,000 feet above sea-level so not a great deal can be expected in an agricultural way; but timothy and clover will grow luxuriantly, as is amply proved by what has taken place about the old road camp at that point. This fact is important as there is a considerable acreage of good land east of the Cariboo Road in this vicinity.

I have, etc.,

W. S. DREWRY, B.C.L.S.

VICINITY OF PACIFIC GREAT EASTERN RAILWAY, BETWEEN PEMBERTON AND LILLOOET, LILLOOET DISTRICT.

BY GEORGE S. BOULTON.

October 29th, 1918.

J. E. Umbach, Esq.,
Surveyor-General, Victoria, B.C.

SIR,—I have the honour to submit the following report on surveys of pre-emptions lying between Pemberton and Lillooet, and also in the Fraser River Valley between Lillooet and Texas Creek:—

The first work undertaken was the survey of six pre-emptions on the west side of the Fraser River between Lillooet and Texas Creek. A. F. Hautier, since taking up his pre-emption on the south side of Texas Creek, has made considerable improvements; he has about 40 acres of level bench land, and this, together with the adjoining lot on the east which he has purchased, should make a very fine ranch. None of the other pre-emptions contain agricultural land to any great extent.

There is a good road from Lillooet to Texas Creek running through several ranches on which large crops are grown.

Two pre-emptions were surveyed on Seton Lake, one at the east and the other at the west end of the lake. The country along both sides of Seton Lake is very rugged and broken, and what land there is of any agricultural value has already been alienated from the Crown.

At the portage between Seton and Anderson Lakes are several small ranches which are being developed; the ranchers here are devoting their attention chiefly to fruit. Several pre-emptions were surveyed along the west side of Anderson Lake, taking up the balance of land of any value. The country to the east of the lake for almost its entire length is of a very mountainous nature, rising steeply from the shore. From the south end of Anderson Lake along the valley of the Gates River are a number of small ranches, the owners in the majority of cases being on active service.

Leaving the wagon-road about a mile from D'Arcy Station, near the north boundary of Lot 3127, a good pack-trail runs to Blackwater Lake, a distance of five miles and a half, and on to Birkenhead Lake, another four miles and a half. Traverse connections were made along this trail, linking up the various groups of surveys in this vicinity.

The Pacific Great Eastern Railway are now operating three trains a week each way during the summer from Squamish to Clinton, and two trains a week in the winter.

There is a good stand of timber—fir, spruce, cedar, and pine—in the country adjacent to D'Arcy which will create quite an industry when logging operations are commenced.

Considerable activity in mining is being displayed, and this district is being thoroughly prospected, development-work on the properties on McGillivray Creek being carried out.

As summer resorts Anderson and Seton Lakes merit attention from the public; trout-fishing on the lakes and in the creeks is excellent. Good accommodation is to be had at D'Arcy and also at the east end of Seton Lake.

I have, etc.,
GEORGE S. BOULTON, B.C.L.S.

UPPER NORTH THOMPSON VALLEY, KAMLOOPS DISTRICT.

BY W. G. MCELHANNEY.

October 18th, 1918.

J. E. Umbach, Esq.,
Surveyor-General, Victoria, B.C.

SIR,—I have the honour to submit the following report of this season's surveys on the North Thompson River, north from Clearwater River:—

The valley of the North Thompson River is narrow, averaging about a mile in width. During the construction of the Canadian Northern Pacific Railway most of this land was alienated either by pre-emption or purchase. Many of these pre-emptions were occupied and improved, houses and barns built, and some clearing done. There were ties and bridge-timber

required for the railroad, and these were largely obtained from the pre-emptions, so that the work of the settlers was profitable. But with the close of construction this market fell off, and the settlers found difficulty in getting enough land cleared and in cultivation to make a living. A great many held on till they had completed their pre-emption duties and obtained their Crown grant, by which time their finances and their courage were at a low ebb, and the war and increased industrial activity elsewhere opened an avenue for many of them to leave. I would roughly say that two-thirds of the pre-emptions are now vacant, with cleared land going back to its original state and houses and buildings going to decay. Some of this land is good, especially that in close proximity to the river; but clearing is costly, and with the exception of cedar poles, railroad-ties, and in some cases shingle-bolts, there is no market for the timber on the pre-emptions. Mills or industries are required where men can find employment during part of the year, at least while living on and improving their holdings. There are individual cases of enterprising men who have held on, cleared land, and acquired enough stock to be able to live fairly comfortably. Garden produce does very well and expenses are not heavy.

The pre-emptions which I surveyed this year are mostly at the outskirts of the valley land, a small corner being flat or valley land and the remainder on the hillside. The hillsides are, as a rule, very thickly covered with a dense growth of small hemlock, spruce, cedar, birch, and poplar which has sprung up since the great fires that swept the hillsides bare. This land in its present state is of little value. It is impossible to clear these hillsides economically except by wholesale burning of large areas, and it would then be most suitable for grazing if seeded at once. The small area that can be cultivated is, in nearly all cases, all that the pre-emptor uses, and the remainder is only of value to him for any timber that he may be able to use from it or to obtain control of certain water privileges.

In the vicinity of Messiter, near Hell's Gate Canyon, the four pre-emptions I surveyed this year were mostly on a stony hillside separating the North Thompson River and the north branch of Salmon Creek. This hillside is covered with a light growth of poplar, easily cleared, but having very little land of agricultural value. The portions in the valley of Salmon Creek are better land, but this is heavily timbered with cedar and hemlock, is very wet, and the cost of clearing and drainage would be heavy. Only small portions of each pre-emption could be cultivated, and the remainder would be most suitable for grazing land.

At Avola there is one of the best mill-sites on the river at the mouth of a slough. The current is sluggish here and logs and shingle-bolts can be easily held. A shingle-mill has been in operation here for the past two years, but is now closed. There is some good land on both sides of the river, both above and below Avola, but it is subject to overflow. I surveyed three pre-emptions in this vicinity, each having a few acres of good level land and the remainder steep hillside covered with a thick growth of small timber.

Around Wire Cache two pre-emptions were surveyed. These belonged to soldiers on active service and were for the most part bench land or hillside timbered with tie-timber, the land being gravelly.

Vavenby is one of the oldest settlements on this portion of the river. Land has been occupied and cultivated here for over twenty years. The most of the valley land has been taken up previously, and the land surveyed this year, consisting of six pre-emptions, is almost entirely on the hillside and is most suitable for grazing purposes. There is a great deal of thick brush interspersed with scattered fir suitable for tie-timber. The timber is more scattered here than farther north, and grazing is better. The most of the pre-emptions were being acquired by adjoining owners who required additional land for cattle or sheep. The sheep industry is being carried on here quite extensively by one man who has a flock of about 500. These range on the top of the mountain in the summer in care of a shepherd, and are fed in the valley in the winter with hay grown on the valley lands. This country is mineralized and extensive prospecting is being carried on this year. A mine has been opened up within a mile of the railroad and shipments are likely to be made soon.

At Birch Island I surveyed only one pre-emption on a bench about 600 feet above the railroad. This land has been burned over and has grown up with poplar and willow. The land is rolling, somewhat stony, but appears productive, and is freer of frost than the low-lying land adjoining the river. There is considerable mining development here. A wagon-road has been built from the railroad for seven miles up the mountain, where development-work is proceeding

on a large deposit of low-grade copper. Should the results be satisfactory it will aid materially in the development of this district.

The remainder of our work was in the vicinity of the Clearwater River, where we surveyed four pre-emptions. The soil here is light and inclined to be stony. It is not very suitable for agricutural purposes, but more for grazing.

The climate in this portion of the North Thompson Valley is wetter than around Kamloops, but still not so wet that irrigation can be dispensed with. Occasional frosts occur during the summer, but these are less harmful on the bench lands than along the river. The snowfall is from 18 to 24 inches on an average. Summer months are usually fine, with plenty of sunshine and rapid growth.

Vegetables and small fruits can be grown almost anywhere in the valley. Apples are produced as far north as Vavenby. Less hardy fruits do not thrive well on account of the frosts. Hay is a staple crop, and where sufficient irrigation can be obtained gives good results, two crops at least being obtained. Summer feed is scarce, as the hillsides are too thickly covered with brush.

Game is scarce in the valley, but on the mountains adjoining there are bear, caribou, deer, etc.

At present this district is very backward on account of so many settlers being away at the war or engaged in some allied occupation, but with conditions normal again there is room for a limited number to engage in general farming, stock-raising, mining, and lumbering.

I have, etc.,

W. G. MCELHANNEY, B.C.L.S.

LOWER NORTH THOMPSON VALLEY, KAMLOOPS DISTRICT.

BY J. E. ROSS.

November 22nd, 1918.

J. E. Umbach, Esq.,
Surveyor-General, Victoria, B.C.

SIR,—I have the honour to submit the following report in connection with my survey of pre-emptions on the North Thompson River:—

The work was a continuation of last season's. The country in general is somewhat similar, but there is less open grazing land and the hills are more rugged and heavily timbered or covered with a thick growth of brush.

I found the pre-emptions to be surveyed were even less favourable for farming than those of last year. Some of the pre-emptions had not been occupied or improved; some had been occupied intermittently and very little improved; some rather isolated, and others so inaccessible that it was impracticable to reach them with a good wagon-road. Only a few were suitable for farming.

Your instructions were to the effect that only pre-emptions actually occupied or held by pre-emptors in military service were to be surveyed, and that lands not particularly suitable for settlement were not to be surveyed. In carrying out the instructions I found it necessary to survey only about one-third of the number allotted to me. On the remaining ones I reported the particulars as fully as I knew.

The soil on the hills and benches is sandy and gravelly. Except the land has a considerable depth of black soil or sufficient water for irrigation, it is not worth taking up. It seems a pity that so much time and work have been expended on the uplands while there are thousands of acres lying idle along the river-banks. One reason that these bottom lands have not been settled on is that they were held at a high figure some few years ago, though such does not appear to be the case at the present time. The cost of clearing, which would reach $100 per acre in some parts, is another obstacle.

Lumbering was very brisk in this section. Several sawmills and logging camps were in operation. Besides lumber and railway-ties, a considerable quantity of electric poles, piling, and fence-posts are shipped from here. At the present rate of cutting, the timber in this part will be exhausted in a few years. The marketable timber comprises fir, pine, cedar, and spruce.

Quite a revival in mining has taken place lately on the North Thompson. More substantial development-work has been done during the past year than ever before. At the Queen Bess

Mine, near Blackpool, quite a force of men was engaged all summer. They had just completed a 400-foot tunnel leading to the main body of ore while I was in the neighbourhood. The manager was greatly pleased with the result. At Birch Island a wagon-road seven miles long had just been finished to the Lydia Mines. Since then machinery has been hauled up and a plant installed. A vaulable discovery near Vavenby has been quite recently reported. The coal-mines near Chu Chua, from which coal was shipped some twenty years ago, are to be tested by diamond-drill as soon as they are out of litigation.

Game appears to be gradually getting scarce. We only noticed several deer and a few grouse.

The Canadian Northern Railway, with stations every six or seven miles, has proved a great convenience to the settlers, but the mail service is poor, and while the mail clerks' strike was on it was very bad.

My survey operations were carried on under considerable difficulty, chiefly on account of the scarcity of suitable men. The mosquitoes were not more numerous than usual, but rather more persistent for reasons that I am not able to explain. Drinking-water was scarce on the hills owing to the dry weather in the first part of the season. During August the brush was wet almost continuously.

I have, etc.,
Jos. E. Ross, B.C.L.S.

WHITE VALLEY, SOUTH-EAST OF VERNON.

By F. H. Latimer.

November 20th, 1918.

J. E. Umbach, Esq.,
Surveyor-General, Victoria, B.C.

Sir,—Work was commenced on a group of pre-emptions lying south of the Coldstream Ranch, chiefly held by men on war service. A wagon-road leads up past Coldstream Ranch stables, with branches to several of the claims, the grade being 7 to 15 per cent., with some short steep rises up which a car can be taken with difficulty. Towards the end the grades and condition of road become impossible, except for a powerful team and light load.

Considerable wood has been taken out from some of the claims as obtained in the process of clearing, but not much other work has been done on any of the claims beyond building good cabins, also stables in some cases, and small clearings of 1 to 2 acres. All but one claim is covered with brush and timber, so that the problem of getting the land in condition for crops will be heavy, $50 to $80 per acre. Water is obtainable on all the claims, either from small streams or springs or from wells sunk in hollows.

A portion of the south end of three claims—Pre-emption Records 6482, 6581, and 6563—lies on a high rolling plateau which rises towards the south in rock cliffs varying from 75 to 150 feet in height. This plateau, so far as explored, is covered with jack-pine and balsam, with numerous natural wild grass meadows, swales, and swamps, on or around which is found thick alder, willow, birch, spruce, and balsam and occasional mountain-ash. These latter could be cleared and the necessary drains made without much difficulty, and could be made to produce considerable hay.

Access can be gained to this plateau conveniently, either up the east bank of Deer Creek in Section 8, Township 6, through a break in the cliff a short distance east of the centre of Section 4, or by way of the road and pack-trail which leads from the Coldstream Ranch through Sections 10 and 3 towards Aberdeen Lake.

The general slope and creeks on these claims fall towards the north, some of the smaller streams sinking on reaching the bottom lands of the main valley, excepting during high water.

After moving camp eight miles and surveying one pre-emption in Section 2, Township 9, in vicinity of Cousen's Bay on Long Lake, camp was moved to Section 6, Township 3 (elevation 3,400 feet), on south slope of a group of high rock peaks called by some "Bluenose," which form a prominent landmark when coming out from Vernon on the White Valley Road.

Five claims were surveyed in the vicinity of this camp, two of which are being occupied and improved and cultivated, the remainder being held by men overseas. All these lands have been covered with timber at one time, but have in considerable part been overrun by fire, and

in South Half of Section 12 has left very little except standing dead stubs, windfall, and a heavy second growth of willow, tamarack, and alder. On the remainder the timber is chiefly tamarack and fir, with the addition of cedar, balsam, and a little spruce next the streams or in hollows, but not in commercial quantities. In most cases the disposal of the wood as cord or stove wood will assist in carrying the settler along while clearing the land, though the haul to the only market—Vernon—is about thirteen to fifteen miles.

A good wagon-road (excepting that grades run up to 12 or 15 per cent. in some places, going south) runs from the main valley through Sections 7 and 6 to south-west corner of Lot 4162, from whence one settler's wagon-road leads through Lot 4174 to Lot 4175, the other branch going south to north-west corner of Lot 4172, continuing from the latter point southerly to a group of lakes, swamps, and natural meadows, including Summit Lake, Fish Lakes, Haddo Lake, and Aberdeen Lake. On the two latter, dams have been constructed to store water for the Grey Canal, these lakes being one of the sources of Jones Creek, from which creek the Grey Canal is diverted near the south-west corner of Lot 3654 (in Section 8, Township 3).

Having completed the survey of these claims, camp was moved to near a watercourse close to south-east corner of Lot 3521, from which three claims were surveyed and designated as Lots 4528, 4530, and 4531, all of which are held by men overseas. Not much work has been done on any of them except in building cabins, small clearings, and making trails on which to get from wagon-road to the cabins.

The well-cut-out pack-trail previously mentioned as leading from the Coldstream Ranch to Aberdeen Lake passes diagonally across Lot 4530. I have been informed that much of the cement and supplies required in construction of dam on Aberdeen Lake was packed in over this trail.

In general, these claims are situated on a high rolling plateau covered with jack-pine, some tamarack and balsam, with many natural hay meadows, marshes, and lakes, in the latter of which is good trout-fishing. The clearing on these meadows is generally light, and the soil a deep black loam or muck that can be easily drained.

The elevation of this plateau is rather high (about 3,400 feet) and is subject to late spring and early fall frosts, though the first frost this season was on September 25th, and the first snow in Camp No. 4 being a light fall of 1 inch on October 22nd, followed by a fall of 2 inches on October 23rd and 24th.

Camp was next moved to vicinity of south-east corner of Lot 3654 (Section 9, Township 3), the distance in an air-line from Camp No. 3 being two miles, but requiring a travel of fourteen miles by way of Lots 435, 432, 436, and 3654, owing to intervening deep valley and canyon of Jones Creek and existing roads. The last half a mile before reaching camp is up a very steep, rough, and sideling settler's road, though a good road can be made with moderate expense, the distance from Vernon by most direct route being sixteen miles. The elevation of this camp was approximately 2,790 feet near H. Ashman's house.

Four claims were surveyed from this camp, two of which are for men overseas. These claims have also been all covered with timber-growth, chiefly consisting of tamarack and fir, with addition of considerable cedar and balsam in creek-valleys. Jones Creek lies to the west of this group, and along the east an unnamed small tributary of Harris Creek runs. At the time of survey there was only running in this latter tributary about ¼ second-foot, but the appearance of the creek-channel would indicate that the stream must be of considerable size during high water.

Portions of these claims are on high knolls or ridges, on which the soil is light, with considerable rock, but the benches are of a clayey loam, and there are indications of considerable underground seepage coming out as springs near the creeks mentioned in preceding paragraph.

Heavy rains set in while at this camp during the last week of October and first week in November, accompanied by thick mists, the rain showing as snow at an elevation of about 1,500 feet above camp.

Very little game was seen this season, though numerous deer-tracks were observed to the east of Long Lake and some on Upper Jones Creek. A few black bear are in the vicinity, and a limited number of blue, willow, and Franklin grouse.

Timothy was seen growing in many places over or in the vicinity of the pre-emptions surveyed, particularly near Camps 3 and 4 on Lots 4165, 4162, 4173, 4163, 4164, 3521, 4174, and 4175, also in Sections 9 and 10, Township 6.

I have, etc.,

F. H. LATIMER, B.C.L.S.

VICINITY OF SUMMERLAND, OSOYOOS DISTRICT.

By B. A. Moorhouse.

December 17th, 1918.

J. E. Umbach, Esq.,
Surveyor-General, Victoria, B.C.

Sir,—I have the honour to submit the following report on my season's work during 1918 in the vicinity of Okanagan Lake:—

Following your instructions, surveys were made of scattered pre-emptions, some of which had been held under record for a number of years, situated on the west side of Okanagan Lake from the Municipality of Summerland on the south to Wilson's Landing on the north, which latter point is nearly opposite Kelowna. This district takes in the towns of Summerland and Peachland, and also the smaller settlements of Minneola and Altamont on the west and Glenrosa and Westbank on the north.

Owing to the district being well supplied with roads fit for motor travel, which connect the settlements and also have branches up most of the small valleys down which the numerous creeks flow to Okanagan Lake, the lands under consideration are more accessible and to that extent more valuable than the majority of pre-emption holdings in some parts of the Province.

Generally speaking, the lands in the valleys nearer Summerland are already planted to orchards and yield splendid crops of the best fruit and other produce, as they have a successful irrigation system practically ensuring certain harvest each year.

The first camp was located one mile west of Faulder, which is a small station on the Kettle Valley Railway about seventeen miles west of Penticton, on the Coast-Kootenay branch of the Canadian Pacific Railway, and about ten miles west of Summerland by road. From Faulder this road turns north to Fish Lake, about eight miles up the Darke Creek Valley, passing through the little sawmill town of Minneola, about half-way. Minneola has a school, post-office, store, and a few good houses and many other buildings surrounding the sawmill.

The land to be inspected before survey operations were possible was so grouped at great distances apart that it is only possible to report upon the same in groups.

In the valley of Darke Creek, in which Minneola is situated, all the bottom and side-hill lands are rapidly being denuded of the merchantable timber, leaving the lands in an easier state for preparation as farm and orchand lands, which will be possible as soon as a successful irrigation system is completed.

In the southern portion of the valley below Minneola sawmill there is at present very little of even the bottom lands under cultivation, as all the water from Darke Creek is used by the sawmill, thus depriving land-owners of water for agriculture; but to the north of Minneola some of the land at present under cultivation suggests the possibilities and proves the producing value of the land even under the uncertain flow of water for irrigation from Darke Creek.

Five pre-emptions and three lots were surveyed adjacent to the townsite of Minneola; the soil on the benches and hillsides being a good sandy loam, excellent for fruit land if irrigation could be applied thereon. The majority of the lots contain excellent pasture, and on some parts hay and other crops could be grown when the normal supply of water from Darke Creek is again available.

The sawmill at Minneola has about completed its work of cutting timber from some 2,000 acres of land, most of which is now semi-ready for irrigation, and some of the surveyed lots along with the longer-established pre-emptions will likely be divided into small fruit-farms when a comprehensive irrigation system is assured.

Two pre-emptions were surveyed nearer to Fish Lake, the owners having done considerable improvements.

Four places were surveyed to the west of Faulder as far as Canyon Creek and on the south side of Trout Creek, which lands lie at an elevation of from 500 to 800 feet above Trout Creek on the summit between it and Shingle Creek. A fairly passable road goes through this property and connects with both Penticton and Summerland.

The land here was mostly used for range. There were some 200 sheep and many cattle pasturing there this summer. The accessibility to water is of prime importance, and for this reason the survey of Lot 4457 was diverted from usual methods in order to utilize Trout Creek.

This district is very park-like, slightly sloping to the north and south from the summit,

where several small lakes and a few excellent springs are to be found. The timber is mostly fir and pine scattered over the land, intermingled with dense patches of young willow and other growths. This part of the country appears to be a sportsman's paradise, as deer and duck have been found there in large numbers.

Some pre-emptions directly north of this district across Trout Creek were inspected and found to be at present not sufficiently useful to warrant survey, the barren hillside lands being particularly dry, as all the springs during the last few hot summers have disappeared, to the detriment of the land-owners high up near the summit.

Three pre-emptions surveyed were within the limits of the Municipality of Summerland, the owners all appreciating the value of having their places surveyed. The proximity of these lands to the 10 acres of orchards make them particularly useful for near-by pasture lands.

In all, eighteen places were surveyed from Camp No. 1 and seven inspections made.

Camp was moved by the Kettle Valley Railway up to the Trout Creek Valley a distance of fourteen miles to Altamont, a busy sawmill community at which there is a store, post-office, many houses, and station, etc. The mill here has turned the timber from the surrounding hillsides into lumber available for buildings, etc., and incidentally made the lands more easily prepared for cultivation.

Of the five places surveyed here, four belonged to soldiers who will no doubt return to further develop their lands, as the soil generally is good sandy and black loam, and where irrigation can be placed thereon; fairly level and easily cleared. The hillsides are covered with bunch-grass and make good range for cattle.

An old wagon-road from Altamont to Faulder and also farther west along the railway to Osprey Lake requires some repairs in order that when needed by settlers a fair road can be got to Summerland. Some of these places have small natural meadows easily made irrigable from Trout Creek. On the south side of the creek the hills are densely covered with black pine.

The next move was to Deep Creek, which is close to the southern boundary of Peachland, and along this creek twelve pre-emptions were inspected, of which seven were surveyed; also certain tie lines, etc., made.

These lots to the south of Deep Creek on the adjoining high plateau between Deep and Eneas Creeks are all the property of soldiers, and now used solely for range purposes; but there is some level land with rich black loam soil, and also some small natural meadows which are easily cultivable. The majority of the land is rolling bunch-grass range with scattered fir and pine, with dense clumps of willow and other small brush in places. Water for domestic purposes is scarce.

There is an old construction-road which can be repaired in order to give these pre-emptions access to Peachland when necessary.

Other scattered pre-emptions were surveyed up the South Fork of Deep Creek, most of the lands being covered by dense young jack-pine, except for the natural open meadows to be found near the summit of the divide between Deep and Trout Creeks. The Peachland Municipality and others use the meadows and reservoirs for storage of irrigation-water during the season. There is a fair road right to the summit, where construction of dams has taken place a few years ago.

Surveys were also made up Trepanier Creek, but owing to the absence overseas of owners, these, with many other places surveyed this season, are either idle or used solely for range land; but upon the return of the owners these places should receive a new lease of usefulness, especially when it is realized that the places are now entirely the property of the soldier pre-emptors by Crown grant from the Government.

Inspections were made of Westbank and Glenrosa properties and two places surveyed up near Bear Creek.

The season was exceptionally fine for outdoor work and the district fairly free from forest fires. No summer frosts, and no accidents of any kind occurred.

I have, etc.,

B. A. MOORHOUSE, B.C.L.S.

VICINITY OF FAIRVIEW, SIMILKAMEEN DISTRICT.

By C. A. E. SHAW.

November 27th, 1918.

J. E. Umbach, Esq.,
Surveyor-General, Victoria, B.C.

SIR,—I have the honour to report that under your instructions I made surveys of a number of pre-emptions between Fairview and the International Boundary-line on that part of the range lying between the Okanagan and Similkameen Valleys.

This range is rolling and broken with deep valleys and a number of small lakes, some of them salt, and one (Spotted Lake) has been worked extensively for Epsom salts, some thousands of tons having already been shipped from it. The hills are usually clear of timber on the south slopes and covered with bunch-grass, but on the north are generally timbered, mostly with fir of fair size and quality, and many of the valleys have groves of cottonwood in them.

The soil of this range is usually of excellent quality, deep black loam with clay subsoil. Dry seasons are the great drawback to this district, the past season being the worst on record in this respect. Many springs and streams were dry for the first time on record, and the crops, where irrigation was impossible, were practically a failure. On this account nearly all the settlers whose land was being surveyed were away from home working elsewhere.

The climate of the Okanagan and Similkameen Valley is mild, with a long summer season. Snow falls on the hills, but very seldom lies in the valleys. The rainfall is light, and summer frosts are practically unknown in the valleys. Where water for irrigation purposes can be obtained, all the tender fruits and vegetables, such as peaches and tomatoes of the finest quality, can be grown in abundance. At Keremeos, for instance, a few miles to the west, where a cannery was built about three years ago, 100 tons of tomatoes a day were delivered during the season; and I have no hesitation in saying that when the Okanagan and Similkameen Valleys are placed under irrigation they will be able to supply not only British Columbia, but also the Province to the east, with all those species of tender vegetables and fruit that are with difficulty raised elsewhere.

Fairview, which is the mail centre for this (Okanagan) district, consists of a post-office, store, and a few houses; the Government offices are also located here. It is situated in the Okanagan Valley about twelve miles north of the International Boundary-line. Penticton, the market town for the district, is about thirty-two miles farther north at the south end of Okanagan Lake. Excellent roads connect the two places, and the Kettle Valley Railway, which passes through Penticton, provides transportation to the Coast and also to the East. Steamers on Okanagan Lake provide access to Vernon and also to Sicamous, on the main line of the Canadian Pacific Railway. There is also a wagon-road from Fairview to Keremeos, sixteen miles to the west, and farther south a road runs through the Richter Pass to the Lower Similkameen. This in the future is intended to form a link in the International Highway. There are also two good roads leading east to the Boundary country—one from Fairview and one from Osoyoos, about ten miles south, where it crosses a narrow point in the lake of that name. The road through Richter Pass connects with this.

Deer are fairly plentiful in the higher ranges of the district. There are mountain sheep and goats in certain sections. Grouse are plentiful. There are scattered flocks of prairie-chicken, and in the fall and winter ducks are numerous in the Osoyoos and other lakes in the valley. Geese are also to be found at times, and in Vaseaux Lake a flock of swans has remained winter and summer for many years. Pheasants and quail were introduced into the Okanagan and Similkameen Valleys about four years ago and are now becoming fairly plentiful. In Osoyoos Lake, which is the lowest point in the interior of British Columbia (986 feet above sea-level), are various species of trout. Carp, which were introduced some years ago, are numerous, and in the fall a species of red salmon from the sea come up in large numbers to spawn.

I have, etc.,
C. A. E. SHAW, B.C.L.S.

NICOLA VALLEY, KAMLOOPS DIVISION, YALE DISTRICT.

BY O. B. N. WILKIE.

October 9th, 1918.

J. E. Umbach, Esq.,
Surveyor-General, Victoria, B.C.

SIR,—I have the honour to submit the following report of the country surveyed during the past season in Nicola Valley:—

Merritt is the principal town in this section and is reached by the Kettle Valley Railway, being forty miles in a southerly direction from Spences Bridge, on the Canadian Pacific Railway. From Merritt the Kettle Valley operates trains through Southern British Columbia, connecting at Princeton with United States railway-lines and giving a direct route to travel from the States through Spokane by way of Princeton to Merritt.

Merritt is a thriving little city of about 1,500 inhabitants, the principal industries being its coal-mines, which furnish employment for a large number of men. Business is represented by two large departmental stores, one drug-store, three general stores, one men's furnishing goods store, two meat markets, and several other smaller shops of various kinds. It has two banks, two garages, and owns its own water and electric-lighting plants.

AGRICULTURE IN THE VALLEY.

Merritt is the centre of a considerable agricultural community and good Government roads radiate from it in all directions. General farming is successfully carried on, the land requiring irrigation for the most part to grow good crops.

Dry-farming is being tried out. A dry-farming experimental station established by the Government has been in operation for the past five years above Quilchena, at the head of the valley, at an elevation of 3,800 feet. Splendid cereal crops have been produced there under scientific dry-farming methods. One year it produced a yield of 90 bushels of oats to the acre.

The altitude of the valley within a radius of fifteen miles from Merritt ranges from 1,500 to 2,000 feet, while the upper portion reaches about 2,600 feet. However, farming is carried on at elevations of 4,000 feet in the sections surrounding it, but the ranchers on the higher levels make stock-raising their principal source of income.

CROPS GROWN.

All the staple varieties of vegetables do well in the valley and all small fruits can be grown successfully. It is not considered a fruit district, but certain varieties of tree-fruits can be grown. The Government has a small orchard at Lower Nicola, about five miles below Merritt, and the trees are doing very well. Good crops of wheat, oats, barley, and rye are produced, and hay is a staple product. Merritt furnishes a good market for produce. Poultry does well here and the district is especially adapted for turkey-raising.

STOCK-RAISING.

There are many large cattle-ranches in this vicinity, and practically all the ranchers go in for stock-raising more or less. Sheep-raising is coming to the front and promises to become one of the important industries of the section. Considerable pork is produced. The "porkers" raised here are singularly free from disease and hog-cholera is practically unknown. There is excellent grazing for cattle and sheep in the hills surrounding the valley, and cattle run out on the open range till well along in the winter.

The valley needs a good creamery, and it would undoubtedly be of great benefit to all the settlers.

CLIMATE.

The climate of this valley is certainly one of its greatest assets. Glorious sunshine and clear, bracing atmosphere make it an ideal place of residence for those in search of health. The summers are mild, the nights always cool, while the winters are clear and cold, with medium snowfall. Motor-cars continue in use on the roads most of the winter season. Summer frosts occur very seldom. You may say they are an exception and not the rule.

MINING.

In addition to the coal-mines spoken of above, considerable interest is taken in the development of mining for gold, silver, copper, iron, gypsum, etc., in the territory adjacent. The prospects for the development of the mining industry in general look very promising. Several properties are being worked at the present time.

LUMBERING.

At the lower end of the valley near Canford the Nicola Valley Pine Lumber Company has a large plant, and the getting-out of logs for this mill has been a profitable source of income to settlers. The logging camps up the Coldwater River employ many men. The timber is principally pine and fir, running about 5,000 or 6,000 feet to the acre.

NICOLA LAKE.

Nicola Lake, whence flows the Nicola River, from which the valley takes its name, is one of the beauty-spots of this section. It is seventeen miles long and about two miles wide and is an ideal fishing resort. In fact, all the streams and lakes in this vicinity furnish excellent sport for the enthusiastic trout-fishers.

The town of Nicola is situated at the foot of the lake, and here the Government office for the district is located. It also has the distinction of being the oldest town in the valley. A branch line of the Kettle Valley Railway extends from Merritt to Nicola.

My party proceeded from Merritt by wagon-road to a point near Midday Creek, about six miles in a south-westerly direction. Here we surveyed twelve parcels of land, of approximately 160 acres each, for settlement by returned soldiers. Also some other pre-emptions.

This land has an elevation of about 3,000 feet. It is undulating country with some open land, with groves of small poplars and willows. There are also portions with a fair growth of pine and fir, running about 2,500 to 3,000 feet to the acre.

In regard to clearing the land for crops, it would cost in the neighbourhood of $50 per acre to clear the poplar and willow patches. The pine and fir areas I consider would be unfit for cultivation, but would make good pasture.

Several streams run through these parcels of land which would furnish irrigation in the early part of the summer. They were dry, with the exception of a few pools at intervals, at the end of July. The soil is gravelly loam, very similar to that of the Quilchena Dry Farm. There is a road open into these lands and it is only three miles from Walkerville, a flag-station on the Kettle Valley Railway.

From here we moved to Rey Lake, a distance of thirty miles north of Merritt, a wagon-trail being open to it. Here we surveyed several pre-emptions, principally owned by men on active service. This lake lies at an elevation of 4,000 feet, the country adjacent being undulating, with patches of small poplar. The timber on the wooded slopes consists of black pine and fir, which cannot be considered of commercial value as the fir is not of good quality. Considerable clearing has been made of the poplar groves by the pre-emptors. There are several large natural hay meadows on the east side of Rey Lake on which wild hay is cut and cattle wintered. Summer frosts were observed in August.

From this point we went on to Mamete Lake and surveyed some isolated pre-emptions taken up by men who are now at the Front. The general character of the country is similar to that of Rey Lake, with the exception that the timber is of better quality and the elevation is about 3,200 feet.

There are several large ranches located in the valley adjacent to Mamete Lake.

We proceeded from there to Eight-mile Creek and surveyed a few soldiers' pre-emptions. In this section most of the land cleared is sloping hillside and the elevation is around 4,000 feet. Hay and grain are the principal products. Some sheep-raising is carried on.

From Eight-mile Creek we moved on to the north end of Nicola Lake, where we also surveyed some pre-emptions. With the exception of the lands laid out for settlement by soldiers, our duties throughout the season were mostly confined to the pre-emptions previously taken up by men who are at the Front.

All through this section the lands in the valleys have been taken up years ago and are now productive ranches. Hence, new settlers looking for Government lands must go farther afield. However, throughout all these mountain districts one finds bench land and small valleys which

make good farms when cleared and put under cultivation. We noticed many such small holdings in process of development and found settlers doing well with them. The soil is good, and the many small streams furnish water for irrigation purposes, which can be put on the land at small cost.

Hunters and trappers find a variety of game in the mountains and along the streams. Deer is plentiful, as well as bear, lynx, and coyotes. There are beaver, mink, and ermine along the streams. In the way of game birds, ruffled and willow grouse are here in abundance, and the many lakes provide a happy hunting-ground for ducks and geese in the fall of the year.

A government telephone system connects Merritt with the district and also with most parts of British Columbia.

I have, etc.,
O. B. N. WILKIE, B.C.L.S.

VICINITY OF PRINCETON, KAMLOOPS DISTRICT.

BY P. W. GREGORY.

November 23rd, 1918.

J. E. Umbach, Esq.,
Surveyor-General, Victoria, B.C.

SIR,—I have the honour to submit herewith the following report upon the lands surveyed by me during the past season:—

The work comprised the survey of pre-emptions situated along Allison (One-mile) Creek, Hayes (Five-mile) Creek, and Summers Creek, flowing into the Similkameen River near Princeton from the north.

In all, forty-six pre-emptions were included in your instructions, and, as specified, none were surveyed unless occupied or improved or found to belong to men engaged on military service. Forty only of the forty-six pre-emptions were examined, reported on, or surveyed, when it was deemed advisable to bring the field-work to an end. Of these forty, nineteen only fulfilled the required conditions and were surveyed, whilst twenty-one, being unimproved and apparently abandoned, were not surveyed. Of the nineteen surveyed, five belonged to men absent on military duties, eight only were under occupation at the time of survey, and six were considered sufficiently improved to warrant completion of the surveys.

It would appear unnecessary for me to again describe the district in this vicinity, as it was covered in my report on the season's work for 1916. Mention, however, should be made of the present activity due to railway-construction and mining development. The Kettle Valley Railway has in course of construction a branch line from Princeton to the mine of the Canada Copper Corporation, Limited, a distance of about fourteen miles, which will probably be finished towards the end of next summer.

Three miles south of the town this mining company is erecting a concentration-mill for the treatment of its ores by the oil-flotation process which will have a 2,000-ton daily capacity. Around the mill the small town of Allenby has sprung into existence.

The lands surveyed by me during the season lie generally along the creeks mentioned, and they are readily accessible by roads from Princeton following the creek-valleys. A Ford car was used in moving men and equipment from point to point, and proved indispensable, as horses were almost impossible to hire, the demand being far greater than the supply, a condition applying also this year in a degree to men. The valleys are all narrow, varying from a quarter to three-quarters of a mile wide. The pre-emptions concerned were seldom found to include more than a third of their area of bottom land, the greater part lying along the steep hillsides and benches bordering the creeks. The growth along the bottoms is usually dense, consisting of willow, alder, poplar, and birch, whilst the hillsides and benches are timbered with fir and yellow pine from 12 to 50 inches in diameter. The soil in the bottoms is a rich loam and on the hillsides and benches sandy and frequently very rocky.

Along Allison (One-mile) Creek a wagon-road extends from Princeton northward a distance of about twenty miles, still lacking about eight miles to connect up with the main road from Merritt passing through Aspen Grove. If completed, this route will shorten the distance between Merritt and Princeton by some sixteen miles, making the journey fifty-six as compared with

seventy-two miles over the present travelled route via Tulameen and Otter Valley. Several small but none the less picturesque lakes are encountered through this valley, around which the wagon-road winds, affording additional attraction to the traveller. There are five or six ranches along Allison Creek devoted to mixed farming, the tilling of the soil, the rearing of cattle, sheep, and poultry, and the making of butter. Good crops of hay, grain, and vegetables were seen.

The valley of Hayes Creek, better known as Five-mile Creek, is wider than that of Allison Creek, but lacks adjoining range lands. Here also is a moderately good wagon-road following the creek, but wanting a few miles of construction to link up with the road running westward from Summerland and the Okanagan Lake. Osprey Lake is the present limit of the road on the Princeton side.

The valley of Summers Creek is very similar to that of Allison Creek, to which it is tributary. A road extends as far north along it as Lot 3348, from whence a good pack-trail leads on a water-grade to Missezula Lake, a distance of eight miles.

The country generally covered in my surveying operations is mineralized. Exposures occur along the hillsides flanking the valleys, showing deposits of copper ores, and along Allison Creek, magnetite. Outcroppings of coal are to be seen along Summers Creek, being probably the northerly fringe of the Princeton coal-basin, extending southerly eleven or twelve miles to the foot-hills of Copper Mountain, and estimated to cover an area upwards of forty square miles. The coal is sub-bituminous. Only one company—the Princeton Coal and Land Company, Limited—is actively engaged in coal-mining in this basin. The coal is shipped to Vancouver, Vancouver Island, and many points in the Interior served by the Kettle Valley and Canadian Pacific Railways, as well as to a number of points in the neighbouring State of Washington. The output for the twelve months ending March 31st, 1918, was about 44,000 tons, of which about 14,000 tons were sent across the International Boundary.

The West Kootenay Power and Light Company, Limited, which derives its energy from Bonnington Falls, has under construction a power-transmission line to the mill of the Canada Copper Corporation at Allenby, to which allusion has previously been made, and it is understood that provision will be made for the supply of power for other industries within this district.

The local need is not so much the settler to clear and cultivate the land as capital in the hands of capable mining men taking advantage of the special facilities afforded to develop the mineral resources. A great deal of work has been done in prospecting by W. C. McDougall and his associates on the Regal Group, Allison Creek, and by Uhler and Cox on the Shamrock Group, Hayes Creek.

Our surveying operations took us to Red Creek, a tributary of Hayes Creek. This region of the country was thoroughly burned over by forest fires in the summer of 1914, in effect clearing a way for the prospector through the dense tangle of jack-pine, underbrush, and windfalls formerly covering this watershed. As a consequence several promising locations have since been made.

I have, etc.,
P. W. GREGORY, B.C.L.S.

LOWER MAINLAND COAST AND ISLAND, NEW WESTMINSTER, AND COAST DISTRICT, RANGE 1.

BY H. H. ROBERTS.

November 12th, 1918.

J. E. Umbach, Esq.,
Surveyor-General, Victoria, B.C.

SIR,—I have the honour to submit the following report upon the surveys carried out by me in New Westminster District and Range 1, Coast District, during approximately two months of the past survey season:—

In organizing my party, your instructions that preference should be given returned soldiers over other applicants and that men should not be drawn from industries connected with the war were carried out. A gasolene-launch and a rowboat fitted with an Evinrude engine facilitated the work and added to the efficiency of the party. The work allotted to me consisted chiefly of

the survey of unsurveyed pre-emptions on Cortes and Redonda Islands; on the Mainland, work extended from the vicinity of Melanie Cove, Desolation Sound, northwards to Churchhouse, near the entrance to Bute Inlet.

REDONDA ISLANDS.

The islands, known as the East and West Redonda, are situate near the entrance to Toba Inlet, being separated from the Mainland by Pryce and Homfray Channels and Desolation Sound. Waddington Channel leads from Desolation Sound north-westward between the two islands. About three miles from the south-easterly entrance of Waddington Channel, Pendrell Sound branches off to the northward, extending six miles, with an average width of three-quarters of a mile, and nearly dividing Redonda Island into two parts.

The work at West Redonda Island consisted of the survey of one piece of vacant Crown land adjacent to surveys made by me in 1917 and fronting on Black Lake. Black Lake is situated in the south-east portion of the island and drains into Salt Lagoon, Waddington Channel. Lot No. 5015 was assigned to this parcel, which contains an area of 96 acres, of which about 10 acres are first-class land.

On the East Redonda the land rises to a great height, and the country is extremely rugged, making surveying operations difficult and in many places impossible.

Lots 5017 to 5020 are situated on the east side of the East Redonda, and all of them front on Homfray Channel, with the exception of Lot 5019, which is separated from this channel by Grown-granted Lot 3628. The areas of good land on these lots are limited. The settler on Lot 5018 possesses an exceptionally fine garden producing potatoes, carrots, turnips, cabbages, onions, cucumbers, and apples. The same settler has found hogs serviceable in clearing and preparing land for cultivation.

MAINLAND.

Of surveys on or near the Mainland, that of Eveleigh Island was the southernmost. This island lies at the entrance to Melanie Cove, which is situated in the north-east part of Desolation Sound. It is about three-quarters of a mile in length, with a maximum width of a quarter of a mile, and is separated from the Mainland by a narrow passage which dries at low tide. This island was recently logged, and at the time of survey the smoke from the burning of logging debris made it difficult to make accurate triangulation ties to surveys on the Mainland and Redonda Islands. Eveleigh Island is low-lying and for the most part rocky and broken, with scattered areas of land carrying a light soil. Practically all the timber of merchantable value has been logged off, the standing trees being chiefly scrub fir, cedar, and hemlock.

Homfray Channel is about fifteen miles long, being a continuation northward of Desolation Sound. My instructions called for the survey of six pre-emptions on that portion of the Mainland fronting on this channel. Only two of these pre-emptions were included in my work, the other claims being unoccupied, unimproved, and (excepting one parcel which carried more than the statutory amount of timber) not particularly suitable for settlement.

Lot 5016, fronting on Homfray Channel, is about three-quarters of a mile south of Lloyd Point, which is a point of call for steamers and has a post-office. This area was recorded in favour of a pre-emptor on military service who has made the supreme sacrifice. It contains little land of agricultural value, but carries a considerable amount of fallen cedar which will be suitable for shingle-bolts.

Lot 1834 is near Atwood Bay, in the northern end of Homfray Channel. This parcel contains 185 acres, of which 15 acres are classified as first-class land. The settler's improvements consist of a house and garden.

The Mainland in the vicinity of Homfray Channel was at one time covered with a good growth of fir, cedar, and hemlock, but a greater part of the timber has been logged or destroyed by fire. Large areas are now covered by a second growth of fir, hemlock, and alder.

CHURCHHOUSE.

Churchhouse is the name given to an Indian settlement on the Mainland near the northerly end of Calm Channel. This channel is nine miles long in a north-westerly direction, and lies north of Lewis and Sutil Channels, leading from them to Bute Inlet; its shores rise abruptly to a great height. At Churchhouse a pre-emption adjoining the Indian reserve was surveyed. The question as to the boundaries of this pre-emption has in the past been the cause of considerable friction between the settler and the Indians, but it is hoped that the adjustment of

the boundaries will prove satisfactory to all parties. Churchhouse has a good store and post-office and is furnished with a weekly boat service by the Union Steamship Company. The chief occupation of the Indians is fishing and hand-logging.

CORTES ISLAND.

Cortes Island is situated at the head of the Strait of Georgia, lying between Read Island and the Redonda Islands. The island is well settled and is traversed by several good roads and trails. The chief settlements are at Manson's Landing and Whaletown on the west side of the island, and in the vicinity of Seaford and Squirrel Cove on the easterly side. These points have stores and post-offices and are well served by boats of the Union Steamship Company. Section 12 and portion of Section 13, situated in the south-east portion of Cortes Island, were subdivided into seven parcels, varying in area from 80 to 160 acres and held under pre-emption records. With one exception, all the settlers are in active occupations, and their improvements consist mainly of houses, outbuildings, gardens, and clearing.

GENERAL REMARKS.

The vicinity of the season's work is about a fourteen hours' journey from Vancouver, and is supplied with a good boat service by the Union Steamship Company. Some of the settlers are engaged for a considerable portion of the year either in logging camps or at hand-logging; others, during the summer and fall, are occupied with fishing, the principal waters being Toba Inlet and Bute Inlet.

In the logging camps, summer resorts, Powell River, and Vancouver the settlers have good markets for everything that they can produce.

I have, etc.,
H. H. ROBERTS, B.C.L.S.

QUEEN CHARLOTTE SOUND, COAST DISTRICT, RANGE 1.

BY JNO. ELLIOTT.

November 18th, 1918.

J. E. Umbach, Esq.,
Surveyor-General, Victoria, B.C.

SIR,—I have the honour to submit the following report on the work done during the past summer:—

This work consisted of a survey of the mainland shore of Queen Charlotte Sound and portions of contiguous waters from Shelter Bay to the mouth of Smith Sound, also of two pre-emptions on Branham Island and eight others on the shore of the sound east of Blunden Harbour.

Along such portions of this shore as are exposed to the open sound all vegetation has been destroyed within the limits of the area reached by the surf, and for some distance farther the trees are all stunted and distorted into most fantastic shapes by force of the winds, which at times must be very great. But where the shore is sheltered by adjacent islands and in the lagoons and inlets the forests come to the water's edge, and at high tide the lower branches sweep the water. About midway between Buccleugh and Rayner Points there is a striking exception to the above description; there, for about two miles and a half, lies a stretch of firm sandy beach which if close to some large centre of population would no doubt be of great value as a summer resort. Behind this beach lies a strip of low-lying level land covered with small scrubby timber, and which appears to connect by a low pass with the westerly end of Belize Inlet.

There are indications of coal in several places. A number of claims have been staked and in some cases surveyed, and some prospecting has been done, but with what success I do not know. I saw no traces of any other mineral.

Deer are plentiful all along the Coast, and during the migratory season great numbers of wild geese are to be found in any of the bays in which a large area of tide-flat occurs. Beavers must have been plentiful some years ago, and from signs found this year I believe that they are again slowly increasing in numbers.

There is a salmon-cannery in Nugent Sound, off Seymour Inlet, and a considerable number of hand-loggers scattered along the main inlet and its various tributary inlets, sounds, and lagoons, and these are so far the only industries in this district.

The nearest port of call for steamers is Hardy Bay, on Vancouver Island, communication with which is usually by gasolene-launch; and the possession of a good boat is, in fact, the first requisite of any one intending to do anything in this locality.

So far there has been no settlement along this shore on the Mainland, but on Branham Island, lying off the mouth of Seymour Inlet, several pre-emptions have been recorded, though very few of them have been occupied. This island is separated from the Mainland on the east by Schooner Pass, which in places is not over 250 feet wide, and on the north by Slingsby Channel, having a width of about half a mile; in both these channels the tidal current is very strong, attaining a velocity of over ten miles an hour in portions of Slingsby Channel, but on the south and west the island is exposed to the open sound.

In consequence of this, while the north-easterly part of the island carries the amount of timber normal to this region, the south-westerly portion is much more lightly wooded and contains considerable areas of open grassy land, usually very wet and nearly always broken by rock-outcroppings. If the wild grass could be supplanted by tame without having to do any extensive cultivation of the soil, it might be possible to do something with stock, but, failing this, I do not think that any other kind of farming would prove successful.

The pre-emptions surveyed east of Blunden Harbour are similar to adjacent lands surveyed and described last year, the only difference noted being the number of small lakes met with this year. These lakes, though they could be lowered somewhat by breaking the beaver-dams at the outlets, are so deep and their beds of such contour that such lowering would be of little benefit.

I have, etc.,

JOHN ELLIOTT, B.C.L.S.

RIVERS INLET, FITZHUGH SOUND, AND BURKE CHANNEL, COAST DISTRICT, RANGES 2 AND 3.

BY C. C. SMITH.

December 19th, 1918.

J. E. Umbach, Esq.,
Surveyor-General, Victoria, B.C.

SIR,—With reference to my surveys carried out for your Department during the past season, I have the honour to report as follows:—

My work consisted principally of tie traverses, shore traverse, and triangulations extending from the North Arm of Moses Inlet, through Rivers Inlet, Fitzhugh Sound, and Burke Channel to Labouchere Channel. My outfit consisted of one 40-foot launch, one Linton rowboat, one small rowboat, and a Peterborough canoe. An Evinrude motor was used in the large rowboat.

As was the case last year, the old surveys of the lots were very hard to find. For instance, all trace of the survey of Lot 2 at Koeye River has been obliterated, and the only evidence remaining of the position of the lot is the shape of the shore-line. In order to facilitate adjoining surveys it is very desirable that these lots should be resurveyed.

In traverse and triangulation the same methods were employed as I used last year. In the triangulation of Fitzhugh Sound some of the sides of the triangles were very long and targets were erected with four cross-heads, two being 1 foot x 6 inches and two being 1½ x 4 feet.

At the southerly end of this triangulation a base approximately three miles long was measured by stadia, and at the northerly end, at Restoration Bay, a base 65 chains long was chained as accurately as possible without using base-measuring apparatus.

AGRICULTURAL POSSIBILITIES.

Of the land-bordering the shore from the head of Moses Inlet, around by Schooner Pass, up Fitzhugh Sound, and along Burke Channel to Labouchere Channel, there is none that a settler could improve and make a living on under present conditions. There are a few acres around the mouths of some of the creeks that would contribute to the support of a settler's home if he had other means of support. There are some areas of partly open meadows similar to the

pre-empted areas at Millbrook Cove and Takush, on which an experimental farm would appear to be a capital investment, as these will not grow timber and might by some method of treatment yet unknown be made capable of agricultural development.

OTHER INDUSTRIES.

At present fishing and logging are the industries being carried on, and with proper conservation these industries can be made perpetual here. Approximately 800 people engage in fishing in these waters during the fishing season, which lasts about two months. One man alone made $1,800 that I know of, and some may have made more. An average would probably be $500. But unless some limit is put on the catch the industry is threatened with extinction. As yet salmon is the only fish caught, but there are herring, cod, and other species which will permit of the industry being carried out during a longer season.

The country is almost all heavily timbered with cedar, hemlock, balsam, and spruce. Excepting in the creek-valleys, the timber is of medium grade and is not large. So far only the large timber in the creek-bottoms has been logged, but the supply of this is limited, and the high-lead system of logging is leaving a great deal of waste. Before long the pulp-mills will have to use more cordwood, and this will give permanent work for a large number of small operators.

This part of the Coast is well stocked with game. Deer are plentiful, as also are black bear and goat. Marten, mink, fox, bear, and wolf are caught in fair quantity by the trappers.

On account of the many small bays and harbours these waters are splendid for small-boat transportation. In the late summer and fall, however, Burke Channel becomes very rough occasionally. North winds strike it suddenly and violently, and as the tide runs strongly the seas become very choppy. In Fitzhugh Sound, Safety Cove, Goldstream Harbour, and Namu are the main harbours, but many other bays are available for launches.

I have, etc.,
C. C. SMITH, B.C.L.S.

CUMSHEWA INLET, QUEEN CHARLOTTE ISLANDS, AND ROSCOE INLET, COAST DISTRICT, RANGE 3.

BY A. E. WRIGHT.

December 10th, 1918.

J. E. Umbach, Esq.,
Surveyor-General, Victoria, B.C.

SIR,—I have the honour to submit the following report on the economic conditions in the area contiguous to my survey operations while triangulating in the vicinity of Cumshewa and Selwyn Inlets, Moresby Island, and in the vicinity of Roscoe Inlet near Ocean Falls.

CUMSHEWA INLET.

This is an inlet about eighteen miles long and one mile and a half wide, separating Louise and Moresby Islands. Its shores are for the most part low and covered with a heavy growth of exceptionally fine spruce timber. The north or Moresby Island shore rises gradually to the Interior Plateau and has an elevation of from 300 to 800 feet. The interior between Cumshewa and Skidegate Inlet is heavily timbered, especially in the river-bottoms and on the shores of Skidegate and Mosquito Lakes. On the north or Moresby Island shore the rocks exposed are sedimentary in origin, consisting of sandstones and shales, with bands of impure limestone. Many interesting fossils are seen on the north shore of Cumshewa Inlet, and especially on Fossil Island.

The greater part of the south or Louise Island shore is granite intrusives and is much steeper, although also covered with a heavy growth of valuable timber.

The minerals so far discovered are contained in some twenty mineral claims on Louise Island, one mile and a half south of the abandoned Indian village of Clew, at an elevation of 1,100 feet. The ore is a high-grade magnetic iron and development consists of test-pits, stripping, etc.; the quality is excellent.

On the north shore, near Lot 172, half a mile from the beach, is a group of Crown-granted claims called the Homestake Group. The ore is gold, silver, lead, zinc. About 2,000 feet of tunnels, crosscuts, etc., have been driven; but the property has not been worked for several years.

Cumshewa Inlet, along with all points on Moresby Island, has weekly steamer connections with Prince Rupert, Victoria, and Vancouver. These steamers call at all the principal logging camps. There is as yet no settlement in the district.

The only land in the vicinity which is at all suitable for any form of agriculture has either been purchased already or is held as timber licences, and will not be available for settlement until the valuable timber is removed.

The nearest pre-emptions are on the shore of Gray Bay, on the east of Moresby Island, about six miles north of the entrance to Cumshewa Inlet. W. Rudge, who resides with his family at Copper Bay, a few miles north of Gray Bay, has several head of cattle, which graze along the shore almost the entire year. Farther north on Sandspit, at the entrance of Skidegate Inlet, are several prosperous farms which supply beef to the logging camps and canneries.

There are no wagon-roads or trails in the vicinity of Cumshewa Inlet, the nearest being a foot-trail between Copper and Gray Bays.

By far the principal industry is the logging of aeroplane spruce, which has attained large proportions during the last year through the fostering of the Imperial Munitions Board. Some eight or ten camps are established on Cumshewa Inlet alone, and the industry should continue to flourish, even though the spruce may not now be needed for war purposes. The spruce is towed to the Northern Mainland sawmills at Prince Rupert, Ocean Falls, and Swanson Bay in Davis rafts. It is there sawed and shipped over the Grand Trunk Pacific to the factories in Toronto and Great Britain. The spruce timber in this inlet is particularly adapted for the manufacture of aeroplanes, and so far 18,000,000 feet of Nos. 1 and 2 aeroplane spruce has been shipped from Cumshewa Inlet alone.

Large quantities of salmon, principally cohoes and humpbacks, are caught each year and canned by the cannery at Abford, in Skidegate Inlet.

SELWYN INLET.

The head of Selwyn Inlet is connected with Cumshewa Inlet by a narrow neck of water called Louise Narrows, which is only navigable at high water by small boats. The shores of Louise Narrows are for the most part steep and heavily timbered, and several hand-loggers were operating there this summer.

At the head of Selwyn Inlet are two other inlets—namely, Sewell, bearing south-westerly, and Lagoon, north-westerly. These inlets are both heavily timbered and are now being logged. The head of Sewell Inlet is connected to the head of the North Arm of Tasu Harbour by a good trail about three miles and a half long.

About a mile from the head of Lagoon Inlet, Colonel MacMillan, of Vancouver, has built a salmon-cannery, which was completed in time to take a large part of the season's catch.

At Thurston Harbour, on Selwyn Inlet, the Imperial Munitions Board has erected all the apparatus necessary for the formation of Davis rafts, together with a wharf, wireless station, and a storehouse for the convenience of hand-loggers, and a hospital and houses, etc., for the workmen employed. The rafts from this vicinity are towed to the Northern Mainland, there sawed, and shipped to the Eastern aeroplane-factories. So far, 13,000,000 feet of Nos. 1 and 2 spruce, suitable for aeroplane-manufacture, have been logged from this vicinity.

The Imperial Munitions Board had practically completed the erection of three sawmills at Thurston Harbour to take care of the logs cut during the winter, as it is dangerous to attempt to tow rafts to the Mainland during the winter. I understand that these sawmills are now being dismantled, as the necessity for local sawing as a war measure is no longer there.

The climate of these parts of the Queen Charlotte Islands is not as wet as that of the Mainland in the same latitude, and some of the logging camps were threatened with having to close down on account of the lack of water in the latter part of July. There is little or no snowfall, except on the higher ground.

A small variety of black bear is the only game which can be said to be numerous. They frequent the creek-mouths and beach during the salmon run, and one was bold enough to scratch himself on the legs of a transit left out overnight, without upsetting it. There were a few varieties of ducks and some geese in the vicinity during the summer, but they do not come in great numbers until late in the autumn.

ROSCOE INLET.

Roscoe Inlet is connected with Fisher Channel by Johnson Channel, which commences about fifteen miles south-west of Ocean Falls. Johnson Channel is about eleven miles long and one mile wide, and Roscoe Inlet is twenty miles long and about one mile wide. The shores are rough and precipitous, and no trails or roads of any kind are in the area embraced in this report. A few pre-emptions are found near the lower end of Johnson Channel and on Gunboat Passage, but as one goes northward along Johnson Channel the country becomes too rough to be of any use for agriculture.

The shores of both Johnson Channel and the lower portion of Roscoe Inlet are covered by a growth of good cedar, spruce, and hemlock; and several hand-loggers and three logging camps were operating this summer, all the logs being sent to Ocean Falls. The greater part of the timber, is however, better suited for the manufacture of pulp. Some of the larger creek-bottoms contain some very good spruce.

There is very little land here which could be used as pre-emptions outside of those already mentioned, and these are too far from markets, post-office, etc. The post-offices at Bella Bella and Ocean Falls are about equidistant.

There is no mining activity on either Johnson Channel or Roscoe Inlet, and the general appearance of the country does not look inviting from a prospecting standpoint. Roscoe Inlet penetrates into the heart of the Coast Range, where the country-rock is a particularly hard white granite, which rises almost perpendicularly out of the inlet and is very rugged in appearance. There is practically no timber on this part of the inlet, except in the creek-bottoms.

Considerable salmon are caught during the summer at several points on the inlet and taken to the cannery at Namu.

Game in the form of deer and black bear are plentiful, the latter being particularly numerous on the creeks near the head of the inlet; and there are probably some grizzlies, although no tracks were seen. Goat are also found on the steep mountain-sides near the head of the inlet. Grouse, geese, and several kinds of ducks were seen in the summer, and should be much more numerous later on in the fall.

The climate is typical of the Central Coast, being usually pretty wet, although this summer, along with all the rest of the Coast, it was quite dry. The snowfall is very heavy and usually stays until the end of March or beginning of April.

I have, etc.,

A. E. WRIGHT, B.C.L.S.

MISCELLANEOUS SURVEYS, WEST COAST, VANCOUVER ISLAND, AND LOWER MAINLAND COAST.

BY L. S. COKELY.

November 5th, 1918.

J. E. Umbach, Esq.,
Surveyor-General, Victoria, B.C.

SIR,—During the past season I was engaged on miscellaneous surveys on Vancouver Island and on the Coast of the Mainland, the first two months and a half being spent on the west coast of Vancouver Island.

The various districts of the west coast of the island are much the same, there being little arable land in proportion to the entire area. Much of the country is mountainous and very rough and broken, of little value, except for the timber and what minerals may exist. The timber varies in quality, and while large tracts of good fir exist, most of the timber is hemlock, cedar, and spruce. Throughout a very dense undergrowth of salal pervades the timber, and near the shore this is almost impenetrable.

The climate is mild, with little snow near the sea. The rainfall varies from 80 to 120 inches. During the clear summer weather dense fogs drift in from the ocean and leave the timber as wet as a heavy rain would.

The mineral resources are largely unknown, as very little prospecting has been done; the nature of the country and the heavy timber render it slow and expensive to prospect. There would appear to be copper in abundance, and several mines are shipping ore, the largest being the group on the South-east Arm of Quatsino Sound.

The country is sparsely settled, and what settlement there is is near the Coast in the vicinity of the various industries. Owing to the mountainous character of the country there are very few roads or trails, and most of the travel is by water. There are many good inlets and sounds which afford protection from the rigors of the open Pacific, and it is along the shores of these that the canneries and sawmills, which are the chief industries, are located. The Canadian Pacific steamer "Princess Maquinna" makes three trips a month up the Coast, calling at all the ports.

Game is not plentiful; there are very few deer and a few black bear and panther. There are no grizzly bear on the island.

My first camp was near Port Renfrew, on the Strait of Juan de Fuca. We found the country here similar to other parts of the Coast; the timber is rather small, consisting of spruce, cedar, and hemlock, with a dense undergrowth of salal. The surface is broken with many small ridges and ravines, and the soil is very poor, being mostly rock. The nature of the surface and the dense growth of salal made surveying operations very slow and tedious. There were very few settlers in the part in which I was engaged, there being a small settlement at Port Renfrew, where a salmon cannery, opened this year, is the chief industry.

Our next move was to Pachena Bay, just south of Barkley Sound. Here we were on the open Pacific, and we had a very rough trip around Cape Beale from Bamfield in a launch. The water is shallow and the seas break heavily in the bay, which affords no shelter for boats. The country is heavily timbered, with hemlock predominating, and with the ever-present undergrowth of salal. Some good land lies along the shore of the bay, and not far inland is an open muskeg flat of about 150 acres which was taken up and Crown-granted years ago, but no use is being made of it. A little farther west toward Cape Beale is Trout Lake, around which was a small settlement a few years ago, but which is entirely deserted now. The soil here is very poor and the country rough and broken. In the vicinity of Pachena Bay are a few settlers, the majority of whom are Russians, none of them having extensive improvements. Four miles from Pachena Bay and connected by wagon-road is Bamfield, the terminus of the Pacific cable. The Pacific Cable Board has a well-equipped office building employing a large staff. There is quite a village here of the employees and their families. Bamfield is easily accessible, as a launch runs three times a week from Port Alberni, and the C.P.R. steamer calls three times a month.

From Pachena Bay we took a launch across Barkley Sound to Mayne Bay. We found the water too rough and had to camp on an island in the sound until the sea calmed. At Mayne Bay we were very isolated and did not see a soul all the time we were camped there, there being no settlers. Most of the land is held under timber licences and there is little arable land. About five miles from Mayne Bay is Sechart, where a whaling-station is located, but it was not in operation this season.

After completing the work on the west coast I returned to Victoria about the first of September and paid off my party.

My next work was more in the nature of an inspection survey, and I took only one man with me. This arrangement had its advantages and disadvantages, as in our first camp on Jervis Inlet, between Vancouver and Powell River, we were visited during our absence by a drove of beach-combing pigs which just about cleaned us out. As a result we spent several weary hours in building a log fence around our tent. The chief industry here is logging, and much of the country is heavily timbered with fir of good quality. We also noted several good farms that had a look of prosperity.

From Jervis Inlet we moved to Powell Lake. Here we were engaged in making a triangulation survey of parts of the lake and a complete triangulation of Goat Lake. In this work we were seriously hampered by the smoky state of the atmosphere, due, no doubt, to the heavy forest fires that raged in the vicinity during the summer.

The country around the lakes is very mountainous; we measured one peak which came right to the edge of Goat Lake and found it to be 6,000 feet high. There is very little arable land and logging is the principal industry. There are two logging camps on Goat Lake and two sawmills on Powell Lake.

Powell Lake is drained by Powell River, a stream about half a mile long, which was dammed by the Powell River Company to such a height that the water was raised in the lake about 15 feet. When it is considered that the lake is about thirty miles long it will be seen what a vast storage-reservoir the company has. The lake is quite a pleasure resort for the people of Powell River, and many house-boats and launches are to be seen on the water.

The townsite of Powell River is the property of the Paper Company and is well laid out and beautifully kept. The houses are all well painted and the streets are laid out with ornamental shade-trees. The people are prosperous, as the plant pays good wages. The paper-mill itself is a large concern, turning out 250 tons of newsprint a day. It supplies paper to nearly every daily paper on the Coast, including the American cities. They have well-equipped buildings and a very good dock. Naturally most of the working-people are employed in the paper-mill, but there are a few other sawmills and shingle-mills which employ a portion of the residents.

From Powell Lake we went to Denman Island, and were engaged on the subdivision of the reserve on the southern portion of the island. We also surveyed a few small islands near by for the Dominion Government. Denman Island has been settled for many years and the inhabitants are prosperous. There are many good farms and the island is very well suited for raising sheep, as there are no panther present. About half-way up the island is a Government wharf, and a store, post-office, and church are near by. The C.P.R. furnishes a semi-weekly boat service direct from Vancouver and Nanaimo.

The last two months we used an 18-foot boat and an Evinrude engine, which we found to be satisfactory, except the last two weeks, when the weather was too rough to be able to depend on using the boat when needed.

I have, etc.,
LEROY S. COKELY, B.C.L.S.

LANDS FOR RETURNED SOLDIER SETTLEMENT NEAR FORT ST. JAMES, STUART LAKE, RANGE 5, COAST DISTRICT.

BY J. H. GRAY.

January 14th, 1919.

J. E. Umbach, Esq.,
Surveyor-General, Victoria, B.C.

SIR,—I have the honour to submit herewith general report upon the survey operations carried out last season in the Stuart Lake District jointly by D. J. McGugan, B.C.L.S., and myself. The tract subdivided and examined in detail consists in all of 61,359 acres situated upon either side of Stuart River, directly south and east of Fort St. James, at east end of Stuart Lake.

This entire area, on account of location and physical variety has been divided into three groups—viz., A, B, and C—to which reference shall be made.

Group A.—This group comprises forty-six originally surveyed lots or parcels of land, aggregating 22,917 acres, situated on the west or right bank of the Stuart River, directly south of Stuart Lake, having a river-frontage of nearly ten miles, with a general depth, southerly, of five miles.

Group B.—Group B comprises fifty-two original lots, aggregating 28,539 acres, occupying an area some seven miles square, north and east of Fort St. James, at the east end of Stuart Lake.

Group C.—Group C includes fifteen original lots, containing 9,220 acres, lying to the south-east of Fort St. James, in the valley of Necoslie River, which flows north-westerly into Stuart River, where the latter leaves that lake.

GROUP A.

Comparison with other Groups.—Group A (22,917 acres) of the land so far subdivided includes more generally and to a greater extent than the other two groups areas possessing the requisite and attractive conditions inviting to settlement—viz., the best of soil, light clearing,

with a percentage of open land, regular surface, and, with the exceptions noted, good water-supply; moreover, a fairly good wagon-road connection already established with railway communication.

Classification.—The total, 22,917 acres, contained on Group A has been divided as follows:—

	Acres.
First-class land	19,377
Second-class land	2,080
Third-class land	960
Muskeg land	500

The land on the area specified "first-class" consists of a light and dark chocolate-coloured loam, extremely consistent as to grade, irrespective of tree-growth, throughout the whole tract.

First-class Lands, 19,377 Acres.—This soil is very fine in texture, thereby containing capillary moisture to a maximum extent. In August last it was necessary to only kick up an inch or so of soil to find dampness.

It would appear that the soil deepens in colour and possibly becomes more "clayey" upon the Stuart bank, but at no point were found churnings or lumps, resulting from vehicular traffic that might not be easily pulverized in one hand.

This land is entirely free from stones or rock, and excepting the steep sides of the trough of Todd Creek, about 60 feet deep, and a few lateral gullies, there is nothing to prevent, but the standing timber, the whole area from being ploughed.

The overlying leaf-mould or humus varies from 2 inches to ½ inch in depth, dependent upon tree-growth. Poplar creates the greatest thickness, decreasing to but a thin covering where solely evergreen timber prevails. In the same way the natural covering of wild grasses, vetches, and berry-bushes, for the most part luxuriant amongst poplar, diminishes in extent in proportion to the greater or sole evergreen growth, but, as before stated, the excellent character of the land or soil remains unchanged.

Second-class Land, 2,080 Acres.—Under the heading of "Second-class Land" is soil generally a lighter quality of loam, intermixed with a varying percentage of gravel and boulders, the latter on the higher elevations or tops of local ridges. These areas, although cultivable, would not at the present time be sought, nor attract attention, except as possible cattle-runs, whenever the more attractive areas become "fenced in."

This indifferent land is found on the westerly boundary of group, from Lot 1646 south to Lot 1605.

Third-class Land.—The third-class area (960 acres) may be eliminated entirely from any sphere of utility, beyond a possible supply of building-timber. Otherwise this is an area of useless land, occupying practically the whole of Lot 1648 and centre of Lot 1649.

Merchantable timber comprising fir, spruce, and pine is found here; the whole aggregating a supply of some 7,000,000 feet, which, although possibly a useful adjunct to near-by settlement, could not compare with other sources of similar supply, approximate generally to the settlement area.

Muskegs are scattered.—An area of 500 acres of this class of land is to be found in Group A, about 70 per cent. of which is open. Pending more data as to the feasibility and cost of drainage, these have been classed as "lost lands" at the present time.

Unlike other classifications, muskeg is by no means isolated, but occurs at various intervals ranging in extent from 2 to 40 acres. Their position and extent in relation to each quarter-section may be learned from the detail reports.

Clearing, Group A—First-class Land, $21 per Acre (Average Cost).

The following remarks in respect to clearing relates to the area of first-class land only, some 19,377 acres.

An attempt has been made to estimate the cost of preparing the surface for rough-ploughing in the various degrees of tree-growth. This cost ranges from the minimum in open poplar through changing percentages of this timber with spruce and pine and willow, to a maximum in sole evergreen growth.

Useful Timber eliminated.—In the figures of estimated clearing cost of the first-class land area there has been eliminated some groves of "building" spruce and pine, having a diameter of from 12 to 14 inches and aggregating about 500 acres in extent.

This has been done in the belief that the value of such timber is greater than the cost of removal, which removal under ordinary circumstances would be brought about only by degrees, as requisitioned for useful purposes. The enclosure of this class of timber under the head of ordinary clearing, where the material to be removed is valueless except possibly for fencing, would tend to mislead.

Clearing Cost under $21 per Acre.—It has been adjudged that with this elimination the maximum cost of ordinary clearing would not exceed $30 per acre, nor again cost less than $10, and hence is estimated the following:—

1,000	acres	costing	$30 00
6,641	acres	costing	25 00
6,368	acres	costing	20 00
4,151	acres	costing	15 00
717	acres	costing	10 00
18,887	acres	averaging	$20 81 per ac.

Relating to the above figures, I beg to repeat here what was written in my sub-report of August 18th last:—

"Before concluding, a word on the subject of clearing cost. In body of report are quoted figures of cost in relation to various localities.

"I recognize the risk in stating a price, especially in the absence of any practical experience. It might be explained, however, that what has been quoted is an endeavour to obtain an average rate over the whole parcel dealt with, unless otherwise specified. This would greatly vary in accordance with the manner in which the work was executed. I have tried to base my estimate of cost upon operations as usually followed by the ordinary settler—viz., of cleaning up the open and easier patches of land at his disposal and permit time to work upon his heavier woods (supposedly already slashed or killed).

"Should it be determined to clean up, say 50 square acres forthwith, the cost would certainly exceed my figures. Again, if 'straight-ahead' clearing were to be organized and prosecuted upon a community and large scale, I am of the opinion that they would be largely reduced."

There shall be found many quarter-sections in which, by following the stretches of more or less expansive open land or light tree-growth, it would be possible to clean up acreage under the minimum cost stated, and in many cases practically without.

Natural Water-supply.

Owing to the low altitude of the flanking ridge on the south (the watershed between this and the Nechako Valley), streams are infrequent, the water-supply here being confined practically to Todd Creek, which, after receiving Rabbit Creek, its principal feeder, some two miles within the tract, flows northerly, parallel to the Stuart River, *but in the opposite direction*, in a trough some 60 feet deep.

Numerous small lakes or ponds are scattered about; these, however, could not be counted upon to contribute potable water-supply during the summer months.

The Stuart River bounds the tract on the east, providing a bountiful water-supply of excellent quality (although not always convenient) to the areas adjacent.

Percentage of Dry Quarter-sections.

The distribution of the natural water-supply, as is usually the case, is inadequate to meet the general demands of the entire settlement area.

The first-class land as at present subdivided is composed of quarter--sections or parcels of land to the number of 128. Of this number, seventy-two are without a natural supply of good water, or about 56 per cent., while on fifty-six subdivisions, or 44 per cent., a good water-supply was found.

Wells.

What difficulties may be encountered in the sinking of wells is not known, since, owing to the absence of any settlement on this the west side of Stuart River, no undertaking of this description has been attempted. On the east or Fort St. James side wells have been sunk and water found at varying depths, from 20 to 40 feet.

An amelioration of this situation could, of course, be effected by varying the subdivision so as to distribute the existing supply to the greatest extent possible, since where found, principally Stuart River and Todd Creek, this essential is good and abundant. The lakes and ponds referred to would answer for stock.

Transportation, Group A—30 Miles from Railway.

The Government wagon-road from the Grand Trunk Pacific Railway at Vanderhoof to Fort St. James traverses the length of Group A, being practically twenty-five and thirty-five miles respectively from the former place and railway at its south and northerly boundaries. This road is used by automobiles in the summer and is a fairly good means of communication, subject to the usual disabilities attending country roads during change in seasons. Connection with the railway could be much reduced and still pass through a good line of country at its southerly end.

The crossing of the Stuart River to Fort St. James is at the present time by cable-ferry. A bridge just below the present ferry-site would be a simple affair.

Settlement should be inaugurated in Group A.

Group A, just described, constitutes the most favourable field in which to start settlement. The place within it at which a community point or headquarters should be established is on the present wagon-road at the point on west boundary of Lot 1551, where a bend in Todd Creek crosses and recrosses that line. This combines good water-supply with established line of communication, besides being approximate to several sleigh-roads and trails which traverse this tract in various directions. It is central and some of the most attractive subdivisions in the group surround it.

Cattle and Winter Feed.—Since a small herd of cattle shall be an essential adjunct to the settlers' undertaking, the question of available winter feed, in the beginning at least, is of first importance. Wild hay meadows of any extent in Group A are held under Indian reserve, excepting that in Lot 1656, which lot is already Crown-granted.

The lack of hay meadows here could be effectually met by utilizing temporarily, upon a community basis, the areas of this description in Group B; also the acquisition of Lots 1654 and 1656 may be considered advisable on general grounds.

Lumber—Local Price $35 per 1,000 Feet B.M.

Mill now operating.—A small mill is now established on the north shore of Stuart Lake, about six miles from Fort St. James. This turns out much more material than present needs require, and possibly there may be found cured lumber in stock. The present rate is $35 per 1,000 feet B.M.

Mill-site.—Should it be determined to augment this institution, there is a convenient and reverted Timber Limit 638P, Lot 4932, three miles from river-mouth on north shore of Stuart Lake, which would be available for a mill-site if water and a sheltered nook exists in which to place the plant. This shelter is requisite since this shore of the lake is exposed and shallow.

Stuart Lake Main Timber-supply.

Access to Stuart Lake.—The main timber-supply for not only Group A, but the entire settlement area as proposed, shall come from Stuart Lake, and there is no finer timber in the north than found on its shores. It would therefore seem desirable that access to the lake from within Group A should be secured.

Mouth of Stuart River Best Shelter.—Attention is directed to the alienated area lying to the north and east of Lot 1665, whereby this access would be effected, and what perhaps is of more importance, control over the sheltered waters within the mouth of Stuart River. This question, however, requires more research and expert decision.

Group B, 28,539 Acres.

This group occupies a shallow valley stretching north-easterly from the south end of Stuart Lake for a long distance.

General Description.—The area subdivided includes not only all the good land which lies in a strip some eight miles in length, averaging three miles wide, but extends north and south from this strip up the slopes of the flanking ridges in second- and third-class areas.

Tree-growth.—Evergreen growth in spruce and pine is in greater percentage and heavier than in the lands hitherto described, resulting in greater clearing cost. Open or hay meadows are found to a greater extent, as are also *drainable* muskegs. The general altitude is also greater than in Group A.

Group B suitable for Stock-raising.—In a general way Group B is better adapted for stock-raising than any other of the lands reserved, and beyond the few choice locations in the neighbourhood of Stuart Lake it is likely to be sought for this purpose, combined with a minimum of mixed farming. The whole district lends itself to the production of fine stock, in which, besides the luxuriant natural feed, the presence of a maximum of lime in the water may have something to do.

It is a good horse country, in many instances these run out all winter, but this is not advantageous treatment. A safe estimate would be three and a half months feed for horses and five months for horned stock.

The limited experience so far as practised seems to demonstrate the breeding of local animals with imported bulls to be more successful than the importation of unacclimated beasts —the same with horses.

Classification.—The 28,539 acres contained in Group B have been divided as follows:—

	Acres.
First-class land	13,465
Second-class land	11,752
Third-class land	1,940
Muskeg land	1,382

First-class Land, 13,465 Acres.—The first-class or really good areas of Group B are composed of the same chocolate-coloured silt met with in Group A. There is by no means, however, the same depth of this soil, nor its widespread and consistent excellence. These remarks would not occur only in comparison with such an exceptionally good tract of land as is found in Group A.

In the matter of open land or hay meadows and water-distribution it is better served than either of the other two groups, while the eight sections nearest to Fort St. James offer to immediate settlement inducements quite as attractive.

Hay Meadows.—In the acreage stated for first-class land is included 400 acres of what may be termed wild hay meadow, from a proportion of which hay is now being taken.

It is to this area reference was made in speaking of "winter feed" for settlers in Group A. Where it occurs the covering growth is willow, the removal of which is not costly, so that preparation for even only the wild grasses and their (meadow's) enlargement would guarantee the economical wintering of so much more stock.

Second-class Land, 11,752 Acres.—Second-class land, 11,752 acres, of same character as already described, occurs as the slopes of the adjacent ridges lying north and south are ascended. Owing to the large percentage of evergreen growth, summer feed in places is scant, but at least one-half of this area would be excellent cattle-run.

Third-class Land, 1,940 Acres.—Third-class land, 1,940 acres. This area consists for the most part of rocky tops of the flanking hills, and beyond the (in many cases) good growth of milling-timber are of no value.

Muskeg, 1,382 Acres.—This area is practically contained in one locality, known as the "Grand Muskeg," occupying portions of Lots 4752-4751 and 4725, on the imperceptible height of land between the waters flowing westerly into the east end of Stuart Lake and those into Ocock River on the east, the waters of which, after first flowing into Pinchi Lake, also reach Stuart Lake farther to the north and west. This muskeg is considered "drainable" at reasonable cost, but estimating this cost would require such examination as has not been given.

Lime.—It might here be remarked that, relative to the reclamation and "sweetening" of any such land, the district abounds in limestone, from which an excellent article of lime has been produced, and should be economically procurable.

CLEARING, GROUP B—FIRST-CLASS LAND, $25 PER ACRE.

The clearing cost relates only to the area included under head of first-class lands—viz., 13,465 acres. This has been determined at the average rate of $25 per acre.

Areas near Fort St. James.—The area referred to as "nearest Fort St. James offering inducement to immediate settlement" might be placed somewhat lower, since quite open land is to be found at intervals.

Clearing Second-class Land.—Clearing second-class land is placed at $30 to $35 per acre, and would include a large percentage of good building spruce and pine.

NATURAL WATER-SUPPLY, GROUP B.

A glance at the map indicates that many small streams, all providing a perennial supply of excellent water, flow down from the northerly ridge and meander through the length of the better lands.

Subdivision.—The first-class area, 13,465 acres, consists of eighty-seven quarter-sections or parcels of land.

Percentage of Wet and Dry Parcels.—Of these, fifty-one, or practically 60 per cent., have access to a natural water-supply, while thirty-six or 40 per cent., are without water.

Lakes.—The two lakes that occur in Group B both contain good water.

Wells.—No wells have been sunk in this locality; it is, however, thought that no difficulty will be found in getting water at reasonable depth.

TRANSPORTATION—PRINCIPALLY HAY-ROADS.

As stated, a Government wagon-road connects Fort St. James with the Grand Trunk Pacific Railway at Vanderhoof, a distance of about thirty-eight miles. This same road extends another mile to the Roman Catholic Mission on Stuart Lake. From the "Mission" the Manson Creek (Government) Road is roughly constructed and runs northerly to the northern boundary of tract.

Another road (the old McLeod Lake Trail) starts at Fort St. James and traverses the southerly tier of good sections to the east boundary, and a branch road from this crosses north-easterly and traverses easterly to the same boundary the northerly tier of good lands, so that Group B is already fairly well equipped with lines of communication, such as they are.

These roads have been constructed partly by settlers and to a large degree by the Indians, their principal use being for haying operations (teams and wagons) in the late summer and hauling of hay from the stacks in the winter months, for both of which duties they answer fairly well; during change in seasons, however, they are impassable for wagons.

GROUP C, 9,220 ACRES.

That portion of Group C which was subdivided this season consists of a small portion at its north end of the reserved area lying in the valley of Necoslie Creek, and which may be said to be the inferior portion of this large and excellent tract of land. This inferiority relates particularly to those parcels lying on the southern slopes of the dividing ridge between this and Group B and to the north of the strip of pre-empted lands. It is in this locality that the second-class land noted below occurs. To the south of the pre-empted areas are excellent lands, quite ready for immediate *further* settlement.

A report will follow, made upon the subject of pre-emption improvements in this locality, in which it will be shown that these have been carried on to a considerable extent.

Classification.—Group C has been divided into two classes only, first- and second-class lands, viz.:—

	Acres.
First-class land	7,140
Second-class land	2,680

First-class Land.—The first-class land is of same composition as in Group A, and similar conditions as to depth and consistent grade prevail; generally speaking, however, the clearing is somewhat heavier.

Necoslie Water-flow.—The Necoslie River is a stream of dimension in flood, being from 75 to 100 feet wide and probably reaching a depth of 3 feet, which conditions are changed, however, in autumn to a small run of water forming pools between shallow ripples; abundant water, however, for all needs.

Necoslie Trough.—The stream itself is tortuous, winding across the intervening flats from foot to foot. These flats are open to a large extent, or except where covered with a light growth of poplar and willow. These locations offer opportunities for a small start with little preparation.

The foregoing remarks relate to the first ten miles of the stream, practically to the point where it traverses the north-east corner of the "allotted areas," beyond or to the south of which, through the reserved lands, the river flows closer to the surface of the adjacent ground.

Second-class Land, 2,680 Acres.—As stated, the second-class land, 2,680 acres, occupies almost entirely the northerly end of Group C, and not more than 60 per cent. of this area could be counted of much use for grazing purposes. The fine growth of timber found here, however, will be valuable.

Meadows and Muskegs.—The extent of this class of lands is negligible; that is to say, no extent of either is found in one place.

CLEARING, GROUP C—FIRST-CLASS LAND, $24 PER ACRE.

The tree-growth over Group C may be termed patchy, in so far that, although the mixed timber—poplar, spruce, and pine—prevails, all three are found in distinctly separate and unified groves, but, as in Group A, without change in the supporting soil. The cost of clearing the first-class land, 7,140 acres, has been estimated at $24 per acre, and this rate may be considered on the high side.

NATURAL WATER-SUPPLY, GROUP C.

Outside the Necoslie itself the water-supply is poor. Group C as subdivided consists of forty-five subdivisions, of which twenty-seven, or 60 per cent., are supplied with water, while on eighteen, or 40 per cent., no water was found.

TRANSPORTATION, GROUP C—POOR.

An ill-made or simply "swamped-out" road over which teams may be taken in summer extends through the length of the pre-empted lands as shown. This road starts at Fort St. James and dwindles into a trail ten miles out.

CLIMATE.

Judging from the experience of people who have lived in this locality, the climate is healthful and invigorating. The summers are not excessively hot and showers are frequent up to the middle of August; the autumn is usually dry. Extreme winters last five months; sometimes only four, November to March. Low thermometer is never accompanied with wind. Blizzards, as also floods and droughts, are unknown.

Very cold snaps (— 30° to — 40°) occur each winter; these vary, but are usually of short duration, or three days. The average winter thermometer is around zero.

Precipitation.—The Dominion Meteorological Department has a station at Fort St. James under the direction of Mr. O. W. Murrey. From this source the average rain and snow fall for the past twenty years has been determined as 15.35 water-inches per annum.

ELEVATION—STUART LAKE, 2,200 FEET ABOVE SEA.

The elevations relative to each other and to Stuart Lake were determined throughout the three groups. Obtaining this information was incorporated with other survey-work, so that contours could be available for a topographical plan. These results have not yet been deduced, but it may be stated that, taking Stuart Lake to be 2,200 feet above the sea-level, the first-class land will be found to lie approximately as follows:—

Group A	2,200 to 2,430 feet above sea-level.
Group B.	2,250 to 2,500 feet above sea-level.
Group C	2,175 to 2,300 feet above sea-level.

WORK OF SURVEY.

It is not proposed to more than touch upon this subject at the present time, since the data obtained has not been fully made up, but to delay that report until such time as full returns shall have been completed.

Employees.—Two surveying parties were engaged; two surveyors and one assistant with eight returned soldiers and a cook left from Victoria in July last. This force was augmented on the ground, as the purposes of the work demanded, by engaging Indians and later another returned man.

Standard of Old Surveying-work.—The standard of the previous surveying applied to the original sectional subdivision was found to be excellent. The limit of error established for the subdivision survey having in no case been approached—in fact, excepting in the case of a few intersections, the joining error or difference, both in the cross-chaining and distance off old post, was negligible. The markings on old posts were scrutinized. In one case only was a correction made.

A detail report upon this and other matters pertaining to and resulting from the conduct of the work will be submitted.

SOIL SAMPLES.

Some twenty-four samples of soil were obtained from different points over the three groups. These samples were boxed to be forwarded the week after my departure from Fort St. James, but this has not been done. Word was received some ten days ago that they had been traced and were on their way. These with diagrams will be submitted whenever received.

TOTAL LANDS RESERVED, ONE-HALF SUBDIVIDED.

Area of Reserved Lands not subdivided.—The area subdivided is about one-half that covered by the instructions, which governed the work last season. The remaining area contains all the lands on east side of Stuart River, back to and across the Necoslie River, practically to its head. Speaking from a knowledge of this tract, it may be said it will be found to compare favourably, for the most part, with Group A.

In this connection it might be remarked at the present time that in the matter of transportation it should not be overlooked that the Stuart River offers an excellent and alternative line of communication direct with the Grand Trunk Pacific Railway, not only passing through these unsubdivided areas to the south-east, but as a probably more economical means of handling freight in the summer months to Groups A, B, and C.

Distance by Stuart River to G.T.P. Rly.—The distance by river from the present Stuart River ferry to the railway is sixty-seven miles, forty-two of which is good water. The lower river is swift, one rapid, and has been improved for navigation by the Dominion Government. There is no impediment that boats up to 25 tons, properly equipped, could not successfully and regularly negotiate during six months in the year.

Cross-road from Lot 2785 to Railway.—An excellent "cross-country" line for wagon-road connection with the railway (G.T.P.) exists from a point on west bank of Stuart River in Lots 2785 or 2786. Such a road would reach the railway at Vanderhoof in thirteen or fourteen miles, and strike the lower reserved lands at a half-way point on Stuart River, with an excellent slow-flowing stream on either side (up and down river), besides tapping to the east a natural ascending grade to the back lands.

EXPERT REPORT ON STUART RIVER VALLEY.

The following synopsis, in part, of a report based upon screenings and analyses of soil samples, made a few years ago by a land expert, Mr. Woods, as emphasizing the merits of this tract of country as a favourable field for settlement, may be interesting. He says in his report:—

"*Area.*—102,000 acres.

"*Location.*—In Central British Columbia, near the Grand Trunk Pacific Railway, at the foot of Stuart Lake and along the Stuart River for about forty miles.

"*Stuart Lake Basin.*—An old glacial lake, probably 200 miles long, with numerous arms and variable width—probably 100 to 200 feet deeper than the present lake and containing numerous islands which are now hills.

"*Now partly drained* down to the present lake, the 'pot-holes' of the old glacial lake.

"*The Silt Area.*—All the space between the present lake-rim and the old basin-rim.

"*The Lake-bed Soils.*—The humus: 1 to 3 inches of black vegetable mould.

"The 'white silt': 1 to 3 inches of volcanic dust.

"The 'chocolate loam': 4 to 12 feet of volcanic dust, formed as lake sediment in successive layers from 2 to 12 inches thick, with marine grass-roots and a large content of organic matter in each layer.

"The 'deep silt': A great deposit of fine volcanic dust underlying the chocolate loam to an unknown depth, but observed in the cut-banks of the river to a depth of 60 and 80 feet.

"'The finer the richer': The rule for all soils. (Fletcher on 'Soils,' page 25.)

"Silt and clay particles: These constitute the richness and durability of all soils.

"*Percentages of Silt and Clay in Different Soils.*—(8,671 samples analysed by United States Department of Agriculture from United States soils.) Of the many given, three highest are quoted:—

	Per Cent.
Clay soils	78
Silt loams	80
Silty clay loams	86

"*Stuart Lake Soils analysed*—

Stuart Lake and River 'white silt'	86.3
Stuart Lake and River 'chocolate loam'	86.8

"They are easy to work, are mellow when ploughed, and can be ploughed at any time.

"*Organic Matter in Various Soils.*—Of the many percentages given in Mr. Woods's report, a few of the higher and the highest are quoted here:—

	Per Cent.
Average soils, the average of many	2.30
North-eastern States (highest for average soils)	3.73
Average for rich silt soils	5.30
Yasoo bottom silt (Miss.)	7.37
Putah Valley dark loam (Cal.)	7.12
Arroyo Grande Valley dark loam (Cal.)	6.23

"The Yasoo bottom and the Arroyo Grande soils, mentioned above, are considered to be among the 'richest known soils.'

"*Organic Matter in Stuart Lake and River Soils*—

	Per Cent.
Stuart Lake and River 'white silt'	6.59
Stuart Lake and River 'chocolate loam'	6.72

"NOTE.—All of the above samples for organic matter undoubtedly include a portion of the top humus soil, except the samples of the Stuart Lake and River soils, which do not include any of the humus."

Speaking at length in respect to plant-foods and nitrogen especially, the report sums up:—

"With a top humus and over 6 per cent. of organic matter in its main soil and subsoil bodies, the Stuart Lake and River sediments are sure of surplus nitrogen-supply for an indefinite period."

On the question of moisture Mr. Woods has to say:—

"When at any time the amount of rainfall entering a soil becomes greater than the water-holding capacity of the soil, losses by percolation will result. The bad effects of excessive percolation are twofold: (1) The actual loss of water; and (2) the leaching-out of salts that may function as plant-food. The quantity of nutrient elements lost annually from the average soil in a humid region more than equals that withdrawn by the crops.

"*Unsurpassed Qualities of the Stuart Lake and River Sediment Soils.*—First: The finest texture couples with easy tillage.

"Second: A large excess in mineral plant-foods, as shown by all the analyses of silt soils.

"Third: An organic content in excess of the richest silt soils and far in excess of average soils. No other soils known to the writer or mentioned in the many soil authorities consulted so fully combines *richness, durability, and mellowness for easy working* and for the *conservation of moisture.*

"This could only occur, as in this case, where a wind-carried volcanic dust has been deposited in water and remained undisturbed under water until it accumulated a large organic content. Water-carried soils (alluvial soils) cannot preserve all of these qualities.

"In a word, these lake-bed sediments take the highest rank for fineness and durability, for ease of working, and for range of crop and capacity.

"*Conservation of Moisture and Soil Strength.*—The smallness of the rainfall at Stuart Lake and River (15.35 inches) is more apparent than real. The snow melts in March and April, about 13 inches enter the ground from March 1st to September 1st, during the period of growth and maturity, *and it is all utilized.* There is practically no 'run-off' and no sinking beyond the reach

of crops. The soil is porous enough to let it soak in, but fine enough to hold it by capillary force, without its sinking away as in sandy soils. Further, there is no leaching or flooding away of plant-food elements. Heavy rainfall hinders agriculture and wears out the soil by washing out its values.

"'Enough but not much' describes the Stuart Lake and River precipitation.

"In 'Soils,' by Lyon Fippin & Buckman, page 271, it is stated that of a 28-inch rainfall, one-half runs off, one-fourth evaporates, and one-fourth is used by the crop.

"*Clearing Land.*—Timber of fence-pole size; slashing and burning (by hand), $5 to $12 per acre; grubbing, $5 to $10 per acre. Eighty per cent. of the land could be cleared, grubbed, and ploughed in a single operation by a simple machine of proper size at less than $5 per acre."

I have, etc.,

J. H. GRAY, M.E.I.C., B.C.L.S.

PHOTO-TOPOGRAPHICAL SURVEY, OKANAGAN VALLEY, SIMILKAMEEN DISTRICT.

BY R. D. MCCAW.

November 29th, 1918.

J. E. Umbach, Esq.,
Surveyor-General, Victoria, B.C.

SIR,—In accordance with your instructions, the photo-topographical survey of the Okanagan Valley has been extended southerly on the east side of the Okanagan River from Penticton to the International Boundary, and I submit the following report upon the field operations carried on in this connection during the past season:—

The instruments used were practically the same as those used in 1917, the two cameras and one small transit having been loaned again by J. J. McArthur, Boundary Commissioner of the Dominion Astronomical Observatory, Ottawa. Cramer's slow isochromatic plates were used in photography, some 35 dozen being necessary to cover the area. For triangulation the same instrument of previous years was used, with circle graduations reading to 20 inches. The triangulation was carried south to the International Boundary from stations of previous years, six new primary stations being used, two of which have been located by the Geological Survey of Canada. As a large area was to be covered in a short season, the triangulation-work lacks some readings which I desired to have from 1914 stations, but time would not permit of occupation of these. However, sufficient readings were taken to give complete connection between the various triangles. Connections were made in several instances to monuments on land-survey lines.

Actual field-work extended over a period of a little more than two months, photographic work and triangulations being run simultaneously as in previous years. Two camera parties operated every day that it was possible.

SEASON'S OPERATIONS.

My assistant, T. Rognass, left here on August 8th, collected the camp outfit at Vernon, and made some of the preliminary arrangements at Penticton. He also commenced the erection of signals for future instrumental stations on the west side of the Okanagan River Valley. I joined him on August 15th and completed arrangements for the season. Signals were then erected to continue the triangulation to the International Boundary. The new primary stations consist of two Geological Survey stations—one south of Ellis Creek, the other on Apex Mountain south of Keremeos Creek; also Mount Kobau, Baldy Mountain, Incameep Reserve, and Osoyoos Lake (for boundary tie). Signals were still standing on the Geological Survey stations, so no preliminary trips to these were necessary. The other stations are new and trips were made to Baldy Mountain and Mount Kobau for the purpose of erecting signals before leaving Penticton. Baldy Mountain, on the east watershed and some eleven miles north of the International Boundary, was not difficult to reach, but the distance was considerable, the return trip covering ninety miles. Mount Kobau, on the west watershed, was reached from the main road along the river after a climb of about 5,000 feet. In order to facilitate this preliminary work, a motor-car was made use of

for transportation and thus delays from moving camp were eliminated. In addition to the erection of signals, several camera stations were occupied in close proximity to the Okanagan River.

On August 22nd a camp was located at the Penticton Municipal Reservoir on the South Branch of Ellis Creek. This reservoir is about sixteen miles from Penticton by wagon-road and pack-trail. The Carmi Wagon-road extends easterly from Penticton for a distance of about ten miles, the grade ending at the North Fork of Ellis Creek. A good pack-trail continues easterly towards Carmi, while a branch trail leaving this leads to the reservoir and eventually to Shuttleworth Creek. Penticton has two reservoirs in this locality, a small storage-site lying to the west of the main reservoir. The small reservoir has a very small watershed. Generally the character of the country in the locality is broken and a good number of camera stations were required. While at this camp the Geological Survey station south of Ellis Creek was occupied. The position of this is on a timbered ridge and a great deal of clearing was necessary before sights to other stations could be taken. The timber-growth in this vicinity is usually jack-pine, with spruce and balsam in the higher elevations. The entire area south of the upper part of Ellis Creek and extending to the Shuttleworth Creek Divide has been the scene of fires in years gone by. Much of the country is covered with a tangle of windfalls, which on steep slopes makes travelling hazardous. Intermingled with this is a growth of small jack-pine and spruce. That portion in the vicinity of the east boundary of Lot 2710 between Miles 16 and 20 is the worst area of windfalls I have found in the Okanagan Valley. A great deal of standing dry timber exists over the area as well.

Shuttleworth Creek was the next base of operations. This stream is fed mainly by swampy meadows, with a few small lakes. The North Fork is a small stream flowing from a lake in Sub-lot 16. A dam has been built to create a storage-site here, but the intended reservoir has not been filled. The upper part of the main stream flows through a gently falling valley with non-precipitous sides. The lower part of the creek flows through a deep canyon until the benches of the Okanagan River Valley are reached. The junction with the last-named stream occurs about half a mile south of Dog Lake. The Ellis Creek pack-trail extends towards Shuttleworth Creek, and thence easterly and northerly to the reservoir-site meantioned as being on Sub-lot 16. A poor trail extends westerly along the north side of the creek to the wagon-road at Shuttleworth's ranch. The north slope of the upper part of the creek is almost devoid of windfalls, the growth consisting of open jack-pine usually. The south slope is generally covered with a small growth, with windfalls, running into spruce and balsam, to the east. A very good pack-trail was found paralleling the east boundary of Lot 3639 and a little to the west of this limit. I believe it extends from Wilkinson Creek to McIntyre Creek (Sawmill Creek).

From a camp near the mouth of Shuttleworth Creek stations were occupied east and west of the Okanagan River and in the vicinity of McLean Creek. This latter stream is but a small one heading between Ellis and Shuttleworth Creeks, the outlet into Dog Lake being almost opposite Kaleden. Smoke from forest fires gave a poor atmospheric condition at this period and distance was difficult to photograph. The main valley from Dog Lake south is much broken by small isolated hills separated by narrow and sometimes fairly wide valleys. As a rule these hills have one or more precipitous sides, and near the mouth of McIntyre Creek this particular feature seems to reach the climax. McIntyre Bluff, west of the Okanagan River, is a well-known feature. It drops sheer for about 500 feet, with rock-slides at the river's edge.

McIntyre Creek (Sawmill Creek) is the largest tributary to the Okanagan River south of Dog Lake. The drainage area is large, five branches contributing a large volume of water to the main stream in the spring and early summer. The main stream for six miles back has a rapid fall over a bed of clean-washed boulders. At about two miles back a perpendicular canyon is entered, the sides being between 200 and 300 feet high. The tendency of all slopes on the lower part of the creek is to be very steep, and mud-slides are not uncommon along the bottom. The system is fed by meadows and small lakes, the greater part of the water coming from a mountain-mass to the north-east and from Baldy Mountain. The upper watershed is generally well timbered with the usual jack-pine, spruce, and balsam. In lower elevations southern exposures show some grassy slopes, and the north slope of the lower portion is an extremely steep grass slope, so steep that stock does not take readily to it, although a luxuriant growth of bunch-grass covers it. A forest fire in 1917 damaged a large portion of the timber-growth on the lower six miles. Owing to the steep slopes there is no good trail on the lower part of McIntyre Creek. A fair trail

extends from Shuttleworth Creek across the North Fork of McIntyre Creek, and then follows the north side of the main stream easterly towards the Kettle River. A trail from Incameep Creek joins this near the North Fork of McIntyre Creek.

From a main camp at the Fairview Bridge the balance of the south end of the work was completed. A week of fine clear weather from September 21st enabled us to do numerous stations along the main valley in the vicinity of Incameep Indian Reservation and Fairview. A primary station (Mount Kobau) was occupied during this week. From this mountain a splendid view was obtained in all directions and many signals read. Rain set in about the 28th, and from that date until we finished wet weather hindered us a great deal. In addition, the atmosphere became very smoky again, and this condition continued for over a week. A fly camp was taken up the Camp McKinney Road for the purpose of occupying Baldy Mountain as a primary station. Rain and smoke made the occupation of this station tedious and we were delayed some three or four days. The right-of-way of the West Kootenay Power and Light Company passes over the south end of the Baldy Mountain Ridge and about four or five miles south of the summit. Active clearing operations were going on in this locality, the right-of-way having been already cleared from the Kettle River to the Kettle Valley-Okanagan Divide.

Incameep Creek and Wolf Creek form the source of water-supply for irrigation in the Incameep Indian Reservation. The former is the larger and has its source on the east watershed. The drainage area which embraces part of Baldy Mountain is well timbered, tamarack being much in evidence. The old freight-road leading from the main valley to Camp McKinney ascends through the Incameep Basin and connects with the Kettle River Valley. The West Kootenay Power and Light Company is improving the grade of this road and widening the clearing. At the lower end near Okanagan River a portion of the old road is almost impassable on account of sand-hills. To overcome this obstacle a deviation was made and a good grade is being constructed.

On October 9th the primary triangulation was extended to the International Boundary and connection made to Post 117. Two camera stations were occupied west of Osoyoos Lake to complete photographic work in this locality. Camp was then moved to Penticton and several triangulation and camera stations completed in that vicinity. The party was paid off on the 14th, with the exception of one man whom I retained to accompany me to Apex Mountain and up Ellis Creek to make a tie to the east boundary of Lot 2710. Apex Mountain (about 7,300 feet in elevation), as I mentioned previously, is a primary triangulation station south of Keremeos Creek. Readings were taken from this station to all primary signals visible. A branch road running southerly from the old freight-road along Keremeos Creek took us to an old mining property near the top of the mountain. The balance of the trip was over open slopes. Three days were occupied in the trip to Apex Mountain and return to Penticton. Bad weather with snow followed us up Ellis Creek, and the existing windfall conditions on steep slopes made it impossible to get the connection desired. However, a tie was made to Sub-lot 4, which had been connected with Mile-post 18 on the east boundary of Lot 2710. This concluded the field-work, and according to your instructions the camp outfit was stored at Penticton.

For transport, pack-horses were hired for the season, while a motor car or truck was hired when necessary along the main road. The following gives the number of stations occupied:—

Primary triangulation stations	5
Secondary triangulation stations	4
Photographic stations	54
Separate camera stations	104

GENERAL.

The past season was rather exceptional for the Okanagan Valley, in that there was a great deal of rain during July and August. The early part of the summer was dry and the atmosphere was clouded with smoke from forest fires. The rains following cleared up this condition and the growth became green and luxuriant down to the bottom of the valley. This in the middle of August is not the rule for wild growth in the Dry Belt. Another hot, dry period followed from about August 20th to the end of September and the grass was soon dried up again. Forest fires became numerous, causing smoky atmospheric conditions, very detrimental to good photographic work. The fall rains commenced the last week in September and wet weather followed us to the completion of the work.

The area covered this year is more or less a grazing country and the lower hills seem to be well stocked. Small areas of orchard lands are seen around Dog Lake, but from Vaseaux Lake south very little cultivation is done other than a few hay-fields. A large area of the present sage and grease-wood covered country could be brought under cultivation with an efficient irrigation system.

Very little game was seen, although there seems to be plenty of deer. Sheep may be seen between Ellis and McLean Creeks. Bears seem to keep away back and are almost altogether black, although the Indians say there are some grizzlies near Baldy Mountain. Grouse were plentiful. It would hardly be fair to leave out the rattlesnake. These reptiles are very numerous in the lower elevation; fifteen were killed by members of the party during the season.

Map-work is now being proceeded with, the area covered being about 350 square miles. As a direct tie now exists between the Armstrong Astronomical Station and the International Boundary, the geographic positions may now be revised and the triangulations corrected for the first time. The final photographic work is all being done here this year in the new dark room of the Survey Branch. This includes photographic enlargements from the negatives, which previously have been made in Ottawa.

I have, etc.,
R. D. McCAW, B.C.L.S.

SURVEY OF THE BOUNDARY BETWEEN THE PROVINCES OF ALBERTA AND BRITISH COLUMBIA.

BY ARTHUR O. WHEELER.

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SIR,—During the season of 1918 the survey of the Interprovincial Boundary was carried on by the two divisions heretofore engaged upon the work—viz., that of R. W. Cautley, D.L.S., Commissioner for the Dominion and for Alberta, having in charge the survey of the watershed across the passes of the main divide of the Rocky Mountains and the construction of monuments to mark the same, and that of A. O. Wheeler, B.C.L.S., Commissioner for British Columbia, in charge of the photo-topographical delineation of the watershed between the passes and the mapping of the country adjacent thereto.

INSTRUCTIONS.

It was found necessary for the time being to detach Mr. Cautley's division from the survey of the passes and apply it to the survey of a portion of the 120th meridian in the vicinity of Swan Lake, in the Peace River District, where the said meridian was the dividing line between the two Provinces, owing to the fact that considerable settlement had taken place in that portion of the district.

The topographical division was instructed to continue the survey of the watershed northerly from the point in the vicinity of Howse Pass where it had been discontinued the previous season.

SURVEY OPERATIONS.

Acting under instructions from the Surveyor-General of Dominion Lands, Mr. Cautley proceeded with his party to Pouce Coupe, where the exact longitude had been established by Mr. McDiarmid, D.L.S., the previous year.

In accordance with his instructions, Mr. Cautley established a concrete monument at the nearest suitable point to the intersection of his connecting line with the 120th meridian, said point being 3.334 chains north of the said intersection, and then ran the boundary south. By the end of the season he had succeeded in establishing a little over eighteen miles of the boundary, the last monument erected being No. 74-8, which is a few chains south of the north boundary of Township 74 and about one mile and a half south of the Grande Prairie and Fort St. John Wagon-road and the Government Telegraph Line.

Owing to failure on the part of the contractors for the brass plates required to mark the monuments either to manufacture and forward the plates as agreed or to inform the Department

that they had not done so, he had no plates available for the work until the 16th September and was unable to build any monuments until after that date. Twenty-one concrete monuments were built in all during the season. In accordance with the decision of the Commission the monuments were marked with the number of the township of the Dominion lands system in which they occur, followed by the number of the particular monument in order from the south boundary of the township. Thus the first monument built north of the south boundary of Township 77 is marked 77-1, and so on.

Surveys were made to connect the survey of the boundary with the north boundaries of Townships 75, 76, and 77 respectively, and the strip of land between the boundary as established by Mr. Cautley and the one formerly surveyed to the west of it was found to be 18.304 chains on the north boundary of Township 76 and 18.227 chains on the north boundary of Township 75. Under instructions, Mr. Cautley ran levels and check-levels from B.M. 9, being 180 feet east and 10 feet south of the north-east corner of Section 36, Township 76, Range 14, to the intersection of the boundary with the north boundary of Township 76, from which point he ran levels and check-levels to monument 78-1 at the northerly extremity of the completed line, and afterwards, from the same point he ran a single line of levels south to monument 75-1, and from thence along the Grande Prairie Wagon-road westerly to T.B.M. 156.

CHARACTER OF COUNTRY SURVEYED.

Mr. Cautley states that along the north boundary of Township 77 from Pouce Coupe to the 120th meridian the line crosses two main ridges lying north and south, with approximate altitudes of 2,690 and 2,630 feet respectively, both being over 600 feet above the crossing of Pouce Coupe River; the soil is good and the surface is covered with thick poplar woods.

Through Townships 77, 76, and 75 the boundary runs in a hilly, timbered country, intersected by four high, flat-topped ridges from 150 to 600 feet above the intervening valleys. Most of the land in the valleys is suitable for homesteads and the soil is a rich loam that has been somewhat badly burned by forest fires in some places. Owing, however, to the generally hilly nature of the country and to the fact that the valleys are comparatively narrow and broken by small muskegs, the country is more suitable for stock-grazing than for farming at the present time. The surface can easily be cleared of its comparatively worthless timber by fire, and will then bear a heavy growth of wild grasses, peavine, and wild vetch, so that it will be possible to put up winter feed; this is essential, since he was given to understand by various stockmen of the district that the snowfall is heavy, and that it is necessary to feed stock from four and a half to five months, although horses have been known to winter out on the range. He saw some very fine hay lands along Tate Creek and the Pouce Coupe River which, he was told, had been covered with poplar and only burned for the first time four years ago. It is quite possible to burn such small timber as exists without injuring the soil if fires are set only when the soil is full of frozen moisture; at the same time nothing can be more disastrous to the future of the country than setting fires indiscriminately. Some of the land along the boundary has evidently been burned in the summer, so that every particle of humus has been burned out of the soil, and what was excellent land before the fire is rendered so worthless that it will take, perhaps, 100 years before the damage can be repaired by nature.

The whole country-side seems to be underlain by some porous form of substrata, if one can judge from the small and uncertain flow of the creeks, which does not seem to be in proportion to the watershed areas drained or the average precipitation. The Pouce Coupe River itself, which is the main drainage-channel of the district, carried a very small quantity of water towards the end of September, and several of the smaller creeks had dried up altogether.

SWAN LAKE.

Swan Lake was passed in Township 75 and is a pretty lake three miles long in a north-and-south direction. Former maps show the boundary to pass right through the lake, but it was found only to cut off a very small part from a little bay in the extreme north-east corner of the lake, although it follows the easterly shore for almost its entire length. Four permanent creeks empty into the lake, three small ones on its east side and a large one—named Tupper Creek on some of the published maps—from the south-west; at the north-west corner the lake empties into the South Branch of the Pouce Coupe River, which seems to carry about an equal volume of water as the East Branch crossed by the boundary.

GAME AND FISH.

Swan Lake is shallow and weedy along the shore and one of the finest water-fowl lakes for its size Mr. Cautley had ever seen; thousands of mallards and other good ducks breed there in summer, while geese were frequently seen, and swans were also reported. At the same time there must be deep water somewhere in the lake because whitefish are caught in it. Moose and bear were frequently seen on the line during September, and there are some mule-deer in the country.

DURATION OF WORK.

Mr. Cautley left Edmonton for Grande Prairie with four men on June 13th. He had tried to obtain all the seven men that he required ever since May 27th, but without success. A number of men came to see him in answer to advertisements, but wages were so abnormally high that even the excellent wages which he was enabled to offer were not sufficient inducement.

On October 7th he closed work and left for Grande Prairie, where he arrived on the 10th, when his party was paid off.

Mr. Cautley states that the party he had this year was not large enough to enable him to make progress satisfactory either to the Governments or to himself, and that owing to the scarcity of men it would have been impossible to get together a larger party in any case, but that now that the war is over it seems probable that there will be a number of suitable returned men whom the Governments will be anxious to employ next season.

TOPOGRAPHICAL DIVISION.

The topographical division, under Mr. Wheeler, organized at Banff and left that place for Field on June 25th. Travelling from Field to Howse Pass by way of the Amiskwi and Blaeberry Valleys, work was commenced on July 4th and the country west of Mount Conway covered, two stations on the watershed being occupied.

BUSH PASS.

Work was next carried to the Bush Pass and data obtained to enable the country lying along the watershed between that pass and Howse Pass to be mapped. The survey was also extended northward from the pass as far as the mountains surrounding permitted.

The summit of Bush Pass is a ledge of rock rising on the eastern side 500 feet or more above the valley-floor in a somewhat precipitous wall; it is inaccessible for horses. On the western side the ridge falls steeply 1,500 to 2,000 feet to the valley of a stream tributary to the Bush River. The gap of the pass at the summit is not more than half a mile wide between the mountain heights enclosing it. Owing to the pass being inaccessible for horses, all the work on the western side had to be done by back-packing in a very difficult and thickly wooded area.

HOWSE RIVER AND GLACIER LAKE.

On August 15th camp was moved to the mouth of Conway Creek, flowing northerly from Howse Pass to Howse River (Middle Branch of the Saskatchewan), and a peak, tentatively named Mount David, directly across Howse River occupied. Owing to bad weather two ascents of this peak had to be made before the required information could be obtained.

The party now moved down Howse River and established a camp at the head of the valley in which lies Glacier Lake. Glacier Lake is a fine body of water about three miles long by half a mile to a mile wide. It lies in a valley on the northern side of Mount Forbes and has its source of supply from a magnificent cirque of glaciers descending from the Mount Forbes, Mount Victor, and Mount Lyall groups of peaks and their incumbent ice-fields.

Two stations on the watershed were occupied, but owing to the wide ice-fields that had to be crossed it was found impossible to carry the work beyond it on the British Columbia side. All that could be done here was completed on September 2nd and the party then moved back to Howse River.

On September 4th Mount Sarbach, at the junction of Howse and Mistaya Rivers, was occupied, and on the 5th a move made for the Alexandra River (West Branch of the Saskatchewan) via Howse River and the Saskatchewan (North Saskatchewan). After three days' travel, for much of the distance over wide gravel flats intersected by numerous river-channels, camp was pitched directly at the summit of Thompson Pass.

THOMPSON PASS.

Thompson Pass Summit is a very picturesque spot, abounding in alpine meadow land interspersed with groves of spruce and balsam, and having two exquisitely coloured lakelets on the eastern approach and a small pond on the western. The gap is narrow, not much exceeding half a mile in width between the rock walls enclosing it. On either hand rises a sharp spire-like peak, that on the southern side having been named by Sir James Outram "The Watchman."

While there is a steep ascent both east and west of the summit, the approaches are not prohibitive to the construction of a road, and the central position of the pass and its distance from Howse Pass may in the future render it valuable for such a purpose as a means of communication with Bush River and the Columbia River on the western side.

Directly north of the pass rise the towering heights of Mount Bryce to close on 12,000 feet above sea-level, and northwards, beyond, lies the wide expanse of the great Columbia ice-field, with Mount Columbia rising a huge landmark from its western border. The ice-field sends out broad glacial streams in all directions—Saskatchewan Glacier, Athabaska Glacier, Dome Glacier, Columbia Glacier, and several others still unnamed. The area is collectively that of the highest peaks of the main range and is superbly picturesque in its varied features of towering rock, snow, and ice.

Beyond the watershed a path through the forest was cut for a distance of six miles down the valley of a tributary of Bush River, and two stations were occupied on the British Columbia side.

ALEXANDRA RIVER.

By September 15th all that could be done in the vicinity had been accomplished, and the party moved down the Alexandra River, occupying two stations on the northern side of the valley on the way out.

Alexandra River, like the Saskatchewan, has large stretches of gravel flat, with numerous intersecting river-channels flowing in many directions. It heads in a glacier from the Columbian ice-field, and some two or three miles from its source a branch valley leads westerly over the Thompson Pass. At the mouth are broad marshy meadows.

CLOSE OF THE SURVEY.

On September 20th the party started for Lake Louise via Mistaya River and Bow Pass, being almost completely out of provisions. On the way out Observation Peak, at the summit of Bow Pass, was occupied to tie in the work with that of the previous season. The party was paid off on September 26th.

GAME AND FISH.

Rocky Mountain goat are seen high up on the peaks and are numerous. The tracks of elk and smaller deer are plentiful in the valleys, but the animals are wild and were seldom seen. Grizzly and brown bears were occasionally seen. The woods are full of grouse and ptarmigan frequent the alpine tracts above timber-line.

Fish are found in the Amiskwi and Blaeberry Rivers, but were not seen elsewhere and do not appear to inhabit waters so near the ice-fields.

SUMMARY.

As a whole, the season has been fairly satisfactory. The country is very difficult of approach and much trail-cutting had to be done, a time-taking process for a party not equipped for that class of work. On the British Columbia side there are no existing facilities for approach to the watershed in the way of trails, and all had to be made, while wide ice-fields rendered the reaching of the watershed a matter of much difficulty and labour in most cases.

The latter part of July and the whole of August the weather was very bad for photographic surveying, which further added to the difficulties. September, on the other hand, was almost entirely fine, and not a day was lost except for the sheer necessity for an occasional rest from continuous climbing.

Taken altogether, the work is complete except in one part—viz., the basin at the head of Lyell Creek, which can be reached by going over the Thompson Pass and so carving a path to the valley of the main Bush River; or else by going down the Columbia River and up Bush River

from the mouth, an undertaking that would be out of the question, as it would require the best part of one season and be very expensive for so small a part.

Apart from natural difficulties, the unrest of war-time made labour a very uncertain proposition and the best of the kind required could not be had. I consider it a cause for congratulation that, all detriments considered, the work has been fairly satisfactory and has covered a very difficult section of the general area to be surveyed.

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