RECONNAISSANCE

between

QUESNEL & BARKERVILLE

by

W.W. Stevens

1923

Maps accompanying report:-

1 Type map, scale 3 miles to inch,
-bound with report.

Forest Surveys # 611-6
(Refers also to # 209)
Correspondence #: 045685
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TIMBER REPORT.

The reconnaissance of the area to the East of the town of Quesnel was started July 18th 1923 and discontinued the twelfth of August. With the exception of large burned over areas, the entire district, completed so far, is well timbered to an altitude of from 4500 to 5000 feet above sea level.

The timber boundary or timber line was sketched in from outstanding points that furnished good outlooks over the surrounding country. The two point and three point systems were used to advantage in triangulation work for determining timber and fire ravaged areas. Sample plots were cruised on strips and at every possible occasion in the journey, from point to point. From these sample plots, which were fairly uniform, the average stand of timber per acre and the percentage of the different species in the timbered stand was determined. The G.P.R. volume tables were used in working up the estimate and the merchantable height of trees was checked by the use of the clinometer and the measurement of fallen trees.

LOCATION.

The area reported on is located to the East of the town of Quesnel; the reconnaissance was only partially completed; this report deals with portions of the Cottonwood
River, including part of Lightning Creek as far East as Beaver Pass Creek, Swift River and its branches, Victoria creek, Ahabau Lake and Ahabau Creek; and the headwaters of the Willow River.

The location of the area, completed to date, is marked on the appendix map.

**AREA.**

The area covered contains 408,460 acres, divided as follows:

<table>
<thead>
<tr>
<th>Description</th>
<th>Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vacant Crown Land</td>
<td>359,220</td>
</tr>
<tr>
<td>Timber leases C.G.'s &amp; P.R.'s.</td>
<td>58,240</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>408,460</strong></td>
</tr>
</tbody>
</table>

**GENERAL TOPOGRAPHY AND DRAINAGE.**

Lightning Creek rises in the low mountains to the south of Barkerville and flows west to unite with Swift River near Cottonwood House. Thence the united streams flow into the Fraser under the name of Cottonwood River. A high range of hills borders the North bank of Quesnel River. East of Quesnel town and north of the Quesnel River, the land consists of rolling hills whose summits rise with the general elevation until we reach the foothills of the snow-clad Rockies to the east of Barkerville.

This is a rolling land. West of Ahabau Lake the plateau land consists of long, low, swelling ridges, timber
clad. To the east the hills rise higher, the slopes are steeper and the timber of poorer quality. The plateau west of Ahbau Lake is entirely below timber line. East of the Willow River the summits rise higher and higher while the general elevations increases with the height of the hills and merchantable timber line varies between 4500 and 5000 feet in elevation.

**CLIMATE, TEMPERATURE, PRECIPITATION, EFFECT ON LOGGING.**

Barkerville, elevation 4180 ft., has a mean monthly temperature as follows:

<table>
<thead>
<tr>
<th>Month</th>
<th>Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>16.4</td>
</tr>
<tr>
<td>February</td>
<td>19.2</td>
</tr>
<tr>
<td>March</td>
<td>26.1</td>
</tr>
<tr>
<td>April</td>
<td>34.8</td>
</tr>
<tr>
<td>May</td>
<td>44.4</td>
</tr>
<tr>
<td>June</td>
<td>50.1</td>
</tr>
<tr>
<td>July</td>
<td>54.4</td>
</tr>
<tr>
<td>Aug.</td>
<td>53.7</td>
</tr>
<tr>
<td>Sept.</td>
<td>45.5</td>
</tr>
<tr>
<td>Oct.</td>
<td>37.7</td>
</tr>
<tr>
<td>Nov.</td>
<td>25.3</td>
</tr>
<tr>
<td>Dec.</td>
<td>20.9</td>
</tr>
</tbody>
</table>

Annual Mean... 35.7

Throughout the year the nights are cool. In the middle of July, while camped on Swift River, ice 1/8 to 1/4 inch in depth was found in the water bucket.

The growing season is limited and four to five months in length.

The precipitation at Barkerville is as follows:

**ANNUAL PRECIPITATION**

<table>
<thead>
<tr>
<th>Max.</th>
<th>Min.</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>45&quot;</td>
<td>20&quot;</td>
<td>35&quot;</td>
</tr>
</tbody>
</table>

Snowfall 158 inches.
Over the area examined the temperature is similar to that found at the station at Barkerville. Snowfall and precipitation are somewhat lighter.

Logging could be carried on throughout the year over the area examined. The cold winter season would be ideal for hauling out the timber over iced logging roads to whatever means of transportation is considered the most economical when all factors are taken into consideration. The depth of snow would not affect felling and bucking materially. From 20% to 30% skidding time would be lost because of the numerous windfalls buried in the snow.

**AGRICULTURAL POSSIBILITY.**

On account of frequent summer frosts, cold nights and short growing season, the only crop that can be grown successfully is hay. At the present time the market for this crop is local and limited. Land, suitable for hay, is widely scattered and of very small area. Practically the entire area is true forest land.

**FOREST DESCRIPTION.**

A spruce and balsam type consisting of a stand of spruce and balsam of small size, 150 years of age and approaching maturity is found. The timber has many light branches and is subject to windfall. Around Ahbau Lake narrow strips of timber have been uprooted and cast down by winds of high
velocity and small frontage. Windfall throughout the region is heavy
and universal, thus rendering travel consistently difficult. Spruce
and balsam are of small average diameter, with a fair height
growth, close stand and numerous, light branches. This timber is
suitable for pulp. Reproduction is mainly in spruce and balsam with
the balsam predominating. The soil is a clay loam of varying depth
but usually shallow, covered with a humus from 2 to 4 inches in
depth. Although underbrush is scant, the reproduction is fairly
heavy and in conjunction with the heavy windfall will no doubt
have a minor effect on logging. No signs of infestation or diseases
of any kind were discoverable. The short growing season from 4 to 5
months in length, and cool evenings has resulted in a very slow
timber growth.

A pine stand, containing a very small percentage of spruce and
Douglas fir, occupies the drier soil—soils verging on sandy. Average
age of dominant stand is about 150 years. The pine (jack pine) is
of good height and small taper and averages 11 inches in diameter.
The soil is shallow, sandy in character and the humus varies from 1 to
2 inches in depth. The stand is clear of underbrush, almost park-like.
Reproduction is found in spruce, balsam and fir, insufficient in quantity
to restock the area.
DESCRIPTION OF TIMBER.

The timber estimate is as follows:-

Estimate in thousand board feet.

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>Timbered Acres</th>
<th>SPRUCE</th>
<th>PINE</th>
<th>BALSAAM</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.</td>
<td>24,960</td>
<td>259,584</td>
<td>99,840</td>
<td>39,936</td>
<td>399,360</td>
</tr>
<tr>
<td>B.</td>
<td>51,100</td>
<td>465,010</td>
<td>143,080</td>
<td>107,310</td>
<td>715,400</td>
</tr>
<tr>
<td>C.</td>
<td>63,000</td>
<td>614,250</td>
<td>141,750</td>
<td>189,000</td>
<td>945,000</td>
</tr>
<tr>
<td>D.</td>
<td>59,840</td>
<td>418,880</td>
<td>335,104</td>
<td>83,776</td>
<td>837,760</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>199,000</strong></td>
<td><strong>1,757,724</strong></td>
<td><strong>719,774</strong></td>
<td><strong>420,022</strong></td>
<td><strong>2,897,520</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Site E.</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Little Swift</td>
<td>3,200</td>
<td>3</td>
<td>22</td>
<td>37,050</td>
<td>43,520</td>
</tr>
<tr>
<td>Porter Ck.</td>
<td>1,920</td>
<td>2</td>
<td>22</td>
<td>22,400</td>
<td></td>
</tr>
<tr>
<td>Upper</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Swift Ck.</td>
<td>1,920</td>
<td>2</td>
<td>22</td>
<td>26,000</td>
<td></td>
</tr>
<tr>
<td>Black Bear</td>
<td>2,560</td>
<td>2</td>
<td>22</td>
<td>35,480</td>
<td></td>
</tr>
<tr>
<td>Cabin</td>
<td>1,600</td>
<td>2</td>
<td>22</td>
<td>20,800</td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>210,200</strong></td>
<td><strong>1,846,644</strong></td>
<td><strong>742,004</strong></td>
<td><strong>457,072</strong></td>
<td><strong>3,045,720</strong></td>
</tr>
</tbody>
</table>

In 1914 Gareau had charge of a party which made an extensive reconnaissance of the watersheds of the Willow and Bowron Rivers. His report, 209, and map does not give the area of the merchantable timber but gives the total area and estimate in such a manner that it is possible to embody it in this report.

The part of Gareau's area and estimate that enters into this report is shown on the accompanying map, designated by the letters "E" and "G".

Gareau's estimate of the amount of timber on the areas "E" and "G" is as follows:-
Willow River, Block "F".

Total Area  182,100 Acres.

Spruce   1,313,720 M.B.F.
Balsam    220,520 "
Lodgepole Pine  336,600 "
Douglas Fir  17,200 "

Total  1,888,040 M.B.F.

Bear River, Block "G".

Total Area  358,400 Acres.

Spruce   1,135,700 M.B.F.
Balsam    265,490 "
Lodgepole Pine  359,420 "
Douglas Fir  8,940 "

Total  1,769,550 M.B.F.

Block "G" is located on the watershed of the Willow River. The Willow watershed, shown on timber map, is estimated as follows:

- 209 Gareau - Block "F".
Spruce, 1,313,720 M.B.F.; Balsam 220,520 M.B.F.; L.Pine 336,600 M.B.F., Douglas Fir 17,200 M.B.F., Total 1,888,040 M.B.F. Area 182,100 Acres.

Stevens 1923 Block "G".
Spruce 614,250 M.B.F.; Balsam 189,000 M.B.F.; L.Pine 141,750 M.B.F. Total 945,000 M.B.M. Area 63,000 Acres.

The total estimate of the Willow Watershed (area shown on map) is as follows: - Area 245,100 Acres.
Spruce 1,927,970 M.B.F.
Balsam 409,520 "
L.Pine 478,350 "
D.Fir 17,200 "
TOTAL 2,833,040 M.B.F.

FINAL ESTIMATE in thousand board feet.

<table>
<thead>
<tr>
<th>Blocks</th>
<th>SPRUCE</th>
<th>L.PINE</th>
<th>BALSAM</th>
<th>D.FIR</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.</td>
<td>259,584</td>
<td>99,840</td>
<td>39,936</td>
<td></td>
<td>399,360</td>
</tr>
<tr>
<td>B.</td>
<td>465,010</td>
<td>143,080</td>
<td>107,310</td>
<td></td>
<td>715,400</td>
</tr>
<tr>
<td>D.</td>
<td>418,880</td>
<td>335,104</td>
<td>83,776</td>
<td></td>
<td>837,760</td>
</tr>
<tr>
<td>E.</td>
<td>88,920</td>
<td>22,230</td>
<td>37,050</td>
<td></td>
<td>148,200</td>
</tr>
<tr>
<td>Willow R.</td>
<td>1,927,970</td>
<td>478,350</td>
<td>409,520</td>
<td>17,200</td>
<td>2,833,040</td>
</tr>
<tr>
<td>(C.&amp;F.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bear R.</td>
<td>1,135,700</td>
<td>359,420</td>
<td>265,490</td>
<td>8,940</td>
<td>1,769,550</td>
</tr>
<tr>
<td>TOTAL</td>
<td>4,296,064</td>
<td>1,438,024</td>
<td>943,082</td>
<td>26,140</td>
<td>6,703,310</td>
</tr>
</tbody>
</table>

Total area in acres 948,960

It is estimated 198,200 acres consist of burned over areas; 76,800 acres of water, 105,500 acres unmerchantable; and 568,460 acres of merchantable timber.

The natural outlet for the timber on the headwaters of the Willow and Bowron Rivers is northward to the Fraser near the line of the Grand Trunk railroad. That is, a total of 4,602,590,000 bd. ft.; out of an estimated stand of 6,703,310,000 bd. ft., is not naturally tributary to the Pacific Great Eastern railway. With a pulp mill located on the Quesnel River and served by logging railways, it is possible to regard the entire area, containing 6,703,310,000 bd. ft. plus other areas which are designated on the map
and have not been estimated yet, as tributary to the Quesnel River and thus to the Pacific Great Eastern railway.

I have not made the trip down either the Willow or Bowron Rivers, so a comparison of cost between stream driving to the Fraser River tributary to the Grand Trunk railway and railroad haul to the Quesnel River is impossible.

I feel sure however, that both the Willow and Bowron can be driven with no great difficulty. If this assumption is correct the method of stream driving will be far cheaper than logging by railroad.

An area to the west of Victoria creeks, the limits of which are not accurately defined, contains approximately 490,000 M.B.F. Spruce; 84,000 M.B.F. Balsam; 126,000 Jackpine, a total of 700,000 M.B.F.

The timber on Terry Creek, Canyon Creek and the lower portion of Ahbau Creek is located on an area of about 128,000 acres. This area was not entered by the party because it could be estimated more easily and at considerably less expense from the west (Strathnavey on the projected line of the Pacific Great Eastern).

Figuring very conservatively, it is estimated that this tract will cut 1,025,000 M.B.F.

An area, located between Lightning Creek and Swift River, was not entered but is believed to contain 236,800 M.B.F.
LOCATION OF BEST TIMBER.

There is not a great deal of variation in the size of the trees making up the timber stand. The best stand (both in regard to volume per acre and quality) is located west of Victoria Creek. Around Beaver Pass Creek the timber is smaller and species much more heavily branched. A good stand of timber is located between Ahbau Lake and the Willow River and on the hills to either side of the Willow River.

In the area covered merchantable timber was seldom found above an elevation of 4800 feet above sea level.

DENSITY AND QUALITY OF STAND.

The timber stand varies only slightly in the amount of timber or volume per acre. It is estimated that stand per acre varies from a minimum of 8,000 B.M. to a maximum of 30,000 B.M. with an average volume of 15,000 B.M. per acre. The stand is usually closely spaced and the diameter of trees, breast high, seldom exceed 18 inches.

Spruce and Balsam consist of timber of pulp size (Spruce averages 13 inches in diameter and Balsam 10 inches). The two species mentioned are exceedingly healthy. There is no indication of defect in spruce while balsam could be culled from 5 to 10%. The average log run in 16-foot logs will vary from 10-18 per thousand B.M. with an average log run of about 15 per 1 M.
Jack Pine timber seldom exceeds 14 inches in diameter and is suitable for hewn ties. This tree is straight, fairly tall, clean boled and with a light crown. Very little defect; a cull of 5% would be ample for this species.

LOGGING CONDITIONS

FELLING AND SKIDDING.

The surface of the ground is fairly smooth and firm; the few muskegs and swamps are of small size and could be readily avoided. There is very little rock outcrop in the timber stand, even on the steep timbered slopes. Underbrush, consisting of Spruce and Balsam of reproduction and sapling size, and the heavy windfall, in Spruce and Balsam stands, would have some effect upon felling and skidding, especially when the snow covers the ground to a depth of 2½ feet and over.

Felling and Backing at $7.00 per day

$1.57 Estimate 4500 bd.ft. per day 1.55 per M.
Equipment depreciation

1.57

Skidding

2 Swampers $6.00
Teamster 3.50
Team 4.00

13.50

$3.05 Estimate 4500 bd.ft. per day 3.00
Equipment depreciation .05

3.05
Yarding

2 landing men $7.00
1 team 4.00 and Teamster 3.00  7.00
0.49
Estimate 15,000 bd. ft. per day  0.46
                    .03

One-half time  0.49

Yarding - Hot Logging

2 landing men $7.00
0.24
Estimate 15 M. per day  0.23
                    .01

One-half time  0.24

A total of $5.35

Since practically all the creeks or feeders to the Cottonwood River or Lightning Creek are incapable of being driven and high water only lasts a comparatively short time during the spring,—from 3 to 5 weeks; and since, if this area is taken up under pulp lease, the only water power available to a pulp mill is located on the Quesnel River, there are only two methods whereby the timber can be transported to the mill, namely, by flume and railroad.

Where possible, fluming could be used to advantage during the four to five months open season. The railway line following the higher elevations could be operated throughout the year. Streams capable of being flumed are so far apart that a long haul is necessary, in any event. In this area, where the timber averages 15 M. per acre over a large area it may be possible to lay out a main railroad system, figuring on a length of haul by horse or tractor not to exceed one mile to spur tracks.
Since donkey skidding or other kinds of high speed mechanical skidding cannot be utilized because of the destruction to reproduction (the Forest Branch can enforce regulations on this land, owned by the Crown, to manage it in perpetuity by regarding and protecting the reproduction as a nucleus of a second timber crop.) Horse and tractor skidding and hauling to the railroad or flume must be used throughout.

Figuring on an average haul of one mile, 4 trips per day and 1500 bd. ft. per load (average of winter and summer hauling) the hauling charges amount to:

<table>
<thead>
<tr>
<th>Description</th>
<th>Charge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loading</td>
<td>$0.50</td>
</tr>
<tr>
<td>Hauling</td>
<td>$1.33</td>
</tr>
<tr>
<td>Deprec.</td>
<td>$0.05</td>
</tr>
<tr>
<td>Total</td>
<td>$1.38</td>
</tr>
</tbody>
</table>

**Rolling Down at Landing.**

<table>
<thead>
<tr>
<th>Description</th>
<th>Charge</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 men at 7.00 rolling</td>
<td>$0.35</td>
</tr>
</tbody>
</table>

**Loading Logs on Cars.**

<table>
<thead>
<tr>
<th>Description</th>
<th>Charge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineer</td>
<td>$5.50</td>
</tr>
<tr>
<td>Asst.</td>
<td>$4.50</td>
</tr>
<tr>
<td>2 hookmen</td>
<td>$8.00</td>
</tr>
<tr>
<td>Total</td>
<td>$18.00</td>
</tr>
</tbody>
</table>

$0.30 Crew averages 10 cars or 60 M. per day .. 0.30

**Railway Transportation.**

<table>
<thead>
<tr>
<th>Description</th>
<th>Charge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineer 6.00</td>
<td>$6.00</td>
</tr>
<tr>
<td>Foreman 4.50</td>
<td>$4.50</td>
</tr>
<tr>
<td>Brakeman 4.50</td>
<td>$4.50</td>
</tr>
<tr>
<td>40 miles haul (main line)</td>
<td>$6.50</td>
</tr>
</tbody>
</table>

$0.37 One trip per day .. 0.37

$0.25 Dumping in pond .. 0.25
Supervision and miscellaneous expenses (logging)  1.50
Maintenance of logging roads ..........................  .10
Scaling .................................................  .05
Brush Filing and Burning .................................  0.60
Construction of camps ....................................  0.50
Construction of logging roads ............................  0.50
Landing and yard construction ............................  0.10
Transportation costs covering construction, labor, maintenance and depreciation of railway line and equipment.  3.85

$15.70

General Expenses
Ground Rent and Forest Protection Tax ............  .05
Provincial and Dominion Taxes .........................  .20
Allowance for profit, risk, ............................  2.05

$18.00

Reduced to cords at 6 bd.ft. to the cubic foot and 100 cubic feet to the cord makes this charge equivalent to ........................................... $10.80

Royalty .................................................  .25
Stumpage .................................................  .95

(per cord) $12.00

Stumpage at $0.95 per cord or $1.60 per 1 M. ft. bd. measure.

RIVER DRIVING.

It is possible to drive Cottonwood River and Lightning Creek in the early spring during a period from three to five weeks in length. It is not possible to drive a large cut during that short period. Eastern pulp mills have proven the economy of having a continuous supply of timber.
MANAGEMENT.

The primary object of forest management is to protect and insure reproduction in the more valuable species to ensure a continual supply of timber.

There is not enough data obtainable on an extensive reconnaissance of this nature to predict the best method of management or control of this large timbered area with any degree of certainty.

The system of leaving seed trees does not appear desirable because of the shallow root system of the species shown by the heavy windfall areas. Possibly, by the time this timber is logged, silvicultural methods may be developed to attain the object desired.

At present I can only give a few factors which would influence the Management system to be employed.

(1). Species are shallow rooted in shallow soil, and heavy windfall has occurred in the sheltered stand. With the opening of the stands the windfall would undoubtedly increase. Experiments with seed trees and clumps of trees left in sheltered locations after logging may be possible on limited tracts.

(2). Clear Cutting.

Cutting in narrow strips may ensure reproduction in the species desired. No old natural openings after windfall were discovered.
Timber Reconnaissance
Cariboo District
Scale 3 Miles to 1 inch

LEGEND
Area estimated 1914 by 209
Area estimated 1923
Timbered Area found 1923.

209
Spruce 1,313,720
Balsam 220,520
Lodgepole Pine 33,560
Douglas Fir 17,200
Total 1,688,040

Indian Lake

BOWRON LAKE

ISAAC LAKE