THE HISTORICAL GEOGRAPHY OF THE ST. MAURICE VALLEY WITH SPECIAL REFERENCE TO URBAN OCCUPANCE

A Thesis

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by

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"In so far as geographical research seeks to explain and interpret, the element of time must be reckoned with - just as, conversely, it is inescapable that the element of space must be reckoned with in historical research. For this reason history and interpretative geography are inseparable, however much their purposes may differ."

John K. Wright:
AIDS TO GEOGRAPHICAL RESEARCH.

PREFACE

It is the aim of the historical geographer to recreate the geography of past epochs, and to trace the past relationship between man and his physical environment which has resulted in the present landscape. In the following pages an attempt is made to do this with respect to the St. Maurice Valley.

There have been three main types of occupance in the valley since the founding of Three Rivers in 1634. At first the settlements were dependent mainly upon the fur-trade, and upon a few small local industries. This was a long period in the history of the St. Maurice Valley and did not end until 1852, mainly because of the treacherous character of the river. The second period was characterised by the exploitation of the forest wealth of the valley, and lasted from 1852--1898. It produced a different cultural landscape with new settlements growing up and older ones becoming redundant. Finally, in the period 1898 to the present, the power of the river has been harnessed to produce electricity. A new industrial region has come into being with new kinds of towns in new locations.

The following work thus falls quite logically into three sections. In each of these periods the valley has had a distinctive geography, and although the transitions are not sharp they are clear enough to make such a division useful and valid.

The sources which are available for such a study are mainly four. First, and most important, is the actual landscape as it is today. Secondly there are original documents such as journals, decrees and letters giving descriptions of the past landscapes. Thirdly, a number of books have been written recently which contain information relative to the historical geography of the valley. And finally, there are various maps available for study such as the modern sheets of the National Topographic Series, and the older maps of the Dominion Archives.

I owe Mr. J.O. Houde of the Shawinigan Water and Power Company a special debt for his unfailing efforts to secure information which I needed from time to time. Professor Raoul Blanchard was kind enough to discuss various aspects of the physical geography of the valley with me. In addition there were in the communities and in the company offices of the valley a great many willing helpers.

Finally, I wish to thank the officers of the Canadian Geographical Society who made this work possible through their support of it.

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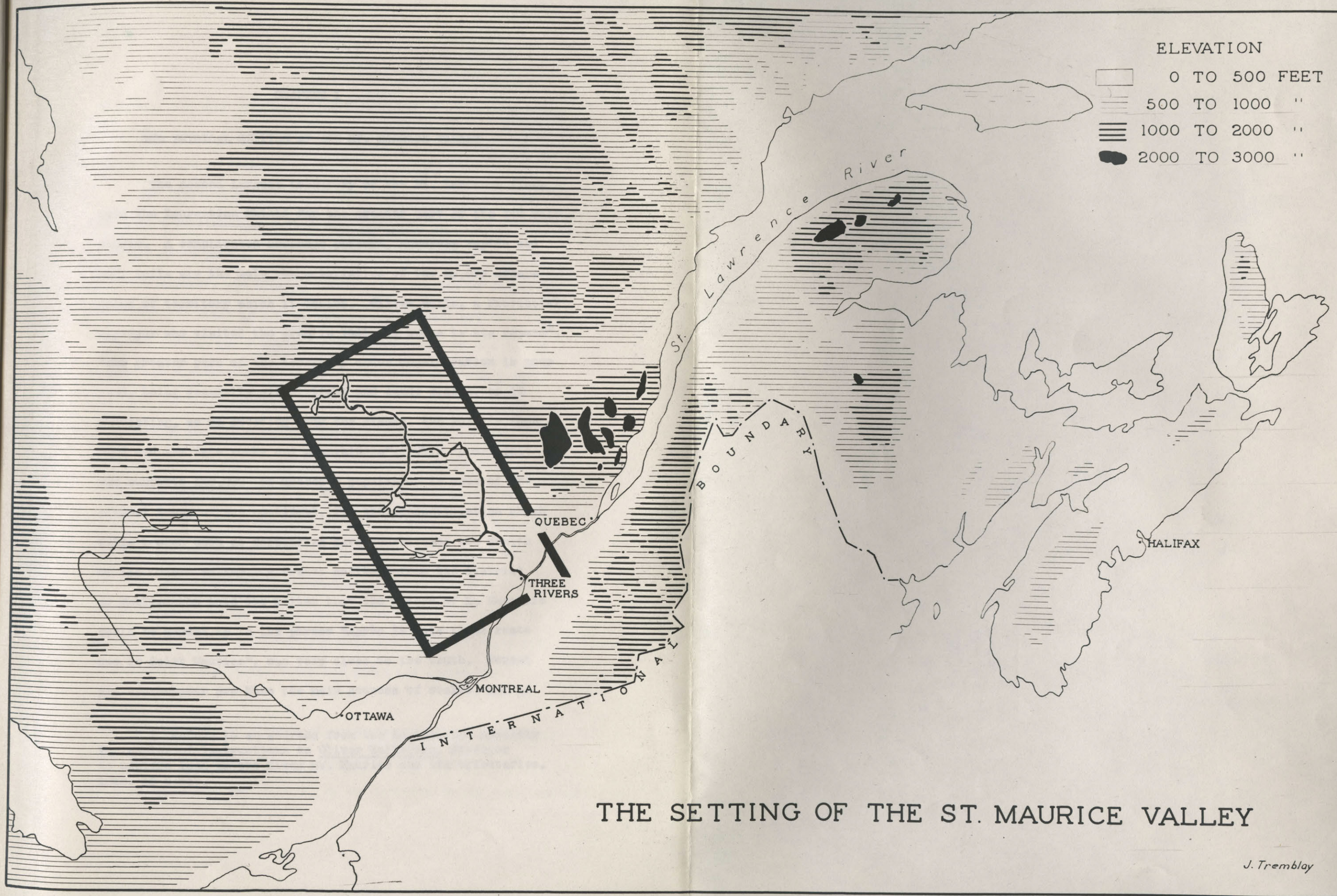

THE SETTING OF THE ST. MAURICE VALLEY

J. Tremblay

CHAPTER 1

THE PHYSICAL SETTING OF THE ST. MAURICE VALLEY

The second largest tributary of the St. Lawrence flows over the Laurentian Shield for the greater part of its 240 mile course. A complicated drainage pattern, numerous rapids and poor soils are the main characteristics of the 20,076 square miles of territory which it drains. Oliver Wells, a Provincial Surveyor who visited the area in 1851--2, wrote in his report[1], "the greater part of the territory under consideration is poor land, being generally either light and sandy plains, or if undulating, as on receding from the rivers, the soil is then hard and the face rocky and mountainous". This 'poor land' now supports 180,000 of Quebec's population in some of the richest towns of the continent, for the characteristics which Wells looked upon as forbidding have constituted the wealth of the modern valley. A French habitant from the district of Mekinac who told the writer that the nature of La Mauricie could be summed up in the phrase "Après le bois il ne reste que le Saint Maurice", was very close to the truth. Forest and hydro-power are here the main sources of wealth, and to

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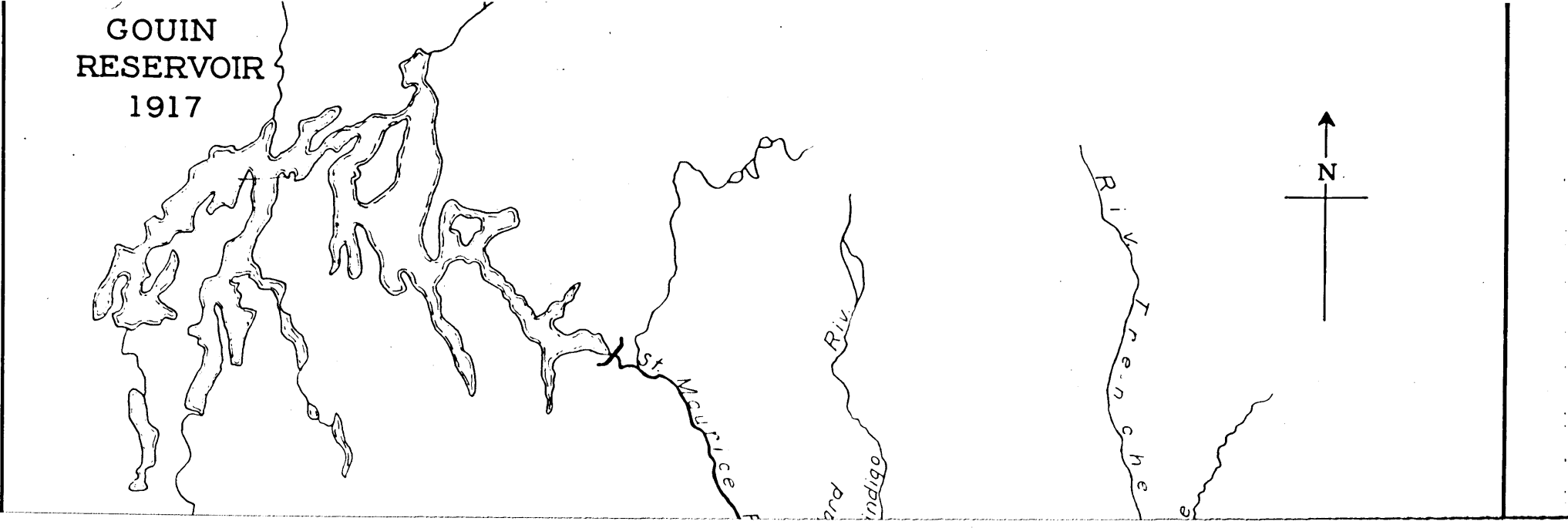
1 Return to an address from the Legislative Assembly for copies of instructions to Oliver Wells, Esq. Surveyor to explore land on the River St. Maurice and its tributaries. 1853. 10 p.map.

understand how they have permitted the extensive settlement of the valley, it is first necessary to describe the physical conditions which give rise to them.

The features of the Shield are well-known. It has, in panorama, a monotonously even summit line made up of rounded hills which are often bare of soil so that the gneisses and granitic rocks are exposed. In detail, however, the country is deeply accidented and there is a good deal of superficial material in the lower parts. As a result of the submergence of the region beneath the Pleistocene Ice-sheet the drainage has been greatly disturbed and lakes are very numerous.

Having undergone various periods of crustal movement during Precambrian time the Shield, toward the close of that period, was subjected to gentle uplift and a long period of erosion. It was above the level of the sea throughout Palaeozoic time when sediments (particularly Ordovician limestones) were laid down in the St. Lawrence Lowlands. By the Pliocene it had been peneplaned, and was again uplifted so that the rivers cut deep valleys and the landscape was well dissected. Finally came the Pleistocene Glaciation which has given the region its present aspect.

The continental glacier affected the Shield in three ways; first, by its erosive action; secondly, by the deposition of englacial material; and thirdly, by the disturbance and complication


GOUIN
RESERVOIR
1917
N
St. Maurice
Rivière Trenche

GOUIN RESERVOIR 1917

MANUAN RESERVOIRS 1908-15

MATTAWIN RESERVOIR 1930

N

St Maurice R.

Rapide Allard

Windigo Riv.

Rapide des Coeurs

Riv. Trenche

Riv. Croche

SANMAUR

WINDIGO

Rapide Lievre

Manuan Riv.

RAPIDE BLANC

Rapide La Trenche

Rapide Sans Nom

Bostonnais Riv.

LA TUQUE

Riv. aux Rats

Riv. Vermillion

Mattawin Riv.

Mekinac Riv.

GRAND'MERE

SHAWINIGAN FALLS

ALMAVILLE

St. Lawrence River

LES FORGES

THREE RIVERS

J. Tremblay

LEGEND

DAMS

PROJECTED POWER SITES

COMPLETED POWER SITES

7 0 7 14
MILES

THE ST. MAURICE VALLEY — QUEBEC

of the drainage pattern.

The ice scoured away most of the soil from the higher land so that bare rock is almost always visible on the hills north of Shawinigan. The relief was modified, and there are few sharp peaks or outstanding summits. Depressions were deepened and often occupied by lakes.

With the melting and retreat of the glacier great quantities of fluvio-glacial material were laid down on the surface of the Shield, and over the Lowlands to the south. The Valley of the St. Maurice was filled with deposits of sand, gravel and clay. Deltas were formed at the mouths of the tributaries, and in the territory between Shawinigan and the St. Lawrence. At each halt in its retreat the glacier also formed terminal moraines which trend in an approximately east-west direction, and these have had an important effect upon the drainage pattern.

As a result of the sinking caused by the weight of the ice the St. Lawrence Valley was occupied by the Champlain Sea in post glacial times. This sea extended northward over the St. Maurice Valley, and its highest shoreline has been detected at 670' a.s.l.[2] at the boundary of the Shield. Varved clays were here deposited by the melt water of the glacier and they have been overlain by coarse sands. The territory in the vicinity of Lac à la Tortue

2 R.W. Ells: Report on the Geology of the Three Rivers Map Sheet. C.G.S. Annual Report 1898.

The St. Maurice Valley north of the Manouan River. A typical section of the Shield.

exemplifies the kind of terrain so produced. It is a mixture of badly-drained, swampy clayplain, and drier but agriculturally unproductive sands. It was in such swampy areas that deposits of bog iron, or limonite were formed which were later exploited.

When the ice had disappeared the land was able to resume its original level and a gradual uplift took place and is still in progress. Thus the rivers have cut deeply into the soft postglacial deposits, forming numerous terraces both along the upper valley and in the lowlands. Near Three Rivers the lowest terrace is at 35' and others rise in echelon to the north to 350' [3]. Along the Upper St. Maurice the highest terrace is about 150' [4] above the river and can be traced for many miles between La Tuque and Grandes Piles.

A distinct physiographic province has been created between the St. Lawrence Lowlands and the Shield, from Grandes Piles in the north to the Valmont Hills in the south. It differs from the lowlands in its frequent outcrops of Precambrian rock, and from the Shield in its extensive sand and clay plains. The plains of St. Boniface and the extensive swampy areas around Lac a la Tortue, interrupted by rocky hills such as the one on which the Cascade Inn of Shawinigan Falls has been built, form its typical

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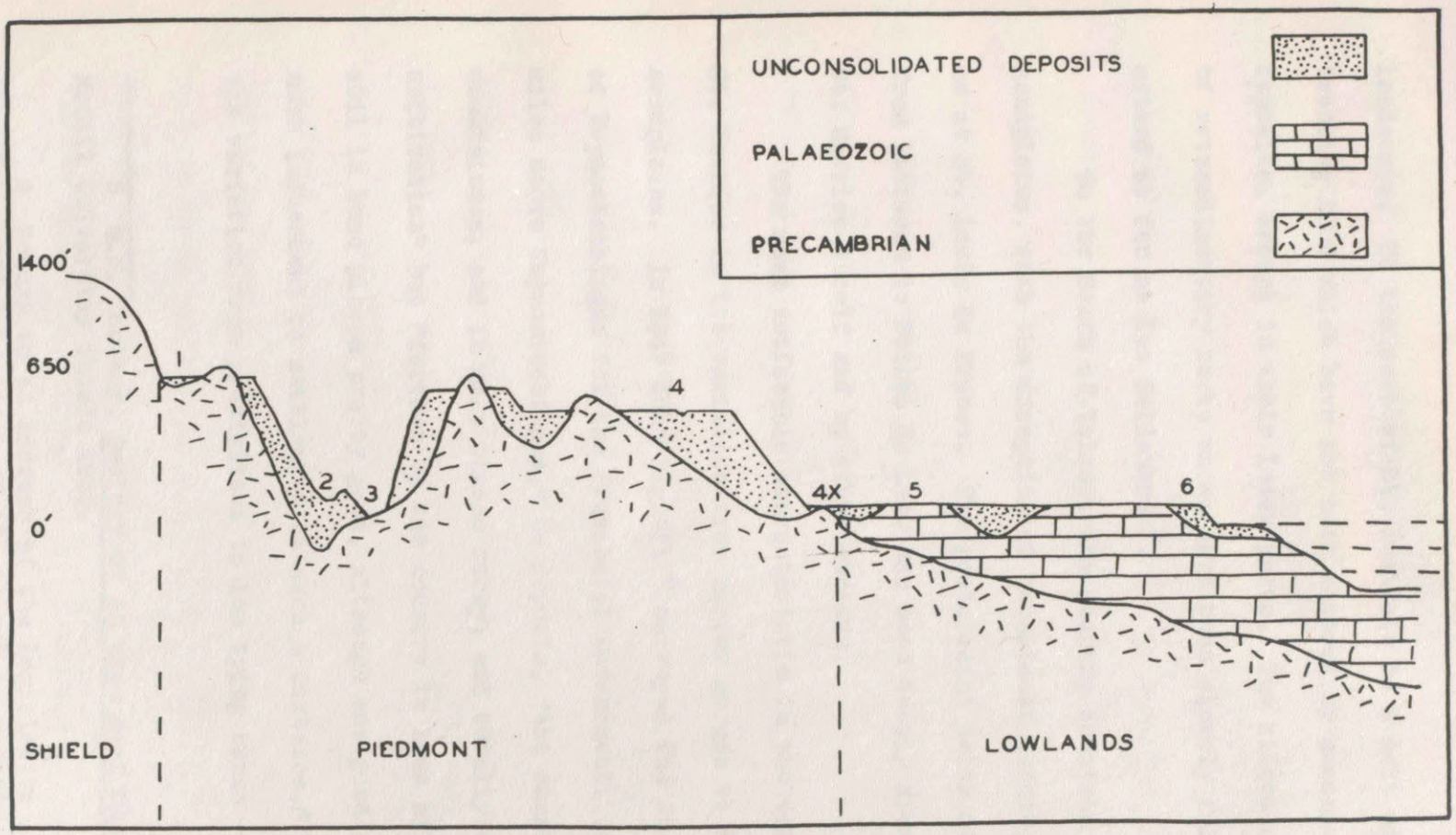
3 R. Blanchard, Le Centre du Canada Francais.

4 R.W. Ells, Geology of Three Rivers Map Sheet, C.G.S. 1898.



PHYSIOGRAPHY - CROSS-SECTION

FIG 4

1 Plains of St. Boniface
2 River Shawinigan
3 St. Maurice
4 Cachée River
4x Valmont Hills
5 St. Louis de France
6 Three Rivers

landscape. To the west of St. Boniface is a belt of ridges trending N30W which have not been covered by unconsolidated deposits, except in their lower parts. The ridges are made up of metasedimentary rocks which have been closely folded and extend as far as Lac Bellemare [5].

To the South of Valmont the country consists of terraced sandplains, with the exception of occasional outcrops of limestones, as at St. Louis de France. The postglacial delta of the St. Maurice, from Batiscan to Pointe du Lac, has been deeply dissected by the St. Maurice itself and by other streams.

The most noticeable characteristic in the valley of the St. Maurice is its variation from narrow gorges to wide, open sandplains. In 1847 John Bignell [6] surveyed the St. Maurice north of Weymontachingue for the Provincial Government. "For thirty miles above Weymontachingue," he reports, "the country is generally mountainous, and in many places rocky, and totally unfit for cultivation" but "farther up the country is less hilly and the soil in some places pretty good, although not good enough to offer much inducement to settlement at such a distance." He also records the variation from precipitous to low lying banks -- "the banks

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5 G.K. Lowther, Geology of an area near Shawinigan Falls, McGill University Thesis 1935.

6 Return to an address of the Legislative Assembly dated 23rd July 1850 for a copy of the report or reports of the survey of the St. Maurice.

The St. Lawrence Lowlands near Three Rivers.

of the falls. The deposits of sand to the east of the falls are over 500 feet deep.

From La Tuque the St. Maurice continues through a deep pre-glacial valley to a point below Grandes-Piles where it leaves the Shield. Here it has again deserted the old valley and flows over a series of ledges at Grand'Mere, Shawinigan Falls, La Gabelle, and Les Forges. Mackenzie describes the section as follows: "Where pre-glacial drainage valleys are followed the river is sluggish and the valleys are broad; where it jumps gaps and low ridges from one old valley to another, there are rapids. Thus in most cases where we have falls, there is rock near the surface and deep wide valleys extending upstream"7.

At Shawinigan Falls the river drops over the rocky ledges to the valley of the Shawinigan River. The valley of the Shawinigan is pre-glacial and the deposition of glacial material in the vicinity of Cross Hill has forced the St. Maurice to adopt its present course.

The present drainage system of the St. Maurice is thus a product of glaciation and the rapids are concentrated in almost every case where bedrock is close to the surface. The location of these rapids and the suitability for dam construction

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7 I.D. Mackenzie. Dam Building, 25,000 B.C. Shawinigan Brieflet No.3 Privately Printed n.d.

is one of the most important of the valley's physical assets[8].

The drainage pattern is rectangular, the mainstream flowing to the southeast and the tributaries flowing to and from the northeast, often turning sharply to join the mainstream. There are twenty-four tributaries large enough to support log-drives and ten of these are of major importance (see map 2a). Both the scouring and depositional action of the ice combined to disturb the pre-glacial drainage pattern. Old valleys were blocked and new ones excavated, in many cases over hard rock ledges. I.B. Crosby[9] has attempted to reconstruct the drainage as it was before the Ice-Age and has examined the reasons for the present pattern.

His final conclusion is that there must have been two or more rivers flowing to the southeast originally. Their courses were blocked by a number of moraines, the most notable being south of the Manouan, and south of the Vermilion. Hence the water was forced to cut through the old divides and find a new course so that the present system is made up partly of old valleys and partly of new, with numerous rapids and falls throughout.

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8 I.D. Mackenzie. Op. Cit.

9 Drainage Changes and their causes in the St. Maurice Valley, Quebec. Jour. Geol. 40,2,pp 140--153, 1932.

Laverdiere and Faessier [10] have suggested the line from Petites Piles through Ste. Flore and down the Shawinigan Valley to the lower bay as a pre-glacial valley of the St. Maurice. The present valley of the Shawinigan is certainly much larger than anything which the present river could have excavated. Nevertheless between Petite Piles and the Shawinigan River the pre-glacial bed, if it exists, has been covered by later deposits. The present Shawinigan Valley could have been cut by the more easterly of Crosby's streams coming from the northwest (see map4a) . Whatever may be the true explanation the important fact for the present study is that the St. Maurice drainage has been profoundly disturbed. In the section of the "new valley" between Petites Piles and Shawinigan alone there are four rapids.

In the whole system the rapids and falls are too many to enumerate, there are ten, however, between the Manouan and Three Rivers which are of major importance to the exploitation of the valley (see map2a). In the whole of its length the river makes a fall of 1300 feet; 636 feet of this occurs in ten distinct falls, the rest in rapids and cascades.

The second important aspect of the physical geography of the valley is its climate. In 1634 Champlain wrote to Cardinal Richelieu, "l'habitation des Trois Rivières est placée dans un des plus beaux endroits de tout ce pays, ou la tempèrature de

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10 Gerard Filtreau ed. 'L'Épopée de Shawinigan' 1943.

l'air est bien plus modèrée, le territoire plus fertile, la pêche et la chasse plus abondante qu'a Quebec[11]." Modern statistics and observations made at various meteorological stations do not support his view. In the July and January mean temperatures there are little or no differences between Three Rivers and Quebec, while the maxima and minima only differ by a degree or two. We must assume that Champlain's visit was made when, for some reason, there was temporarily a noted difference between the temperature regime of the two areas.

The Valley lies in the path of cyclones formed on the Atlantic Polar Front. It is therefore subject, like most areas which border the St. Lawrence, to a procession of these disturbances. The net effect of this situation is to produce a uniform precipitation distribution throughout the year, and to make the air temperature subject to sudden changes with the passage of successive warm and cold fronts.

The most noticeable areal variation in the temperature pattern is that between the southerly points on the St. Lawrence and the more northerly inland stations. The Upper St. Maurice is not only colder in terms of means and extremes than Three Rivers, it is also more continental. The mean annual range at Three Rivers is 58 degrees Fahrenheit; at Manouan it is 59 degrees

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11 Champlain, Samuel de, Works ed. H.P. Biggar, 6 vols. Champlain Society, Toronto 1922.

and at La Loutre Rapids, 61 degrees. More striking perhaps is the difference in January mean temperatures. At La Loutre Rapids the January temperature is 1 degree Fahrenheit, at Manouan it is 3 degrees and La Tuque 8 degrees. It is remarkable that the difference between La Tuque and Three Rivers is not great, and the mean annual range is actually less at the northern point, (56 degrees) than at the southern (58 degrees). La Tuque is nevertheless the colder place with a difference of 3 degrees in the annual average.

The averages of Daily Minimum Temperatures show even more strikingly the difference between Upper and Lower St.Maurice. 1 degree Fahrenheit is the figure for Three Rivers in January, while La Loutre Rapids is 9 degrees. For July the figure is 50 degrees at La Loutre Rapids, and 57 degrees at Three Rivers. (Table 1).

The difference is emphasised by the figures for Daily Maximum Temperatures. There is a nine degree difference between La Loutre Rapids and Three Rivers in January, although in July the difference is only five degrees. (Table 2)

The annual range in mean temperatures is 58 degrees at Three Rivers and 62 degrees at La Loutre Rapids (Table 3). When extreme highest and extreme lowest temperatures are examined there is found to be a 10 degree difference between La Tuque

and Shawinigan Falls, the towns being only ninety miles apart. The extreme range at La Tuque is 123 degrees. At Shawinigan it is 112 degrees (Table 4). Another interesting feature is the fact that La Tuque appears to experience higher extremes of summer temperature than any of the other stations.

The annual amount of precipitation varies considerably throughout the region. At Three Rivers it is 40.56 inches and at Manouan only 29.66 inches. The mimima at Manouan and La Tuque occur in February and April, with maxima very apparent in July. At Three Rivers the mimima also occur in the Spring but the maximum occurs in August. The precipitation is distributed fairly evenly from month to month. 2.35 inches is the lowest figure for Three Rivers and occurs in March, the highest is the 4.25 inches of August. At Manouan the low figure is 1.81 inches for February and the high, 3.09 inches for July. A definite annual maximum is much more noticeable at La Tuque than at Manouan (Table 5).

The statistics for annual and monthly snowfall show a reversed relationship between the north and south. While Three Rivers receives only 81.5 inches of snow annually, Manouan receives 119.3 inches and La Tuque 90.6 inches. The snowfall is heaviest in January in all sections. There are, however, considerable contrasts between the separate months. In February and March, the snowfall of Three Rivers drops from 20.5 inches to 9.4 inches. At Manouan and all the other northern stations

there is an increase from February to March from, for example, 17.3 inches to 21.1 inches at Manouan, and from 16.8 inches to 19.7 inches at La Loutre Rapids. Similarly the snowfall increases at Three Rivers from 6.6 inches to 18.2 inches in November and December. At Manouan the figures for the same months are 16.2 inches and 21.5 inches. As might be expected the onset of snow is earlier at the northern stations and it continues longer. There is no snow after April at Three Rivers and only 0.2 inches falls in October. There is still considerable snow in May, however at La Loutre Rapids (1.7 inches), at Manouan (0.9 inches), and at La Tuque there is a trace. In September both La Loutre Rapids and Manouan receive some snow, 0.2 inches and 0.1 inch respectively and by October the snowfall is relatively heavy (Table 6).

In reviewing the foregoing facts it seems that there is a considerable difference between the climate of the lower St. Maurice and that of the territory above La Tuque. In general the climate becomes more severe as one travels north. After his survey of 1848, John Bignell wrote of the country above Weymontachingue, "the climate is severe, the thermometer (Fahrenheit) ranging from 10 degrees to 45 degrees below 0. Spring is late, and the river seldom clear of ice before the fifteenth or twentieth of May"[12]. The climate becomes more continental to the north, the Spring later, and the onset of winter sooner. Although there is a general decrease in

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12 Return to an address of the Legislative Assembly dated 23rd. July 1850 for a copy of the report or reports of the survey of the St. Maurice.

PLANCHE II

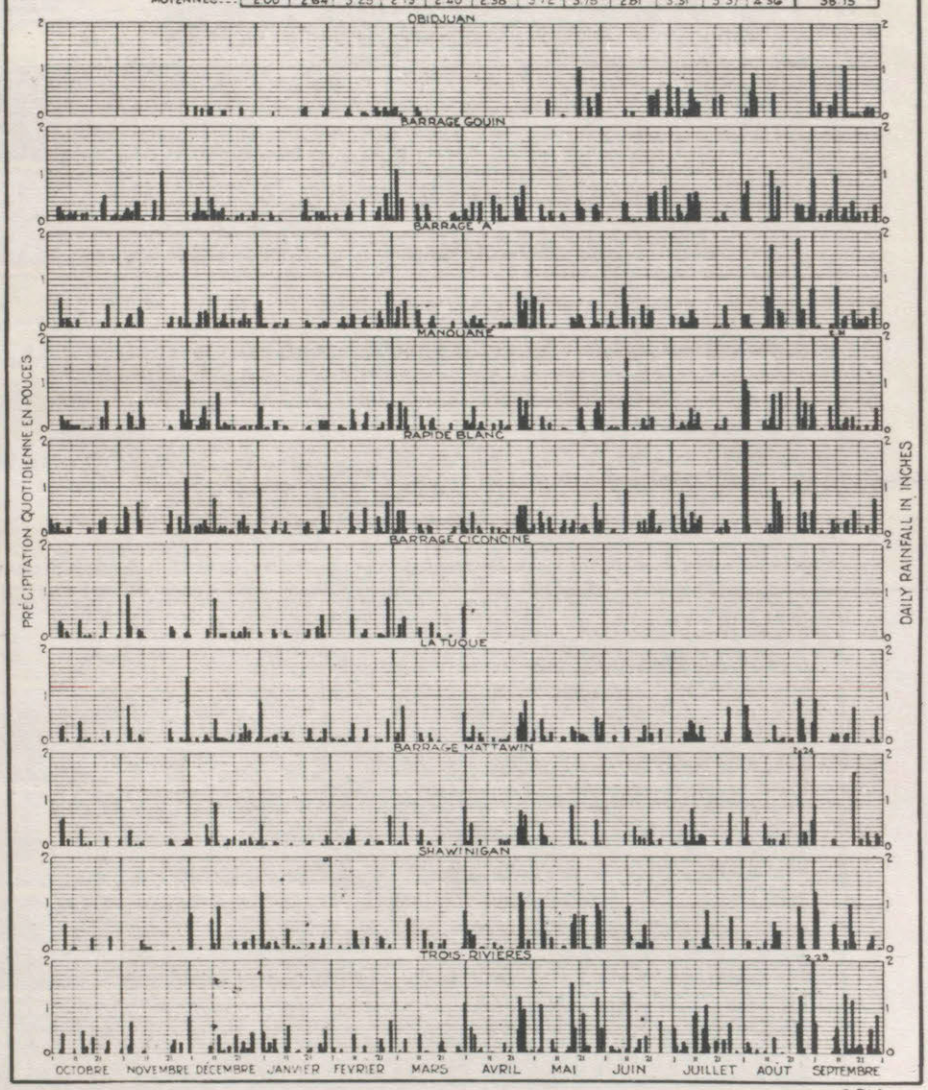
LA COMMISSION DES EAUX COURANTES DE QUÉBEC

PRÉCIPITATION DANS LA VALLÉE DU ST-MAURICE

ANNÉE 1944-1945

PRÉCIPITATION MENSUELLE EN POUCES — **MONTHLY RAINFALL** IN INCHES

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	TOTAL
OBIDJUAN			1 20	0.70	1 15	0 70		2 53	2 45	4 45	2 50	3 80	
BARRAGE GOUIN	2 83	3 23	3 15	1 40	2 72	2 89	4 22	3 05	2 65	3 60	4 72	4 25	39 01
BARRAGE 'A'	2 12	2 32	4 85	1 90	3 07	2 19	3 62	2 81	3 53	2 13	7 17	3 82	39 53
MANOUANE	2 27	2 33	4 00	2 05	2 81	2 24	3 75	2 35	2 94	2 35	6 40	4 72	38 19
RAPIDE BLANC	1 91	4 01	3 35	3 05	2 77	2 20	3 37	3 52	3 67	3 76	6 93	3 34	41 88
BARRAGE CICONCINE	1 81	3 75	2 05	2 63	1 87	2 21							
LA TUQUE	1 60	3 38	2 62	2 38	1 90	2 41	3 47	3 53	1 94	3 50	3 70	3 21	33 64
BARRAGE MATTAWIN	2 13	2 38	2 72	1 08	1 85	2 32	3 29	2 70	2 44	3 35	5 32	4 41	33 97
SHAWINIGAN	1 11	0 94	3 29	2 54	2 22	2 38	3 35	5 68	1 94	2 13	3 51	5 13	34 22
TROIS-RIVIÈRES	2 03	2 54	2 04	2 62	1 85	2 44	4 71	6 55	3 10	5 65	5 19	6 04	44 76
MOYENNES	2 00	2 64	3 25	2 13	2 40	2 38	3 72	3 78	2 81	3 31	5 37	4 36	38 15



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The chart shows typical precipitation distribution at various stations in the St. Maurice Valley.

PLANCHE II

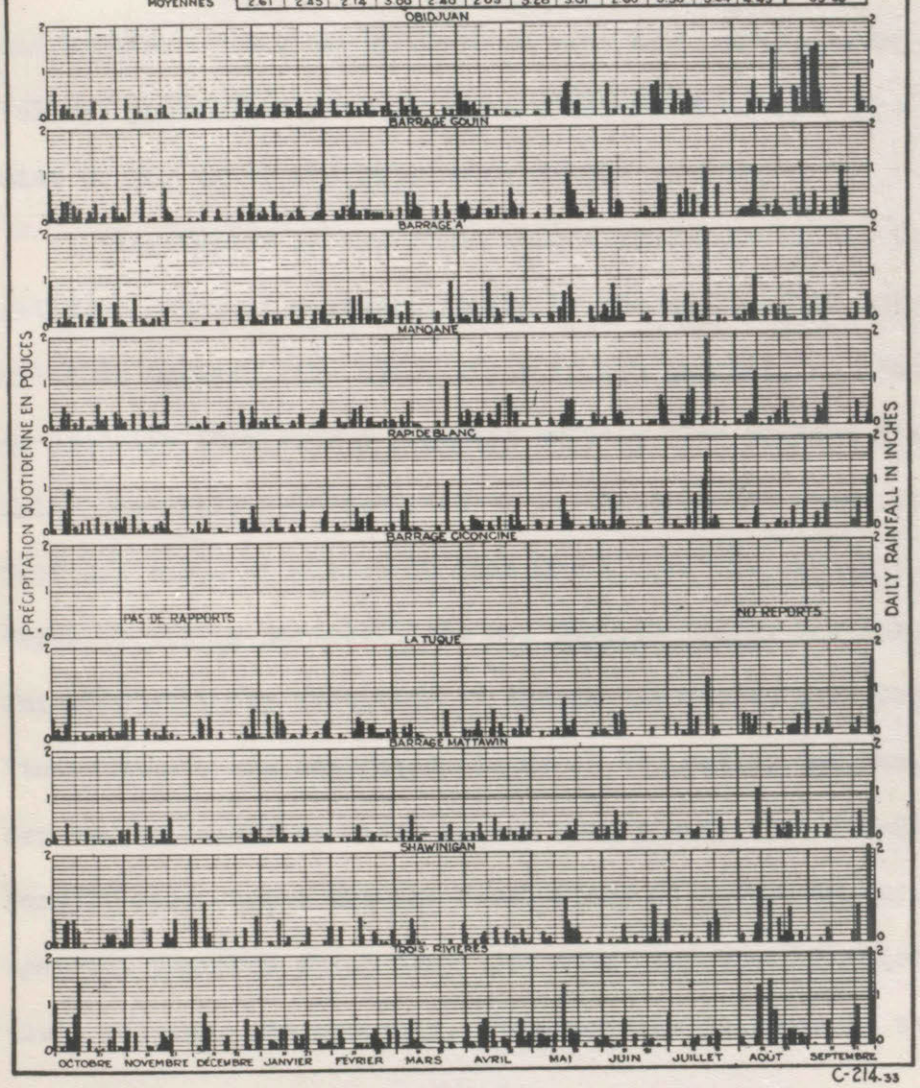
LA COMMISSION DES EAUX COURANTES DE QUÉBEC

PRECIPITATION DANS LA VALLÉE DU ST-MAURICE

ANNÉE 1945-1946

PRÉCIPITATION MENSUELLE EN POUCES — MONTHLY RAINFALL IN INCHES

	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	TOTAL
OBIDJUAN	2.47	1.50	2.05	4.50	3.30	2.04	2.04	2.64	4.61	1.85	5.45	7.35	39.80
BARRAGE GOUIN	4.45	3.30	2.10	3.16	2.59	2.55	4.03	4.32	3.75	4.33	3.50	3.53	41.61
BARRAGE A	3.51	1.85	1.45	3.18	2.50	2.47	3.30	3.24	2.62	4.10	2.88	3.28	34.38
MANOUANE	3.55	2.46	2.15	2.65	2.13	2.38	4.07	2.78	2.96	4.56	3.16	3.43	36.22
RAPIDE BLANC	4.21	2.67	2.63	2.37	2.17	2.77	3.90	2.40	2.10	5.56	1.82	5.44	38.04
BARRAGE CIGONCINE		PAS DE RAPPORTS								NO REPORTS			
LA TUQUE	3.38	2.25	2.15	3.05	2.96	1.85	3.60	2.23	2.02	3.40	2.69	4.86	34.48
BARRAGE MATTAWIN	1.96	2.50	1.08	2.11	1.20	1.50	2.73	2.81	1.96	2.15	4.17	3.52	27.67
SHAWINIGAN	3.68	2.81	2.81	1.87	2.33	1.25	2.34	2.84	2.05	1.93	4.05	4.26	32.26
TROIS-RIVIÈRES	5.32	2.71	2.82	4.17	2.37	1.43	3.54	3.87	1.29	1.79	5.01	4.73	39.05
MOYENNES	2.61	2.45	2.14	3.00	2.40	2.03	3.28	3.01	2.60	3.30	3.64	4.49	35.95



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Precipitation Distribution

precipitation to the north, snowfall increases greatly.

The average date of the first frost in Fall, based on observations of minimum temperatures at La Tuque for five years ending 1947, is September 21. The average date of the last frost in Spring based on readings for five years ending 1948, is June 10th. The main microclimatic effects are valley fogs and frosts. These are evident in most settlements along the valley, particularly at La Tuque which is often enveloped in mist or fog until the late hours of the morning.

Vegetation is the third important factor in the physical setting. Jacques Cartier passing by the mouth of the St.Maurice River on October 7th, 1535, wrote in his journal, "à l'entrée de laquelle (Rivière) y a quatre petites îles plaines d'arbres". Later Champlain reported that he saw land in the lower St. Maurice, "qui est basse et pleine de tous bon arbres"[13]. Prior to its exploitation by Europeans the St. Maurice Valley was largely forested with the exception of Indian clearings, peat bogs or "tourbières", and some meadowlands in the valley bottoms. There are two sources from which we can reconstruct this Pre-European forest; first there are the conclusions of modern scientists based upon the remnants which they find today and their knowledge of their science; and secondly, there are the accounts of the

13 Jacques Cartier "The voyages of Jacque Cartier". Published from the originals with translations, notes and appendices. Ed. H.P. Biggar. Publications of the Public Archives of Canada No. 11, Ottawa 1924.

surveyors, lumbermen and explorers who first went into this territory.

By modern forestry experts the forest of the St. Maurice is usually divided into three zones; a transition zone, a central mixed zone and a deciduous zone [14].

The transition zone extends from north of the water divide to Weymont. The soil is essentially of the forest type; it is light and contains much undecomposed humus with a carpet of conifer needles. The main tree types are grey pine, black spruce, and fir. In the valleys, on the banks of rivers where there is deeper soil, there is an association of fir, spruce, aspen, and birch.

The central mixed zone extends from Weymont to the parallel of 47 north latitude. Here the soils are better with respect to aeration and drainage. The main tree types are wild cherry, birch, aspen and ash. The conifers are white pine, red pine, spruce, fir, and cedar.

The deciduous zone stretches from 47 north latitude to the St. Lawrence. The soil here is less acid and more fertile. Beach, ash, elm, oak, and lime are the most important deciduous types. Conifers including white pine, spruce, fir and cedar occupy the less fertile land.

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14 L'Actualité Économique, L'économic forestière de la Vallée du Saint Maurice. October 1947.

Oliver Wells' report of 1852 describes the timber as follows, "nearly the whole district passed over, and of which I herewith forward a plan, abounds with white pine timber. Immediately upon the rivers, the quality of the timber is apt to be poor and subject to knots and shakes or rots, but on leaving the streams, we meet with table land and high swells, containing, both upon the side of the hills and in the valleys, thrifty pine mixed with hard wood. Excepting upon the River Mattawin, there is very little red pine. The general character of the land and features of the scenery, are very similar to those of the country along the Ottawa and tributaries, between Pembroke and Lake Temiscaming."

"The Banks of the St. Maurice, for a considerable distance above Rat River, are, (in most places), high and steep and produce an inferior growth of soft timber; but on topping the banks the country is more level with a considerable mixture of hardwood, with some pine and a better soil[15]."

"From the mouth of the Vermilion upwards, to the distance of thirty miles, the banks are generally hilly and bear a prodigious quantity of pine; on the east bank this growth extends to a considerable depth being particularly fine about the River Trenche; on the west bank the same growth extends as far in as

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15 Bignell -- See report cited on page 13.

the Coucoucache, being a block of several hundred square miles of fine pine, and pine alone."

"From the Coucoucache to Weymontachingue the banks vary in some places being high, steep, and rocky, and in others low; but although the soil does not become poorer, the timber is inferior in size and quality."

There thus appears to be a very definite falling off in the quality of the timber to the north, and this independent of the effect of topography and soil. Bignell confirms this as he describes the territory above Weymontachingue in its virgin state. "The country on the St. Maurice above the Hudson's Bay Company Post at Weymontachingue is generally poor soil, light and sandy; in some places rocky, mountainuous and barren; the valleys of the tributaries, however, present a better soil, which is loamy and fit for culture; the country is less mountainuous on nearing the Great Lakes, but the soil worse; the timber throughout is an inferior growth of boileau, spruce, silver fir, tamarack,and cypress, the last being the prevailing growth, which always indicates a sandy soil;.....".

An interesting feature of the original vegetation was the occurrence of meadows along valley bottoms, probably as a result of the action of ice and frost which prevented the growth of trees. Bignell wrote, "the Vermilion also offers many facilities to lumberers, for fodder, etc. as from about the

sixteenth mile tree to the twenty-third, the banks on both sides are natural meadows, a good soil, producing a spontaneous growth of hay, and susceptible of any improvement at trifling expense." Catalogne in 1709 also described the meadows in the fief Marsolet where he said, "there was a great expanse of grass land on which to pasture the animals"[16].

Another variation in the forest landscape south of the Shield was the "tourbiere" or bogs. Dominique St. Cyr who accompanied an exploratory party to Champlain County in 1874 wrote, "although immense forests cover the whole of the northwest part of this county . . . . . .the great deposits of peat deserve some place in this report. The peat is found usually lying on a bed of marl which was at one time the bottom of a deep lake. The vegetation of the bogs consists principally of sphagnum moss"[17]. Beside these mosses the bogs were also the favourite habitat of larches, and several species of flowers. The peat was formed by the decay of these plants. The bogs were of considerable size, the one in the parish of St. Luke covering about two square miles, and in the latter half of the 19th century the peat which was usually five to six feet thick was exploited for commercial purposes.

The outstanding feature of the valley's vegetation was, however, its thick forest cover with the valuable white pine which

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16 Tessier, Three Rivers - Four Centuries of History

17 Cloutier, Histoire de la Paroisie de Champlain 1915

by the 1870's had almost entirely disappeared. The black spruce and jack pine in the upper valley was also of great potential value and is at present being exploited.

Such was the physical environment into which came the first white settlers from France. It was on the whole forbidding, and contained only two major resources and these were not easily exploited -- timber and water power. With a comparatively primitive technology the first arrivals contented themselves with the exploitation of the soils and animal life to which there were great limitations.

CLIMATIC TABLES

These tables are extracted from the Climatic Summaries published by the Meteorological Division of the Canadian Department of Transport.

TABLE 1
MONTHLY AVERAGES OF MEAN DAILY TEMPERATURES

	Jan.	Feb.	Mar.	Apr.	May	Juhe	July	Aug.	Sept.	Oct.	Nov.	Dec.
Montreal	14	15	26	42	56	65	70	67	59	47	33	20
Quebec	10	12	23	37	51	62	67	64	56	44	30	16
Three Rivers	10	12	24	39	52	63	68	66	56	45	32	16
La Loutre Rapids	1	4	17	32	45	57	62	59	51	39	24	9
La Tuque	8	5	20	37	51	59	64	63	54	42	28	13
Manouan	3	5	19	34	47	57	62	59	52	40	25	11

TABLE 2
MONTHLY AVERAGES OF DAILY MINIMUM TEMPERATURES

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Montreal	6	8	19	34	46	56	61	59	51	40	28	13
Quebec	2	4	15	29	41	52	57	54	48	37	24	9
Three Rivers	1	1	15	29	41	52	57	55	45	36	25	9
La Loutre Rapids	-9	-8	5	22	34	44	50	48	42	32	17	2
La Tuque	-8	-8	8	26	38	48	52	50	43	33	20	4
Manouan	-8	-8	8	22	35	44	49	47	40	31	17	2

TABLE 3

MONTHLY AVERAGES OF DAILY MAXIMUM TEMPERATURE

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Montreal	22	22	33	48	63	73	78	75	67	54	39	25
Quebec	18	20	31	44	61	72	76	73	64	51	36	22
Three Rivers	20	23	34	48	63	74	78	76	67	53	39	24
La Loutre Rapids	11	15	28	42	57	69	73	70	61	46	30	16
La Tuque	16	19	31	48	63	70	76	75	65	51	35	22
Manouan	15	18	31	45	60	70	74	71	63	50	33	20

TABLE 4

MONTHLY AVERAGES OF EXTREME HIGHEST TEMPERATURE

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Montreal	42	41	49	70	81	86	89	87	82	71	58	45
Quebec	39	38	45	64	79	86	88	84	79	67	53	40
La Tuque	37	37	49	70	83	90	90	88	80	72	54	39
Shawinigan Falls	36	36	49	68	81	88	89	87	80	68	54	30

TABLE 5

AVERAGE MONTHLY PRECIPITATION IN INCHES

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Montreal	3.76	3.02	3.46	2.60	3.14	3.43	2.74	3.45	3.65	3.42	3.55	3.58
Quebec	3.45	2.74	3.02	2.35	3.15	3.68	4.02	3.98	3.60	3.41	3.23	3.22
Three Rivers	3.15	2.41	2.35	2.92	3.29	3.84	3.92	4.25	3.98	3.55	3.98	2.92
La Loutre Rapids	2.53	1.73	2.39	2.24	2.67	3.28	4.54	3.90	3.80	3.68	2.88	2.45
La Tuque	2.39	1.95	1.99	1.91	2.86	3.25	4.09	3.58	3.43	2.77	2.64	2.03
Manouan	2.77	1.81	2.59	2.38	1.92	2.30	3.09	2.73	2.58	2.33	2.60	2.56

TABLE 6

AVERAGE MONTHLY SNOWFALL IN INCHES

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Montreal	27.7	23.3	20.1	5.5	0.1	-	-	-	T	0.9	10.9	23.8
Quebec	29.3	23.1	20.8	8.7	0.5	-	-	-	T	1.8	14.4	25.1
Three Rivers	22.6	20.5	9.4	4.0	-	-	-	-	-	0.2	6.6	18.2
La Loutre Rapids	23.5	16.8	19.7	9.2	1.7	0.1	-	T	0.2	6.8	17.0	21.0
La Tuque	21.3	17.7	14.4	5.1	T	-	-	-	-	1.9	11.8	18.4
Manouan	26.3	17.3	21.1	11.4	0.9	0.1	-	-	0.1	4.4	16.2	21.5

CHAPTER 11

EARLY EXPLORATION AND SETTLEMENT 1634 -- 1852.

Although the impact of Indian culture upon the primeval landscape was small by comparison with that of the European, nevertheless the existence of the different tribes, their location and their habits were important landscape features. They were important in a number of ways; trade with them helped the early colonies to survive and at the same time hindered the agricultural development of the valley; fear of them influenced the location of new settlements and affected their growth; their experience of the country aided its exploration.

We are concerned with four tribes in this area. They are the Algonquins who occupied the territory west of the St. Maurice; the Hurons in the vicinity of Georgian Bay; the Montagnis to the east of the St. Maurice; and the Iroquois in the St.Lawrence Lowlands.

The Algonquins were primarily nomadic hunters and fishers who migrated from place to place in search of their food. They had no permanent settlements and little agriculture. Although they numbered only from three to four thousand[1] and were scattered over a large territory adjacent to the Metaberoutin, their name

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1 Jenness, Indians of Canada

for the river, they were important. This was largely because of their skill in hunting, and their friendly disposition towards the French. An important section of the Algonquins were the Têtes de Boules band of the Upper St. Maurice. The Jesuits spoke of the Attikamégues and of the 'whitefish' tribe inhabiting the "Upper Three Rivers", and the Têtes de Boules in the Indian Reserve at Weymontachingue today call themselves Tcekamek or 'whitefish people'. The agriculture of the Algonquins appears to have been confined mainly to those of them who lived in contact with the Hurons and grew a little maize, squash,and beans. There appears, however, to have been an Algonquin settlement at the site of Three Rivers prior to the arrival of the French. This village was apparently destroyed by the Iroquois as the first settlers found only its ruins. It is possible that small clearings of this kind where the women cultivated small patches of corn were fairly common throughout the valley. They had summer fishing grounds and winter territories for the hunting of moose and migrated between them; it is interesting to note that, before the arrival of the European, they did not hunt most of the fur-bearing animals which we consider valuable today.

The Iroquois, implacable enemies of the Algonquins lived in the Lowlands to the south. They had developed agriculture much more than any other tribe. Their settlements were semi-permanent and they were able to store agricultural products for the winter

and were thus less dependent upon hunting. They knew nothing, however, of fertilization and were obliged to desert their villages every three or four years. It is also believed that they moved whenever the supply of wood fuel became too distant from their camps. Their culture thus had far more effect upon the landscape in the form of clearings than did that of any of the other tribes.

The Hurons were like the Iroquois in culture while the Montagnais resembled the Algonquins.

The most significant fact, however, about the Indian situation was the rivalry between the Iroquois and the Algonquins for this closely affected the early settlement of the St. Maurice Valley.

The first European account of the St. Maurice River is given in a journal of Cartier's voyages dated October 7th. 1535[2] -- "et le jour nous vinmes poser par le travers d'une rivière qui vient devers le nort, sortant audict fleuve; à l'entrée de laquelle y a quatre petites ysles plaines d'arbres; nous nomasmes icelle rivière la Rivière de Fouez. Et pource q. l'une d'icelles ysles s'avance audict fleuve, et qu'on le veoit de loing, feist le capitaine planter une belle grande croix sur la pointe d'icelle, et commanda apprester les barques pour aller avec marée, dedans icelle, pour

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2 Jacques Cartier op. cit.

venir la nature d'icelle, ce qu'il fut faict et nagèrent celui jour amond rivière. Et parce qu'elle fut trouvée de nulle expèrience n'y profonde, retournèrent et appareilasmes pour aller aval".

Basque and Breton fishermen probably visited the area between 1535 and 1599 but it is not until the latter date that we find further written accounts. Dupont-Gravé made a reconnaissance and was greatly impressed by the advantages of the confluence of the two rivers as a site for settlement. There is an account in Champlain's writings of a controversy between Dupont-Gravé and Chauvin over this matter. Dupont-Gravé,"remonstra audit Chauvin plusieus fois qu'il fallait aller amont le dit fleuve, ou le lieu est plus commode à habiter, ayant esté eu un autre voyage jusques aux Trois Rivières pour trouver les sauvages afin de traiter avec eux"[3].

In 1603 Dupont-Gravé went up the St. Lawrence with Champlain in search of a good site for settlement. Champlain himself was impressed by the favourable conditions around Three Rivers and wrote that he saw land, "qui est basses est plaine de tous bons arbres, jusques aux Trois Rivières, ou il commence d'yavoir tempèrature de temps quelques peu dissemblables à celui de Sainct

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3 Champlain op. cit.

Croix, d'autant que les arbres y sont plus advancés qu'en aucun lieu qu' j'eusse veu"[4].

The fact that an Indian settlement existed at the site of Three Rivers is some indication of its qualities. Its main advantage was the fact that it stood at the mouth of a river which gave access to about 20,000 square miles of northern country. It was, as it is today, "la porte de la Mauricie". To the first Europeans who were primarily interested in the fur trade this was very important. Here was a point favoured by the Indians when they brought their winter's furs out of the back country. "Les Sauvages se plaisent d'avantage à Trois Rivières que non pas à Quebec; aussi fait-il la plus souvent leur sejour et en plus grand nombre[5]."

Equally important was the comparative security which could be assured at Three Rivers. "Elle est eslevée de costé du Sud, et va quelque peu en baissant de costé du nort. Ce serait à mon jugement une place bien propre à habiter, et pourrait on le fortifier promptement, car sa situation est forte de soy[6]."

Nevertheless Three Rivers did not become the site of the

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4 Champlain ibid
5 Blanchard op.cit.
6 Champlain op.cit.

first French settlement. From 1610, however, traders met the Indians at the mouth of the St. Maurice at an annual "trade fair". In 1618 the first building, a small log chapel, was erected by Père Paul Huet to serve the Indians and traders. This kind of temporary settlement might have continued for much longer had it not been for the hostility of the Iroquois toward both Algonquin and whitemen. It was because of this hostility that Champlain decided to establish a fort which would protect the fur trade in La Mauricie[7].

In 1634 Laviolette was commissioned to build a fort "on a sandy promontory" at the mouth of the St. Maurice. He arrived at the site on the 4th of July with 10 men, 3 women and a small party of soldiers. Two priests, Breboeuf and Daniel, also accompanied him. It seems that Champlain had at first considered building the fort on one of the islands at the mouth of the St. Maurice, but finally decided upon the mainland. He chose the lowest of the terraces, about 35 feet above the river, which has come to be known as "le Platon". This location had a number of advantages. It was easily defended, having a steep drop towards the St. Lawrence and gentle slope to the north. It was safe from flooding and the sandy soil made road-making unnecessary.

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7 Sulte, p.37, states that immigrants arrived from France as early as 1617 and that there was permanent settlement after that time. He gives no details but quotes Ferland V.1 p 187.

The original settlement was associated with a grant of 600 arpents by the Company of "One Hundred Associates" to the Reverend Fathers of the Society of Jesus which was to be held in "grande aumône" or mortmain. This was followed by other grants -- in 1668 Maurice de Poulin received the Seigniory of St. Maurice, and the Sieur de Tilly received the Seigniory of St. Michel. Ste. Marie près de Batiscan, Ste. Anne de la Pérade, and Ile St. Joseph were also granted during this period.

At first there was only a fort which served as a place of refuge for a few habitants who settled in its vicinity. As a result of the Iroquois war it became necessary to wall in these houses. The settlement then took on soemthing of the appearance of a town with four streets crossing at right angles within a wooden palissade. By 1645 its population was only 100 including 21 children and 11 families.

The growth of the population of the town was very slow for a number of reasons. From 1637 to 1655 the Iroquois maintained a reign of terror which not only discouraged settlement but also disorganised the fur trade. In 1651, for example, the Iroquois pursued the Algonquins up the St. Maurice to its headwaters thus almost completely stopping the trade. Furthermore Three Rivers suffered from competition with newly formed posts to the west such as Montreal (1642) and Sorel (1665). These newcomers took away from Three Rivers the distinction of being a frontier outpost.

Indians who used the Gatineau-St. Maurice route to meet the white man found it much simpler to go down the Ottawa to Montreal. In 1658 further competition came from the Postes due Roi which were established from Lake Mistassini and Nekoubau to the Saguenay and greatly reduced the St. Maurice trade. The fortunes of the town were always closely related to activities in the hinterland and it was not until the beginning of the timber trade in 1852 that the population began to increase rapidly.

The end of the Iroquois war and the demobilization of the Regiment of Carignan brought some improvement. The officers of this regiment were given land in the Lake St.Peter Region, in Cap de la Madeleine, Champlain, Batiscan, Ste Anne de la Pérade, Pointe du Lac, Yamachiche, Rivière du Loup and Maskinongé. By 1661 the total population of Canada was 9677 and of this number Three Rivers had 150 people and 26 families. By 1681 Cap de la Madeleine was already larger although it had only been founded in 1651.

Although the population increased slowly, exploration of the Upper St. Maurice proceeded. The most notable and the first exploration was carried out by Père Buteux, a missionary, although other traders and adventurers who have left no record must have ascended the river. In 1651 he received permission to visit the Attikamégues Indians on the Upper St. Maurice, and left Three Rivers on the 27th March. M. de Normanville, two servants, a

body of soldiers and about 40 Indians accompanied him. He camped for the first night about three miles below Shawinigan and in his journal of the following day describes the Falls of Shawinigan and Rapids, des Hêtres, Grand'mère and Grandes Piles. It is because of his description of three mountains at Shawinigan that Sulte, and others who claim he was describing Rapide des Grès, find it necessary to suppose that the three mountains have disappeared as the result of an earthquake. E. Denoncourt suggests a more logical explanation. If the party had disembarked near the Petite Shawinigan and scaled the height of land up to the Upper Bay that would have been one mountain. Côte des Belges or Avenue de Érables would make the second and the hill of St. Pierre Church the third. This circuitous route may bave been necessary owing to the rapid water in the Upper Basin (See Appendix A).

Pére Buteux returned on the 17th June and made his fatal second journey in April 1652 in the course of which he was murdered by the Iroquois, probably at Shawinigan.

The next definitely known exploration of the river was that of the famous Des Grœseillers in 1657. In the following year he was successful in reaching the Ottawa and did not return to La Mauricie. At this period the Iroquois were watching portages on the river and greatly hampering trade so that it was decided to send a powerful expedition upstream under Jacques Godefroy de Vieux Pont in 1661. Soon after setting out he met 80 Iroquois

and after two days of fighting his party was wiped out. This was a blow from which the Attikamégues did not recover,what remained of them being absorbed in the related Têtes des Boules tribe.

Apart from the brief activities of La Verendrye in the fur trade in the latter part of the 17th and early 18th century there was little economic activity in the Valley for 150 years. At La Tuque fur trading posts of the "Postes du Roi" and the Hudson's Bay Company were established,also at Rivière Aux Rats. In 1815 La Tuque consisted of 3 houses and 1 store.

By 1739 Three Rivers had grown to a population of 378. Levasseur de Nère, an engineer, gave the following details concerning the town at the turn of the century. There were 32 houses in the main section and 17 in the faubourg or basseville [8]. These buildings included a church (1682), a presbytery (1686), a convent,the church of the Recollets,and the Governor's House. The limits of the Parish stretched from the St. Maurice to Yamachiche, and on the south shore of the St. Lawrence from Bécancour to Nicolet.

The reasons for the survival of Three Rivers as a town rather than as a cluster of farming settlements lies mainly in its location with reference to Montreal and Quebec. Although in 1765 Berthier, Cap Santé, Neuville and St. Augustin were all

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8 Tessier op.cit.

larger than Three Rivers they possessed much less of the character of towns. Three Rivers, halfway between Quebec and Montreal was a convenient administrative centre for the Lake St. Peter region. It thus acquired a college in 1697, a governor, royal lieutenant, civil and judicial officers, indeed something of a minor court. This political importance helped to preserve it when it had no advantage over its neighbours economically.

In 1733 work began on the Forges a few miles above Three Rivers and this resulted in the establishment of a thriving village, the activities of which benefitted Three Rivers, the entrepôt. Régaud in 1748 described les Veilles Forges as containing 120 persons. Their houses were a little removed from the two iron mills and well-spaced, and scattered according to no particular plan. The workshops were black but the houses were gaily painted in yellow and red, and were very tidy, each worker keeping a large garden. The largest building was the house of the Director which dominated the scene.

"Les hauteurs couronnés par la forêt primitive, envadraient le paysage sur lequel se detachèrent, imposante dans sa masse, la grande Maison, avec son toit Normande, ses murs énormes et ses

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9 Caron, Napoleon. Deux voyages sur le Saint Maurice,1889 (Trois Rivieres).

fenêtres riantes aux quatre faces de son long carré." Laterrière estimated that in the 1770's the operation of forges involved the employment of from 400 to 800 persons.

Expansion was slow and the settlement did not impress the traveller from Europe, one of whom wrote in 1709 the following description of Three Rivers -- "elle est petite peu peuplée, et d'un petit commerce qu'elle fait avec deux missions de sauvages abénakis qui sont etablis aux environs et avec quelques autres sauvages qui descendent du Nord par cette rivière qui en est proche. . .;la paroisse est desservie par un Recollet, dont il y a un convent, aussi bien que d'Ursulines lesquelles tiennent un hôpital pour le soulage ment des malades; cette ville est entourée de pieux, et la plupart des maisons ne sont que de colombage et piéces de bois mises les unes sur les autres[10]".

The method of settlement in adjacent rural areas was entirely different from that of France. The European type of village was unknown in spite of some governmental attempts to create it. La Hontan, a French officer who travelled up the St. Lawrence in 1685, writes --"les nomms de 'bourg' et de 'village' sont inconnus, on se sert de celui de 'côtes' qui sont des seigneuries dont les habitations sont escartées de

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10 Tessier op.cit.

deux ou trois cents pas les unes des autres et situées sur le rivage de fleuve Saint Laurent". [11] He goes on to tell how the poorest habitant had land four arpents wide and forty deep.

The housing and general standard of living of the habitants are difficult to assess because of the conflicting reports which were sent back to France. For example La Hontan says, "toutes le monde est bien logé et bien meuble". On the other hand Mère Marie de l'Incarnation writing to Paris at about the same time describes the riches of New France with this reservation --"cette abondance neanmoins n'empêché pas qu'il y a ici un grand nombre de pauvres". The poor she explains are mostly people trying to establish themselves on new land.

The attraction offered by the fur trade militated against the agricultural settlement of the colony. So much so that in 1676 the king forbade sorties into the forest to meet the Indians. In 1678 the habitants were forbidden to go more than a league from their homes but in 1679 this order was relaxed so that they could go from January 15th to April 15th.

By the time of the conquest agriculture had made comparatively little headway. The new English Govennor, Ralph Burton, deplored this situation which he put down to the laziness of the people, the

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11 Tessier, ibid.

easy profits of the fur trade, and contriband trade with the English colonies. The area of the government of Three Rivers at this time stretched from Ste. Anne de la Pérade to Maskinongé on the north shore and a similar distance on the south. In the total of eighteen parishes there were 6472 people of whom 4188 lived in the eleven parishes of the north shore. In Three Rivers there were one hundred and fourteen houses. Out of a total area of 92,840 granted arpents only 16,701 were cultivated, but by 1808 Three Rivers had more than doubled in size; it then had 250 houses and a population of 1500.

The first requirement of any colonial settlement has always been a natural product which could be traded for comforts and tools. Thus in Virginia, New England and New France settlement and expansion depended to a great extent upon the ability of the colonists to gather or produce exportable commodities. In New France this process was carried to the extreme where trade was carried on for the benefit of a few men, and in a fashion which tended to hamper the growth of population. This should not, however, blind us to the fact that,from the earliest days, commerce was essential to the welfare of New France and of the St. Maurice Valley. The harmful emphasis on one commodity and the various attempts to diversify commerce were important facets of the early history and geography of the area.

The commerce of the Valley depended to a large extent upon

the development of industries which were based upon local resources, and the building of a transportation system capable of handling their products. Industry and transportation may therefore be fittingly considered in conjunction with commerce.

The reason for the establishment of Three Rivers, and the dominant activity in the Valley in its early years, was the fur trade. From 1610 Indian hunters met French traders at the site of Three Rivers in July and August. They exchanged beaver and other pelts for knives, axes, shirts, spoons and pocket mirrors and similar articles. After the trading was over both Indians and French dispersed.

In the period 1610--1634 the fur trade of Three Rivers flourished largely because it had little competition either from the east or from the west. The establishment of a fur trading post at Sault St. Louis proved to be a failure and it was abandoned. Montreal and Sorel had not yet been established and the Postes du Roi had not begun to interfere with the prosperity of Three Rivers. The strength of the Iroquois south of the St. Lawrence led the Huron Indians to bring their furs down the St. Maurice by way of the Gatineau and the Liévre. They preferred this to the dangerous alternative of following the Ottawa and St. Lawrence route. Montagnais from the east also used the St. Maurice as there were no posts as easily accessible on the Upper Saguenay. Finally of course, the Algonquins who inhabited

the St. Maurice Valley were drawn to Three Rivers.

With the establishment of the Postes du Roi to the east and other posts to the west the trade of the St. Maurice began to decline. Nevertheless the "coureurs de bois", of Three Rivers operated in the Valley until the granting of a monopoly to the family, Gauthier de Varennes. Varennes was Governor of Three Rivers from 1669 -- 1689 and was active in the fur trade in partnership with Pierre Boucher. Frontenac stated that in 1681 they each employed five canoes and ten woodsmen. Shortly after his appointment Varennes established a post at La Gabelle in order to stop the Indians before they reached the traders of Three Rivers. He was soon accused of attempting to monopolise the trade and of abusing his position as Governor. Through influence at court, however, he was able to obtain official permission to operate this monopoly. After his death in 1689 the post at La Gabelle was little used but was regranted later to his son, Sieur de la Verendrye, in recognition of military services. La Verendrye found that the post at La Gabelle did not draw a great deal of trade. He therefore decided to establish two posts further north, one at Ile aux Tourtes and the other at Shawinigan. He was greatly admired by the Indians for his honesty and his skill in woodcraft so that his fame soon travelled far to the north. Têtes des Boules, Iroquois, Hurons, Northern Algonquins, Montagnais, Abénaquis and others came to his post. Perhaps because of his

honesty and partly due to the growth of his family, La Verendrye found his income from Shawinigan insufficient and in 1728 he left for Lake Nipigon. Others took over his post but did not succeed and it was soon abandoned.

The establishment of Postes du Roi and of the Hudson's Bay Company at La Tuque together with diminution of fur bearing animals caused the trade to migrate farther upstream. The Hudson's Bay Company also had a post at Rivière aux Rats and later at Weymontachingue (the reserve of the Têtes des Boules).

The concentration of the early French settler upon the fur trade was disquieting to enlightened government officials in France. It meant very often that persons in authority in Canada neglected their duties in their eagerness to make a fortune, as well as neglecting other less lucrative industries. In addition the young habitant was attracted by the free life of the woods and often shirked the hard task of clearing the land and chose instead to engage in the fur trade. In 1672 Louis XIV strongly urged the colonists not to neglect other sources of income such as gulf-fishing and the production of potash from wood.

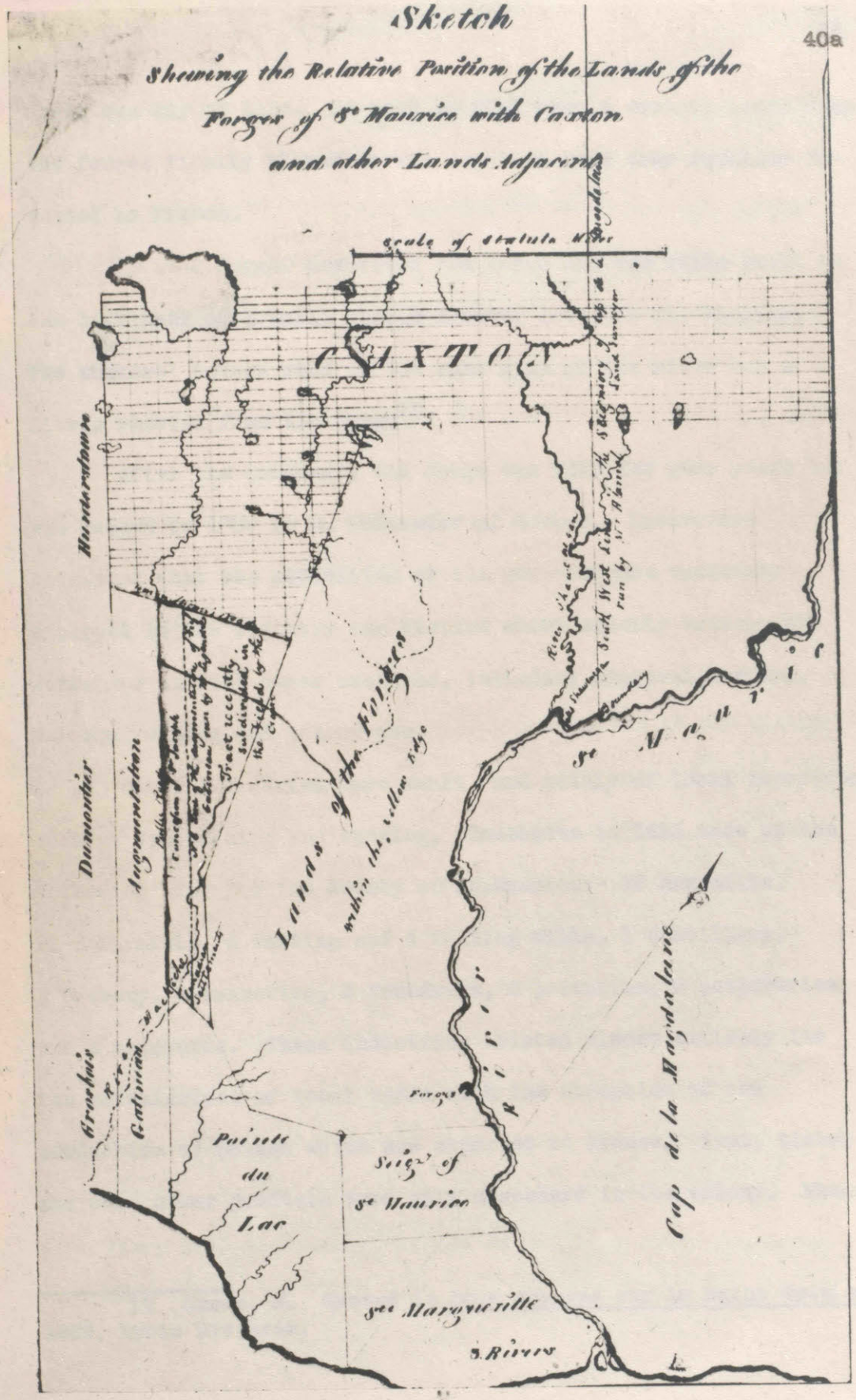
The home government was thus very ready to examine the reported sources of iron ore in the Lower St. Maurice and to help in the establishment of an iron industry. In 1666 M. de la Tesserie, by order of Colbert, explored the lower part of the

valley and discovered rich deposits of iron near Three Rivers. Later, under Talon's administration, M. de la Potardière examined the deposits at Champlain and Cap de la Madeleine but in his report was far from enthusiastic over the economic value of his finds. His report retarded the development of the industry for a number of years. Fortunately other men persisted in the conviction that iron-making was possible in the valley.

In 1730 the King gave M. de Francheville the right to exploit the mines in the Seigneurie St. Maurice,and in 1733 work on the forges began but was discontinued on de Francheville's death in 1735. In the following year a new company was formed which bought the Seigneurie for 6000 livres; it was known as Cugnet and Company or the Compagnie des Forges. The King sponsored its work and loaned $100,000. of the Crown Funds without interest. Because charcoal was one of the basic raw materials for iron production, the company was also granted the fief of St.Etienne. In spite of this assistance the company was not a success and in 1743 its property reverted to the crown.

Nevertheless the forges, located about seven miles north of Three Rivers continued to operate and soon began to supply all the iron needs of the colony such as stoves, axeheads and other tools.

Iron-workers were imported from Bourgogne and Franche-Comté, who knew the iron trade. Peter Kalm, a Swedish naturalist and traveller, observed in 1749 how extremely tenacious they were of



Map of Les Forges dated 1831

their own way of life. So much so that over a century later when the forges finally closed it was reported that some families returned to France.

In 1748 Règaud described the forge and two mills built on the left bank of a small stream flowing into the St. Maurice. The workers' houses were on the same side of the river but a little removed from the forge[12].

After the conquest, the forge was idle for some years but was leased in 1707 by M. Pelissier of Quebec. Laterriere estimated that the activities of the 400--800 men variously employed in the industry was divided about equally between the workshops and the other sections, including charcoal burners, carters, miners and quarry-men.

Other industries were small and mainly of local importance, such as soap-making and tanning. Bouchette in 1815 made up the following list for the County of St.Maurice:- 17 saw-mills, 11 corn mills, 4 carding and 4 fulling mills, 1 distillery, 1 brewery, 4 tanneries, 2 foundries, 2 potteries, 3 potasheries, and 3 shipyards. These industries existed almost entirely for the satisfaction of local needs with the exception of the production of potash which was exported to France. Iron, timber, and some other products were sold elsewhere in the colony. Wheat

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12 Caron, N. Quoted in Deux voyages sur le Saint Maurice, 1889, Trois Rivieres.

was also exported in some quantity.

Few details are available concerning the nature of local commerce between Three Rivers and the neighbouring farm lands. However, Sulte's account of the growth of local market-places throws some light on the subject. In 1722 a market was established to which the farmers were obliged to bring their produce on pain of a fine payable to the church. The market was open every Friday. It was enlarged in 1791 and moved to the corner of the Rue de Platon and the Rue Notre Dame. Fish, meat, and vegetables were the main products sold, as well as bread made by the habitant. There appears also to have been a market near the water's edge for certain products.

Early transportation depended upon the use of the rivers in their natural condition. The St. Lawrence made communication with Quebec and Montreal relatively simple, although the larger sailing vessels did not venture beyond Quebec because of the difficulty of steering in the narrow channel. Communications with the Upper St. Maurice, however, were not so easy. The difficult nature of the river was perhaps the greatest single cause in retarding the development of the valley. Only the birch-bark canoes could venture more than a few miles above Three Rivers. In the first hundred and twenty miles of the river there were eight major rapids as well as other dangerous

but less spectacular spots. Bouchette in 1815 gave the following list of portages encountered in a journey from Three Rivers to La Tuque.

Portage.	Distance from previous Portage	Length of Portage
La Gabelle	5 leagues	550 yards.
Aux Grais	1/3 "	1034 "
Shawinigan	1½ "	554 "
Aux Hêtres	1½ "	616 "
Grand'mère	1-1/3 "	336 "
Petites Piles	1-1/3 "	200 "
Grandes Piles	1 "	32 "
La Tuque	26 "	-

It was a difficult journey which, together with the nature of the land, hindered settlement toward the north. It also prevented expansion of the timber trade for the few operators who tried to send logs down the unimproved river, lost their investment and a whole winter's work. Such an operator was Abraham Grant who in 1852 tried to send rafts of square timber down from the Mattawin. The rafts were loosened by the first two rapids (des Piles and Grand'mère) and were completely destroyed by the falls at Shawinigan. Few were disposed to invest money in such a hazardous enterprise.

The excellent harbour of Three Rivers compensated to some

extent for the unnavigable river. Bouchette wrote, "between the island Bellevue (Île de la Potherie) and the mainbank there is a very good place to shelter vessels in winter, where they remain safely in eight feet of water and escape accidents caused by the breaking up of the ice in spring". Ice was not so great a problem on the St. Maurice as on some rivers owing to the fact that instead of riding down on a fast current it melted "in situ". This was due to the fact that the water was backed up under the ice by the high level of the St.Lawrence.

Few roads were made in the Valley until a later date when there was a greater need for access to the upper river. Bouchette noted that in 1815 the streets of Three Rivers were unpaved and untended. One of the original advantages of the site was that permeable sand made road-making unnecessary and there were no gutters in Three Rivers until 1887. In 1734 a road was completed between Montreal and Quebec with toll-ferries from Three Rivers to Cap de la Madelaine. The only other road of importance at this time was that which connected the forges with Three Rivers. Later when attempts were made to expand the timber resources a road was built for winter use from Three Rivers to the edge of the Shield. Oliver Wells in his report recommended that a road be constructed from Quebec to the timber country which he pointed out would be 15--20 miles shorter than the road from Three Rivers. The existing road was partly over

ice and was at all times unsafe and difficult because of the high banks and snow-drifts. The cost of construction, he estimated would have been from £3.15.0 to £5.0.0 per mile with 50--60 miles of road to be cut out. The cost of survey would have added £150 to £200. As will be seen later his suggestion was not adopted.

Economic activity in the Valley during this period was well summed up by the French traveller, P. Antoine Silvy. Speaking of Three Rivers he said, "elle est petite, peu peuplée et d'un petit commerce". The forges added to its reputation to some extent but by 1852 the exploitation of the Valley's resources and its occupation extended only a few miles upstream with the exception of some attempts at lumbering and the small fur-trading posts, as at La Tuque and Rivière aux Rats. In 1828 the government sent Bouchette to survey the Valley. His report was so enthusiastic that a further party was dispatched under Ingall in the following year. The work of these two men culminated in the expenditure of money by the government later in the century and the beginning of the lumber era. On the eve of the new era (L'ère nouvelle) La Mauricie showed few signs of its future wealth.

Neither did the St. Maurice Valley offer great opportunities for the establishment of agricultural communities. The lower valley was made up largely of heavily wooded, sandy terraces, and of considerable areas of swamp and "tourbières". Above Grandes Piles lay the Shield which was inaccessible, rocky, and infertile. Nevertheless some settlements were made in the lower valley, and there is every reason to believe that the virgin soils yielded fairly well in the early years. "Ces terres vierges rapportent aux centuple" wrote La Hontan in 1665, and Catalogne noted the fertility of the fief Champlain, and even of the water-logged land of the fief Marsolet which when drained by ditches was capable of producing "all kinds of grain".

The greatest problem was that of clearing the land. Various methods were employed, some of them copied from the Indians. Some timber was cut for construction purposes and fuel, and the roots of the trees were dug out with a great deal of labour, in much the same fashion as Louis Hemon's Samuel Chapdelaine toiled at a later date. Another method was to cut rings in the bark of the trees so that they died and were more easily removed. Burning was also sometimes used. A few small patches of land were cleared by the Induans in the vicinity of Three Rivers, and crops of corn and pumpkins were planted. The priests tried to encourage the Indians to adopt a sedentary, agricultural way of life where they would be more amenable to the

teachings of Christianity, but their efforts met with little success.

The growing season was short and there was always a danger from late spring frosts, or from an early fall. "On séme le blé dans le mois de Maie et la récolte s'en fait à la mi-Septembre." This short growing season was to some extent offset by the abundance and variety of the crops. "Ici les blés, les légumes et toutes sortes de grain croissent en abondance. La terre est une terre à froment laquelle plus on découvre de bois, plus elle est fertile et abondante." At first little wheat was grown as it was believed to be unsuited to the climate. Eventually winter wheat was introduced and the first sowing appears to have taken place in 1644. The other main crops were peas, oats, and potatoes, although the latter were not grown for human consumption and were only eaten in time of famine.

By 1667 1,032 arpents had been cleared in the vicinity of Three Rivers and this land supported 142 head of cattle. Cap. de la Madeleine, at the same date, had 1489 arpents of cleared land and 175 head of cattle. By 1681 there were in the Government of Three Rivers 3,758 arpents of cleared land with 738 oxen, 16 cows, and 12 sheep. It should be noted that these

figures are not directly comparable; the first refer to the parish or immediate vicinity of Three Rivers, and the second to the governmental division. Horses were not very much used at first and there were only two in the whole area at this date.

Although the process of colonisation and settlement was slow the amount of cleared land gradually increased. The Census of 1688 gave the following figures for cattle and crop production:

1688 AGRICULTURAL STATISTICS

Parish	Wheat in bushels	Other Grains	Cattle	Sheep	Swine	Horses
Three Rivers	2300	266	127	90	106	7
Cap. de la Madelaine	1960	484	115	12	99	5
Batiscan) Champlain(Marsolet) Riv.du Loup)	6716	2591	409	5	251	13
Tonnancourt (Villemur)	1388	310	85	41	41	0

From the above table it is evident that horses were coming into more general use, and that the farming practices were becoming more diversified with an increasing number of sheep and pigs, and some variety in grain crops.

Flax and hemp were developed later under encouragement from the home government and these crops helped to provide cloth for the habitant and a marketable surplus. In 1735 Hocquart

advocated the raising of tobacco which was added to the list of crops at about this date.

There are conflicting reports concerning the suitability of the area for the raising of sheep. Frontenac reported in 1672, "les moutons qu'on croyait avoir de la peine à nourrir l'hiver viennent si bien en ce pays que je vous dirai avoir vu un agneau de six mois aux Trois Rivières qui me parut si grande j'eus la curiosité de le faire mésurer et je trouvai depuis le tête jusqu'à la queue quatre pieds. Je ne pense pas qu'à Beauvais ils soient quère plus grande". He noted that the dry sandy soil was good for the ewes, "on pourait fort bien appeler toute la côte de Champlain, du Cap de la Madeleine et des Trois Rivières, La Sologne du Canada". However, Peter Kalm, a Swedish naturalist who visited Canada in 1749 makes special note of the poor condition of the sheep and of the difficulty of feeding them through the winter. It is possible that Kalm's observations were not sufficiently complete to give him a true idea of conditions.

The Census of 1765 gives the following statistics concerning the state of agriculture:

THE CENSUS OF 1765--AGRICULTURAL STATISTICS

Parish	Arpents Owned	Bushels Sown	Horses	Oxen	Young Cattle	Cows	Sheep	Swine
Grondines	5824	755	66	28	50	94	89	93
Ste.Anne de la Pérade	11664	2323	154	154	166	301	401	278
Batiscan	9313	2390	148	110	147	323	244	347
Champlain	5481	1257	77	49	87	134	29	159
St. Maurice	3205	809	89	29	67	107	115	184
Cap de la Madeleine	3945	1019	53	15	71	105	30	116
Three Rivers	3830	1119	100	111	78	231	78	276
Pointe du Lac	2070	621	39	32	35	74	2	81
Yamachiche	7861	2475	177	153	370	280	197	481

Thus horses had begun to outnumber oxen as draught anumals by this date and the amount of wheat grown had increased to the point where a considerable amount was exported. The new English Governor of Three Rivers did not, however, consider these figures as representative of a very great agricultural development for one hundred and fifty years of settlement. Indeed when compared with the advances of the next eighty years it was not very great. By 1831 there were in the government of Three Rivers 253,447 arpents of cultivated land out of 629,902 occupied. This land produced 383,544 bushels of wheat, 426,760 of oats, and 101,355 of other grains. It is interesting to note that oats production was at this date exceeding that of wheat, probably owing to the fact that there was increasing production of the latter in Upper Canada on more productive soils. Other crops were 55,300 bushels of peas and 910,295 bushels of potatoes.

Bouchette's notes of 1815 throw some light upon the condition of agriculture at this time. About one third of the land in the seigneuries under the government of Three Rivers was cultivated. In the Seigneurie of Maskinongé the soil was "rich and fertile" and suitable for all types of grain as well as for flax and hemp in places. The land was flat and was flooded in spring near the St. Lawrence where the meadows were especially rich and good pastures. The timber had been greatly thinned out and about two-thirds of the seigneurie was cultivated.

The best settlements were on the Chenail du Nord, on both sides of the Quebec road and on the east bank of the Maskinongé.

The seigneurie of Dusablé was crossed by a small ridge of higher land, to the south of which the soil was good, although poor to the north. It had been cleared of wood excepting small fuel wood. Only a small portion in the front of the Seigneurie of Carufel was cultivated. The soil was of "pretty good quality" with some reddish clay and sand. All kinds of good timber were abundant with some large pine.

The Seigneurie of Rivière du Loup had a sandy, light, red soil, sometimes mixed with clay. The land was generally level with flat, low pastures naar the lake. There was little good timber, but a prosperous farming community of some 30 or 40 houses with good roads in all directions. St. Marguerite with a light sandy soil, was "mostly well cultivated".

In contrast to the above areas, most of them somewhat removed from the St. Maurice Valley proper, the Seigneurie of St. Maurice had little or no agriculture, but considerable swamps with hemlock and cedar with maple, birch and beech on the higher land.

It thus appears that while the lands adjoining Lake St.Peter were fairly well farmed and productive, those actually in the St. Maurice Valley were little used, with the notable exception of St. Marguerite which owed its prosperity largely to the proximity of the markets of Three Rivers.

Above the Forges there was no agriculture whatsoever and even as late as 1852 only a few isolated shacks could be found on the Shield.

Although there has since been agricultural settlement at St. Boniface and Ste. Flore, and as far north as La Croche, it may be said that the St. Maurice Valley is not naturally suited to prosperous agriculture. At a time when there was a great deal of available land on the shore of the St. Lawrence it was largely by-passed.

CHAPTER 111

THE LUMBER ERA 1852--1898

As a result of the surveys of the valley made by Bouchette and Ingall the first forest concessions were made in 1831 to Patterson, Grieve, Thomson and Baptist. The concession of Thomas Grieve comprised part of the present town of Shawinigan, which he later sold to John Forman.

For about twenty years the exploitation of timber progressed very slowly owing to the difficulty of transporting logs safely down the river. Abraham Grant's experience was a typical example of the problem[1]. Furthermore there were continual complaints and controversies over timber limits. It was the custom of the government to sell limits by auction in other areas. In the St. Maurice Valley it was felt that sufficient bidders would not be forthcoming. Grants were therefore made by a simple licence system. Only the most approximate survey of limits had been made prior to 1846, but between that year and 1848 an accurate survey was made.

In 1848 the govennment began to consider the expenditure of money in improving the river. Between 1848 and 1850 various

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1 Vide ante page 43.

surveyors were sent to report on the value of the timber resources, and their reports, such as those of Bignell and Wells, are valuable accounts of the original condition of the forest.

The main problem was to so modify the numerous rapids and waterfalls that timber could be sent down the river without damage. For this purpose the government began works in 1852 at Three Rivers, Rapide des Grès, Shawinigan Falls and Grand'mère. These works consisted of booms, log slides, dams and lateral jetties. They were opened in 1853 and gave a great impetus to the lumber trade, in fact their construction may be said to mark the beginning of the exploitation of the forests of the valley.

The government was so encouraged by the result of its work that it decided to further improve the river, at La Tuque in 1855, Petites Piles in 1863, and Rapide de la Manigonce in 1856--57. By 1872 44,000 feet of booms had been built, 1000 feet of slides and 3300 feet of dams and jetties. At first there were no works on the tributaries. On the Vermilion private companies built at their own expense three thousand feet of booms and slides. These were purchased by the government in 1866.

The total cost of all these improvements was $300,000, for which there was a considerable return from taxes imposed upon the removal of timber from the valley.

There was an abundance of good pine often measuring as much as five feet in diameter. At first only the best timber was

Agricultural Settlement along the St. Maurice, north of Grandes Piles, which was associated with the Lumber Era.

taken and good selective cutting practices were employed but as the demand began to exceed supply more ruthless exploitation took place. By the late seventies there was little good white pine left, and after 1883 spruce was cut and sold for $9.00 per thousand feet. In 1870 it was estimated that about 600,000 logs passed Shawinigan Falls but by 1890 this figure had dropped to 350,000 and the height of the lumber era had been passed. The most accessible limits had been stripped of their spuce and pine and other types of wood did not interest the operators.

Although this had been a passing phase in the history of the valley it had a permanent effect upon the landscape. First, because of the settlements which were established solely to serve the lumber industry, and secondly, because the colonist farmer followed the woodsman's axe.

The first trees were cut at Saint Boniface in 1850. The cleared lands were quickly taken up and in 1887 the village had a population of 1800. Although there was no official subdivision at the time impatient colonists invaded the lands of Ste.Flore in 1856. The first settlers took up farms along the Shawinigan River. In a few years all the land along the Chemin des Piles was occupied, and in 1862 the Parish of Ste. Flore was established. These settlements and others of the same type, such as St. Jacques des Piles, have, in spite of their promising beginnings, remained rural villages. This is largely due to the fact that they are

removed from the river and from the vicinity of the most important power sites. Shawinigan at the end of the nineteenth century was the property of two men, John Forman and Antoine Saint-Onge, and was for the most part uncleared, while Ste.Flore and St. Boniface were flourishing villages.

Grandes Piles was also a typical product of this period. Its importance lay largely in its location at the head of navigable water. In 1853, Phillips, Norcross and Company were cutting pine on the River Mekinac for their mills in Three Rivers. Grandes Piles became the entrepôt of Three Rivers and the Upper St. Maurice and this company operated a steamboat on the navigable stretch of river between Grandes Piles and La Tuque. In 1875 Hall and Neilson established a sawmill in the town and in 1882 another mill was built by M.W. Ritchie. A blow to the prosperity of the town was the removal of the Hall and Neilson mill to Three Rivers when the company was offered twenty thousand dollars to occupy a site within the Three Rivers city limits. In 1888, Caron described Grandes Piles as having 35 houses, a railway station and 6 shops. With the decline of the lumber trade the town stagnated and has developed little since the turn of the century, at least when its progress is compared with the meteoric rise of the new industrial towns.

There were other settlements which grew up in association with the lumber industry notably at Mekinac and La Tuque. Of

Grandes
Piles

these La Tuque has continued to expand in modern times while Mekinac has become redundant.

Three Rivers, of course, benefitted from the activities in the hinterland and by 1892 its population was 8,334, but at the turn of the century this declined slightly which was an indication of the slump in the lumber trade.

In the latter half of the nineteenth century the iron industry also expanded. In 1848 a furnace was built at Mont Carmel which employed one hundred men. It was connected to the river by wooden rails in 1872, but was abandoned in 1878. The Radnor Forges began production in 1854, using power from Rivière du Lard. In 1863 about three hundred workers were engaged at this plant which produced two thousand tons of iron per annum. In 1885 dredging operations were commenced at Lac à la Tortue which was rich in iron ore, and one hundred wagon loads per year were excavated until the beginning of the twentieth century.

By 1900 most of the iron towns had declined. This was largely due to the fact that new mass production methods demanded large supplies of haemitite or magnetite. Iron ore is still used in industry at Pointe du Lac where it is used in the production of red ochre.

This period also saw the beginning of the pulp and paper industry in the valley when John Forman initiated the installation of a mill at Grand'mère. By 1890 the mill was employing 75 men

and had a daily production of 50 tons. In 1896 it began the production of paper. This project was the forerunner of the present industrial establishments and belongs more truly to the twentieth than it does to the nineteenth century.

From the foregoing it will be seen that the changes in urban settlement which took place during the latter half of the nineteenth century were not far-reaching or permanent. The settlements which followed the cleared land along the Shawinigan River were strictly rural with small populations and no industries. Grandes Piles and La Tuque did not reach urban status in the nineteenth century. The lumber industry in the form in which it was practised was by its nature transitory. Although this may be an important period for the economist it is not so much so for the urban geographer. It is possible that except for the development of hydro-electric power the impression which the lumber industry made upon the section of the St. Maurice which flows through the shield would have been almost entirely obliterated. Certainly the urban development which has taken place during the twentieth century is not a natural consequence of the lumber era; it is an entirely new development. If we consider urban settlement only, the landscape of the valley was much the same in 1900 as it had been in 1700 with the exception of the increased size of Three Rivers, beside which there were no truly urban developments.

CHAPTER IV

HYDRO-ELECTRIC DEVELOPMENT

Although there had been minor exploitation of the river's power at such sites as Grandes Piles and Grand'mere it was not until 1898 that any large scale development was planned. It had long been realised that Shawinigan Falls formed an ideal location for a power development. This was largely due to the bend in the river above and below the falls which offered the possibility of diverting the water over a bank which was about 150 feet high. As early as 1828 Bouchette, a government surveyor, suggested a practical plan for such exploitation. Speaking of the narrow strip of land which separated the upper from the lower bay he said, -- "Je ne doute pas cependant que la petite peninsule ne forme avec le temps une nouvelle île et que le Saint Maurice précipitera ses eaux près de l'embouchure de la Rivière Shawinigan. Mais l'on pourrait percer un canal à peu de frais, si l'on considère les avantages que pouraient en résulter dans le cas ou se feraient de grande établissements sur le Saint Maurice". [1]

Bouchette's suggestion did not become a practical plan until 1898 when the Shawinigan Water and Power Company was formed.

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1 Gerard Filtreau, L'Épopée de Shawinigan, 1944.

At this time there were two other companies producing electricity in the Province, the Northern Power Company at Ste. Narcisse and the Royal Electric Company at Montreal. Because of the nature of the site and the "foolhardy" proposal to attempt transmission of power from Shawinigan to Montreal, the plans of the new company created something of a sensation. The Canadian Electric News announced in March 1899 that, "a water power project of rather unusual interest, the construction of which will soon be commenced, is that of Shawinigan Falls.The extraordinary formation of the peninsula of land lying between the upper and lower levels of the river above and below the falls, and the way in which the river turns at more than a right angle to its course after hurling itself down the main cascade, here affords what is undoubtedly one of the most favourable natural locations for a waterpower development in the world"[2].

The installation was to provide turbines and generators for 30,000 horsepower with provision for expansion up to 150,000. 20,000 horsepower of this was to be in the form of alternating currents for transmission to Three Rivers at 20,000 volts. 10,000 horsepower in low voltage direct current was to be used in local electro-chemical industries.

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2 Electrical News and Engineering, Early Shawinigan History. April 15, 1948.

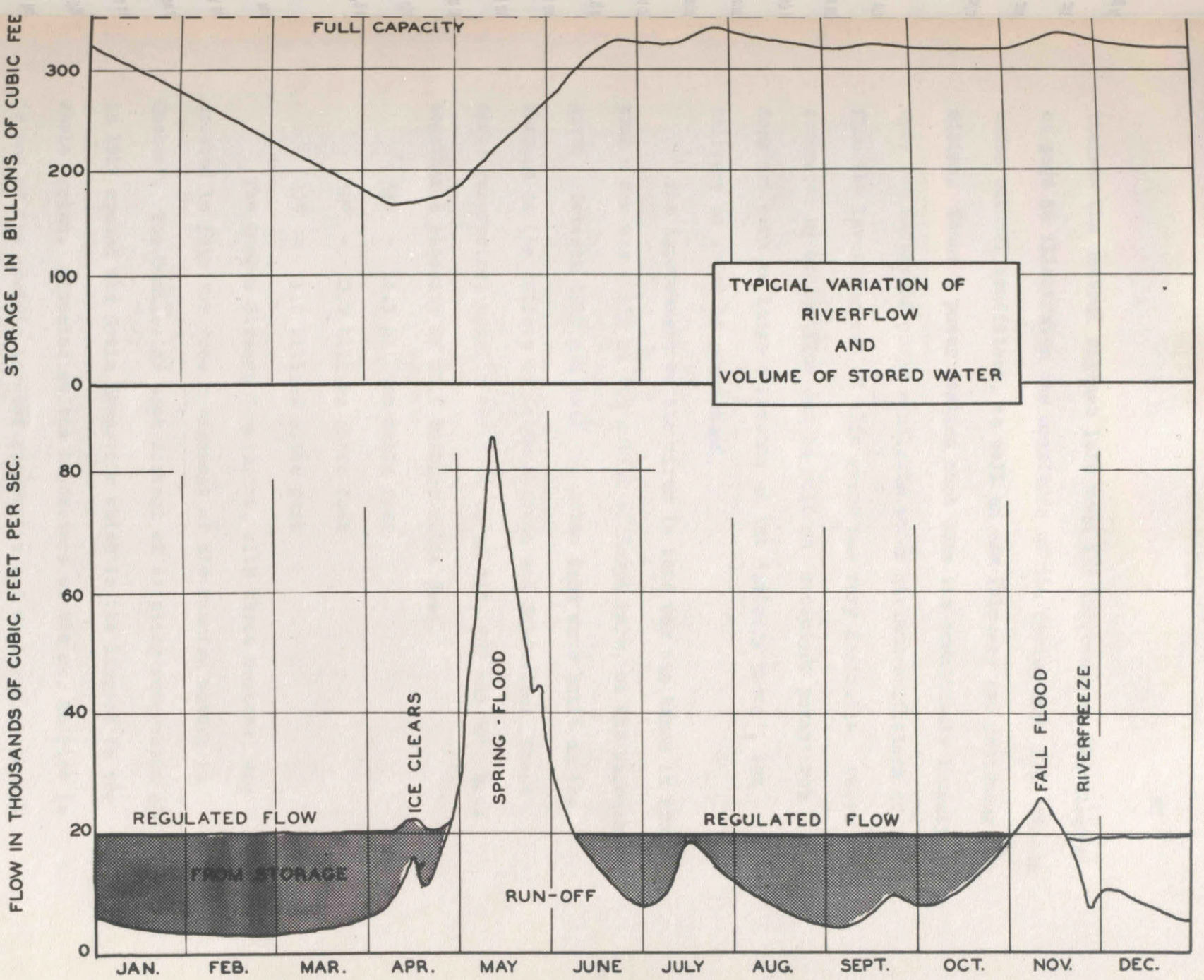
In 1899 Shawinigan was practically uninhabited. There was neither road nor railway into the site so that the problem of bringing the necessary materials and men, and of providing accomodation for them was a formidable one. At the beginning of Spring 1899 a group of engineers of the Warren Scharf Company arrived at Shawinigan after spending four days in the journey from Montreal to Grand'mère. By May several hundred workers had arrived and were billeted in the houses of Ste. Flore and St. Boniface. Two roads were constructed, one to St. Boniface and the other to Grand'mère. This was followed by the building of a branch railway line from Shawinigan to join the Great Northern at Aldred Junction. An electric railway was also proposed from the site to Three Rivers but was abandoned through lack of capital. In the year 1900 more than 1500 men were employed on the project and were housed in neighbouring communities and under canvas.

By 1901 the first delivery of electric power was made in Shawinigan. This was used for street lighting and it was not until 1903 that two 5000 horsepower units were put into operation, and deliveries were made to industry. During these two years industry was supplied directly with hydraulic power which was delivered through Shawinigan Water and Power Company penstocks.

The Northern Aluminum Company and the Belgo-Canadian Pulp and Paper Company bought this type of power. The former had its own power house in the Lower Bay and the latter was served by a separate project on the Upper Bay.

Local markets were not sufficient to absorb all the power which was available by 1903. In that year a wood pole transmission line was built from Shawinigan to Montreal and the first delivery of electricity was made to that city. This was the longest transmission of electricity then in operation in North America. By 1904 another generating unit had been added and a second transmission line to the metropolis. The first power transmission south of the St. Lawrence River by cable was made in 1906. The North Shore Power Company was purchased in the same year by the Shawinigan Water & Power Company and the St. Maurice Power system was already well on the way to its present prominent position in the electricity supply of the province. By 1911 the total capacity of the system was 95,500 horsepower.

As the development of power on the river was increased, it became evident that the regulation of the river's flow would be a great advantage. The average annual run-off of 25,600 cubic feet per second at Shawinigan was equivalent to a depth of 22 inches of water over the whole drainage area or 61% of the total average precipitation. The extensive forest cover and numerous large lakes served to regulate the flow of the river to some extent. Never-


FULL CAPACITY
STORAGE IN BILLIONS OF CUBIC FEE
300
200
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TYPICIAL VARIATION OF
RIVERFLOW
AND
VOLUME OF STORED WATER
FLOW IN THOUSANDS OF CUBIC FEET PER SEC.
80
60
40
20
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REGULATED FLOW
FROM STORAGE
ICE CLEARS
SPRING - FLOOD
RUN-OFF
REGULATED FLOW
FALL FLOOD
RIVER FREEZE
JAN.
FEB.
MAR.
APR.
MAY
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theless the natural regimen left room for improvement. The diagram on page 64 illustrates the magnitude of the Spring and Fall floods under natural conditions, as well as the February and September minima. Since a power station must base its commitments largely upon the amount of power available under minimum conditions of flow the levelling out of this graph was very desirable. Power generated by excess flow can be sold as 'secondary power' but does not earn as large a revenue as the 'primary power', the delivery of which is guaranteed.

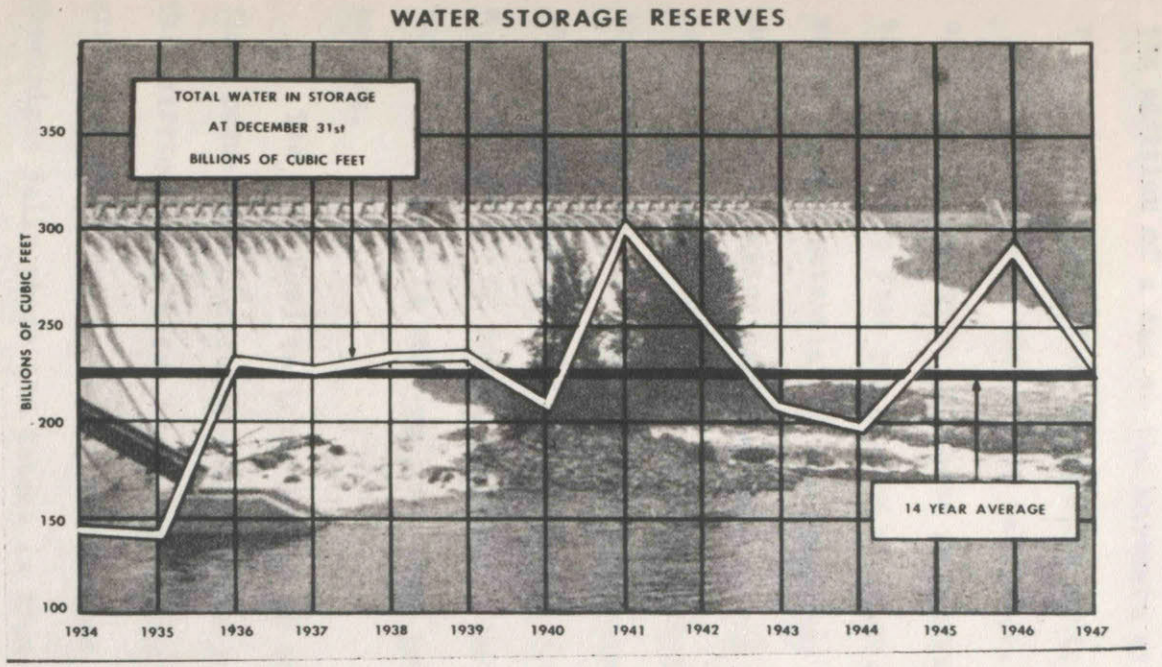
The improvement of the river in this way was begun in 1908 when a dam was built at the outlet of Kempt Lake, on the Manouan River. Between 1910 and 1915 two other dams were built on the Manouan at the outlets of Lakes Manouan and Watoussie. These three reservoirs, usually referred to as "A", "B" and "C", have together a capacity of 20.5 billion cubic feet.

"A" - 14.9 billion cubic feet

"B" - 3.9 billion cubic feet

"C" - 1.7 billion cubic feet

The Quebec Streams Commission, with three members, was created in 1910 for "the management of the running waters in Quebec". The Commission took control of existing reservoirs and in 1917 opened the Gouin Reservoir which is the largest in the whole system. Situated at the headwaters of the St. Maurice it is one of the world's largest reservoirs and contains at normal



The above graph illustrates the increase in storage reserves over a period of years. It will be noted that, according to variations in rainfall, there is a great variation in the demands made upon the reservoirs. Without this storage the power supply would be considerably cut during drought years, and even now two such years result in a shortage of power.

level about 220 billion cubic feet and with the addition of flashboards[4] it can hold 280 billion cubic feet.

The present system of regulation was completed in 1930 by the addition of a dam on the Mattawin River which created a reservoir with a capacity of 33 billion cubic feet.

By means of these five reservoirs the average minimum flow of the river has been increased from 6000 cubic feet per second, to 19,500 cubic feet per second at Shawinigan Falls. In this way the power potential of the river has been almost trebled. During excess water periods, such as the Spring Flood, the regulating dams are closed to replenish storage reserves. At the generating stations units are operated at maximum capacity and the remainder of the river flow is spilled. At these times a certain amount of power, generated over and above the requirements for prime power, is sold as 'secondary power' for use in electric boilers.

The increased tailrace levels at the peak of the spring flood reduce the operating heads of the three lower stations. This difficulty is added to by the accumulation of bark, logs, grass and other debris in the trash racks, particularly at Shawinigan Falls where the intake is from a canal. The trash

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4 A wooden construction along the top of the dam.

problem, however, has been largely overcome by the recent use of self-cleaning racks. At flood periods the rate at which river-flow is discharged at each station must be carefully controlled, in order to maintain headrace levels within allowable limits and at the same time avoid short time discharges appreciably in excess of the natural flow of the river.

For approximately nine months of each year the flow of the river is directly controlled from the reservoirs. Water stored during the excess period is withdrawn to maintain the riverflow at the value required for power generation purposes. Such control of the river required intensive study and good judgment. The rate at which water is withdrawn from storage must be varied to suit both the weather conditions and the power requirements. A series of gauging and meteorological stations are maintained and reports given at least daily to the system operating centre. Government weather forecasts are also obtained twice daily, as well as special forecasts when these are necessary, as when there is danger of sleet or freezing rain.

In this regulating period a running forecast of power requirements is maintained for at least seven days in advance; from this and a study of the uncontrolled flow of the river the amount of water required from reservoirs is determined. Since a certain amount of time is required for water to flow from a

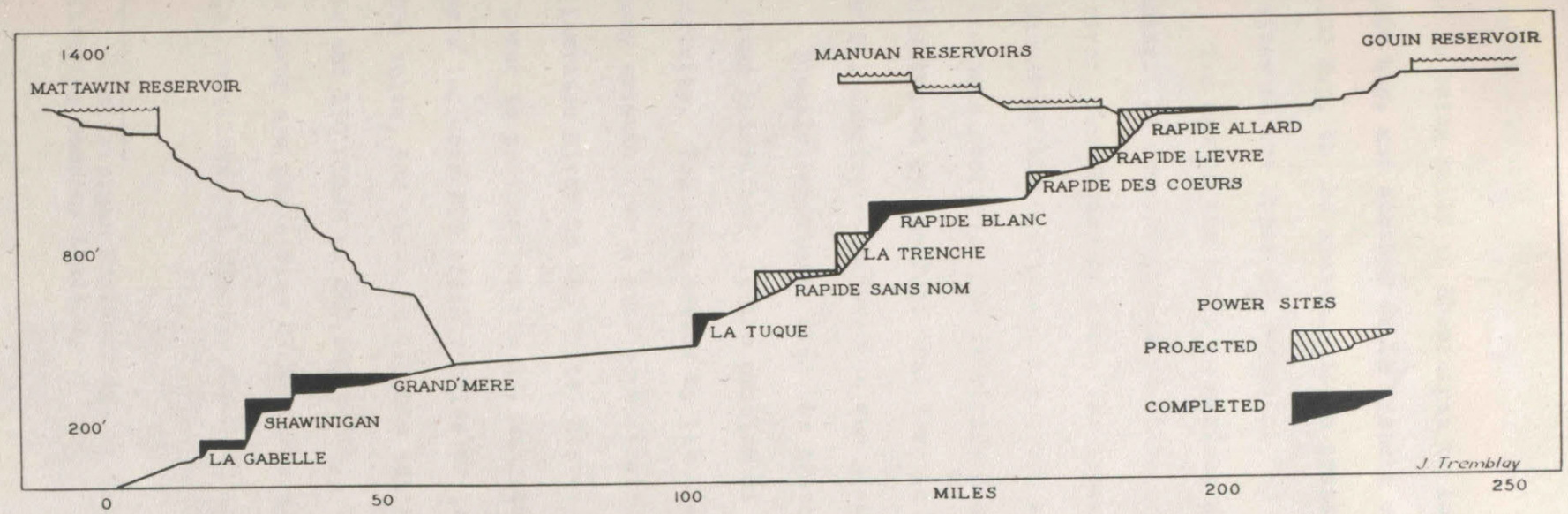
given reservoir to a station, this anticipation of requirements is essential. This applies not only to the withdrawal of storage water but also to the hourly and daily distribution of the total required generation from the five plants on the river.

Towards the end of November air and water temperatures are watched closely, so that the freeze-up period can be anticipated and the necessary measures taken. The average date for freeze-up is November 25th, the date of the thaw varies from April 10th downstream to three weeks later at La Loutre. Just before the formation of a solid ice cover frazil ice may block the trash racks at the Shawinigan Falls generating station where the intake is relatively shallow. On most of the smaller units, this is overcome by lifting the racks when this danger is expected. On the larger units and on some of the smaller ones the trash rack bars are electrically heated to prevent the frazil ice from sticking to them. For a period of about one week when the solid ice cover is forming there is a drop in the riverflow. This is caused by the loss of water which is held back in the form of ice and by the backing up of the water until a sufficient increase in surface gradient is available to allow the normal flow of the river to pass under the ice cover. In the early stages of hydro development frazil ice created a problem. It built up on the down stream side of rapids sometimes forming a dam. Ponding of the frazil by the increased number of power houses has eliminated

this problem.

The industrialization and rapid urban development in the St. Maurice Valley which will be examined in later chapters has depended almost entirely upon the availability of abundant electric power. From 1898 until the present, the demand for electricity has increased in the valley. By 1920 the capacity of the system had reached 200,000 h.p. and still the demand grew as organised urban centres with good communications attracted more industry. In 1924 a new station was put into operation at La Gabelle with an installed capacity of 120,000 h.p. Yet by 1926 the Shawinigan Water and Power Company found it necessary to make a contract with the Duke Price Company for the delivery of 100,000 h.p. from the Ile Maligne station. The expansion continued and in 1933 alone nine new industries were established in the territory of the Shawinigan Water and Power Company. In the following year the Rapide Blanc development came into operation and added 160,000 h.p. to the system so that the peak load was then in excess of 1,000,000 h.p.

Transmission lines from Grand'mère to La Tuque had been constructed in 1929 and had aided the development of the latter town. In 1938 a new power plant began construction at La Tuque and was completed in 1940 producing 178,000 h.p. under the joint ownership of the Brown Corporation and the Shawinigan Water and Power Company. At the present time a third power



DIAGRAMMATIC PROFILE OF THE ST MAURICE

house is being built at Shawinigan to increase capacity there to 195,000 h.p. and another at La Trenche which in 1950 will add 384,000 h.p. to the system. It is proposed ultimately to develop six sites on the Upper St. Maurice.

The use of the river to maximum advantage requires careful planning. It demands intensive study of the characteristics of the river, the choice of site, the types of power station, and the manner of its operation, its cost, and many other engineering and economic factors. How intricate are the problems involved is illustrated by the fact that for the six projects on the Upper St. Maurice consideration was given to thirty-two plans[5].

Equally important, with the problems of riverflow control and power generation, is the problem of the distribution of electricity. The area served by the Shawinigan Water and Power Company extends from a line approximately 30 miles north of the St. Lawrence River to the United States border; almost all of its power is produced on the St. Maurice River. The system network includes 890 circuit miles of lines operating at 60,000 volts, 500 miles at 110,000 volts, 275 miles at 165,000 volts and 190 miles at 220,000 volts. The main outlets for this power are the cities of Montreal and Quebec, pulp and paper mills, metallurgical plants, chemical and asbestos industries.

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5 Shawinigan Engineering. Printed privately. Shawinigan Engineering Company Limited.

Shawinigan Falls, showing the Three Hydro-Electric Power Developments.

Over 535 municipalities are served through various substations with a peak demand of 135,000 h.p. The normal monthly prime power load factor is over 76% with daily load factors of about 88%; if secondary power is included daily load factors of as much as 93% are quite common.

The primary objective of the system is to assure a continuous service to customers under both normal and emergency conditions. The maintenance of this service is subject to a number of hazards of which the climatic are most interesting from a geographical point of view.

One of the main problems from the earliest days has been the number of failures caused by lightning. On the higher voltage lines the lowering of tower footing resistances, improved shielding, and the use of buried counterpoise wires, have greatly improved the situation. On the lower voltage lines, particularly those of wooden construction, lightning is still a problem, although by the use of line networks and automatic reclosing, the effect on service is minimised. On steel transmission lines failures numbered 80 in 1933 and have been reduced to less than 10 in 1946. More than 1000 miles of line have been protected and the corresponding figures per 100 miles of this line are 8 and less than 1.

Sleet storms from time to time affect the southern part of the system. The general policy is to attempt to maintain a

sufficient load on the lines concerned to prevent the formation of ice on the conductors. On the four 110,000 volt lines between Shawinigan and Montreal when sleet is reported at times when the lines cannot be sufficiently loaded, the practice is to take each line in turn out of service and by the use of a separate generator to melt the sleet off. This can be done in approximately one hour when the air temperature is 32 degrees Fahrenheit.

A discussion of the development of hydro-electric power in the St. Maurice Valley would hardly be complete without some mention of its relationship to the production of electricity in the province as a whole. The value of an integrated electrical system was particularly evident during World War 11 when a large amount of 'firm' or dependable power was demanded.

Prior to the war many technical and economic studies had been made with a view to integrating the Shawinigan system more closely with those of Montreal and the Saguenay. Nothing practical was done, however, because the benefits so derived had to be evaluated at secondary power rates which were too low to justify the necessary capital expenditure. Shortly after the outbreak of war it became evident that the Aluminum industry in particular would require enormous amounts of power. The elimination of electric boilers and the use of the facilities of the Gouin Dam supplied this need to some extent but further increases became necessary. Only by the pooling of resources could the necessary

power be supplied.

The necessary agreements were made between the various power companies in consultation with various government officials and the following action was taken:

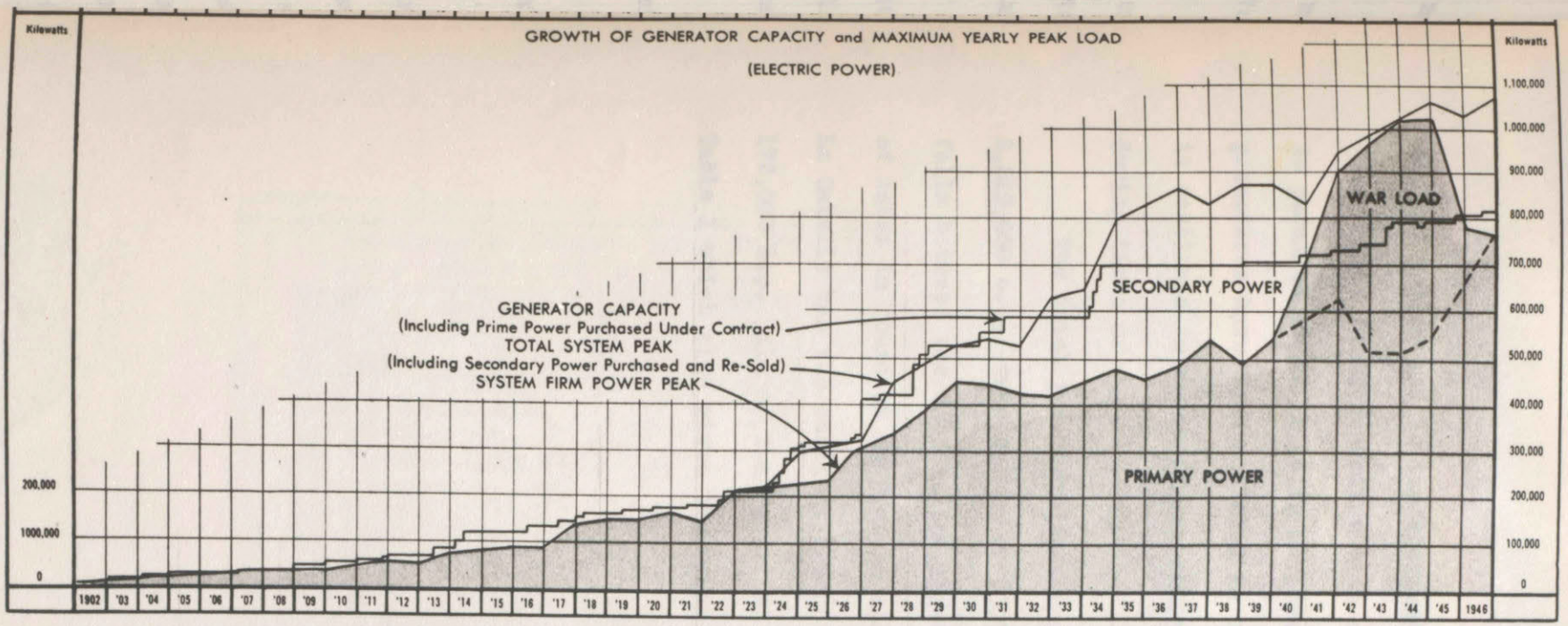
(a) A 220,000 volt transmission line was constructed between Trois Rivières and Quebec, and put into operation in November 1940 to provide an adequate tie line between the Saguenay and the Shawinigan system.

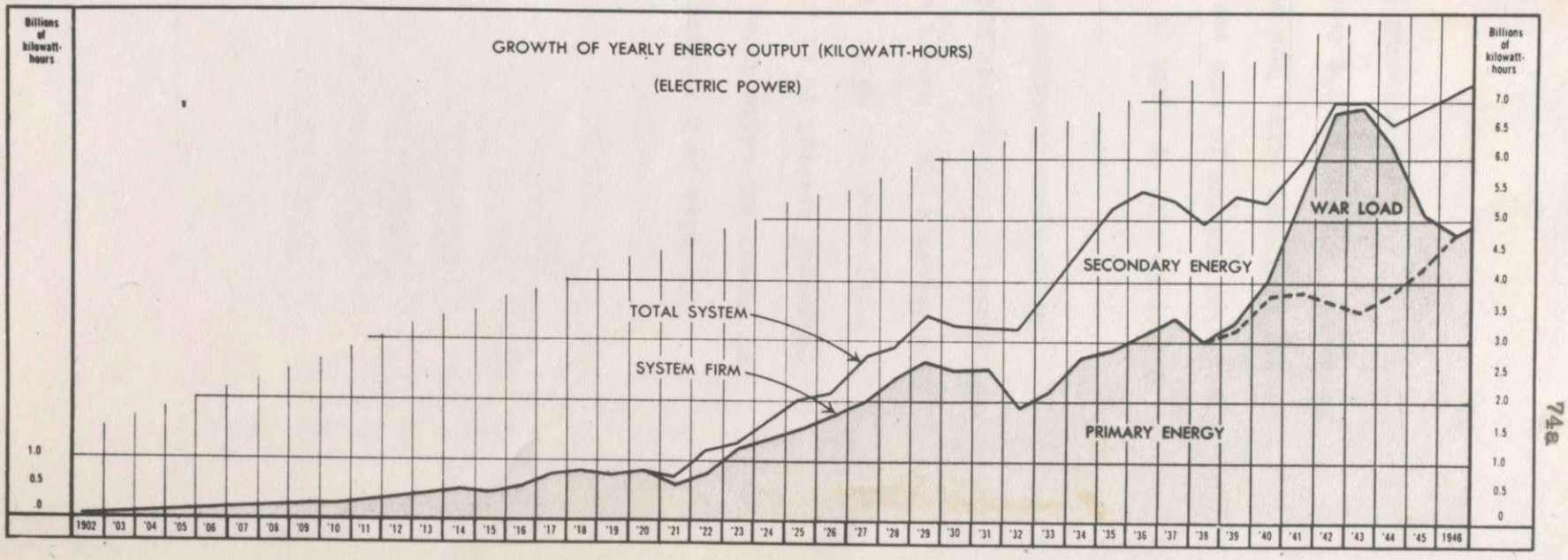
(b) To supplement the existing interchange capacity between the generating system in the Shawinigan and the Montreal areas, a 110,000 volt oil filled underground cable was installed in December 1941 through the city of Montreal.

(c)More storage dams were constructed in the St. Maurice River watershed and the capacity of existing storages was increased.

(d) Additional controlling equipment was installed at Shawinigan and Three Rivers.

With these facilities the companies were able to operate their generating stations to produce the maximum power from the water available without regard to power requirements in their own areas. The Saint Maurice Valley with its large reservoirs functioned as a cushion to absorb any excess power which was available from hour to hour or from day to day, and to make up deficiencies which occurred at other times. This resulted in the maximum use being made of available resources with the minimum



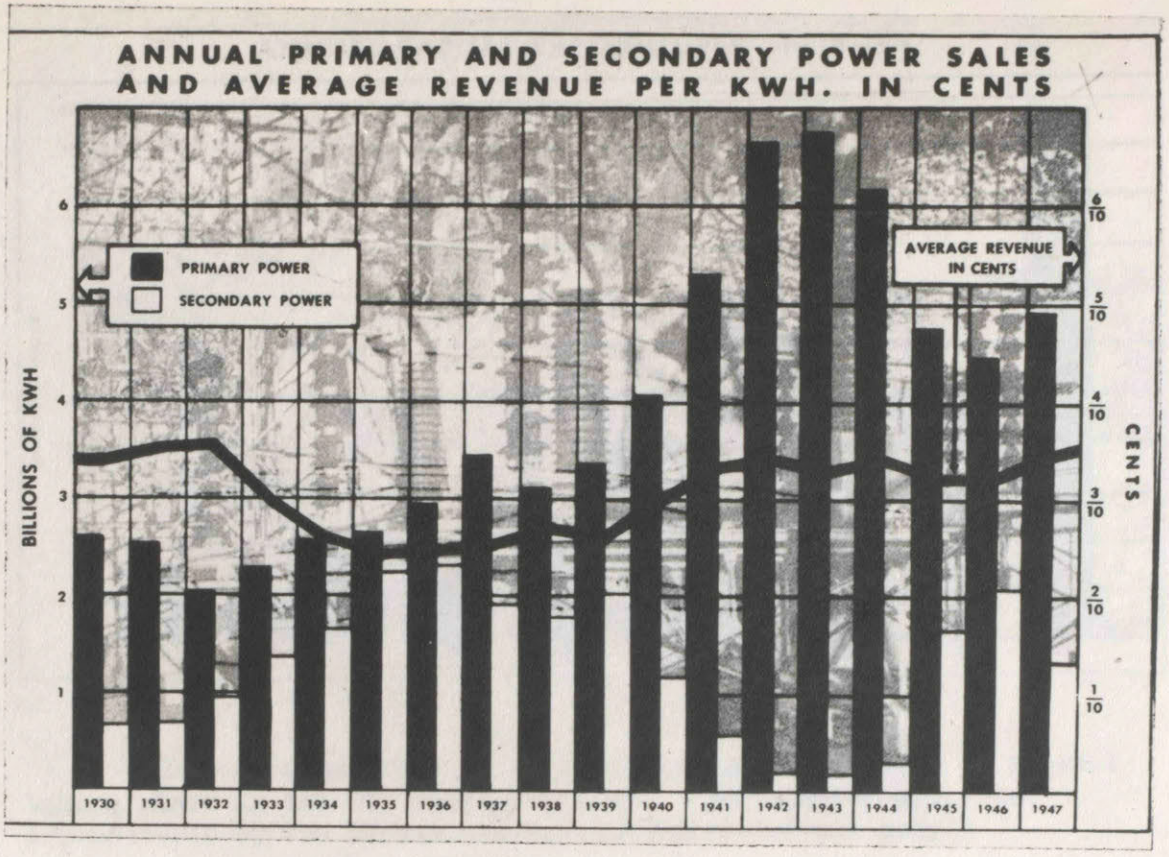


The above graphs show the growth in power output 1902--1946.

capital outlay and in the shortest possible time.

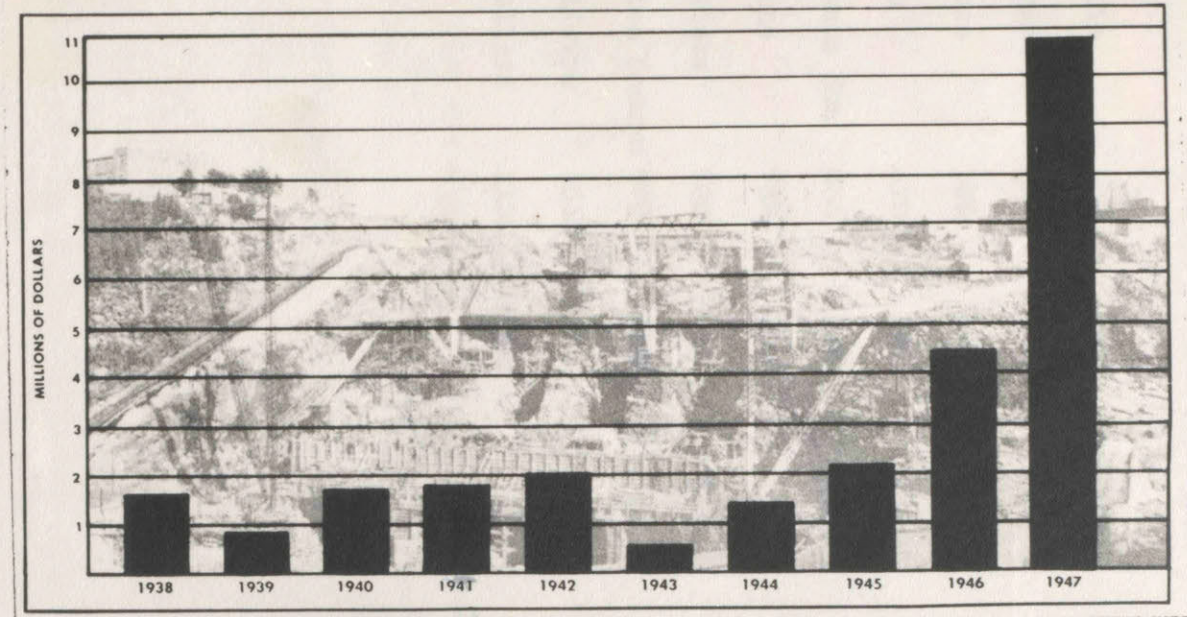
This interconnection with over 3,3000,000 h.p. operating in parallel is still being employed and, while contracts and procedures have been modified to take care of changed conditions, it continues to serve during times of peace as well as it did during times of war.

The total power available is estimated today to be 2,219,000 h.p. This can be developed at a series of rapids and falls between the Manouan and Three Rivers. The greatest head of water is found at La Trenche and is as yet undeveloped. La Gabelle has the smallest head and is at present producing 172,000 h.p. All of the important power sites are listed in Table 1 which also gives the power potential of each.



This diagram illustrates the relationship between primary power and secondary power. Note that most of the sales during the war years were made up of primary, or "firm", power, and that the cost of electricity shows comparatively little variation.

ANNUAL CAPITAL EXPENDITURES 1938-1947



This diagram illustrates the tremendous expansion at present taking place in the St. Maurice Valley. (The figures apply to expenditures by the Shawinigan Water & Power Company only.)

TABLE 1

THE POWER POTENTIAL OF THE ST. MAURICE RIVER

SITE	HEADRACE	TAILRACE	HEAD	POWER POTENTIAL
La Gabelle	102	42	60	172,000 h.p.
Shawinigan	247	102	145	335,000 h.p.
Grand'mere	335	255	80	201,000 h.p.
La Tuque	498	384	114	267,000 h.p.
Rapide sans Nom	633	523	110	252,000 h.p.
La Trenche	793	633	160	384,000 h.p.
Rapide Blanc	905	793	112	240,000 h.p.
Rapide des Coeurs	975	905	70	112,000 h.p.
Rapide Lievre	1061	978	83	124,000 h.p.
Rapide Allard	1150	1063	87	132,000 h.p.
			TOTAL	2,219,000 h.p.

CHAPTER V

THE GROWTH OF INDUSTRY

Almost as soon as the first lines had been surveyed for the construction of the Shawinigan power plant customers were attracted to the site. In 1901 the Belgo-Canadian Pulp and Paper Company established its factory on the banks of the Shawinigan River, one hundred and fifty feet below the upper basin of the St. Maurice. Only a few feet of clay separated the water of the big river from the lower valley, so that it was possible to build penstocks down to the machines of the paper mill, which were to produce one hundred tons of groundwood pulp per day.

At about the same time the Northern Aluminum Company, a subsidiary of the Pittsburgh Reduction Company, began operations, using electricity produced from its own generators by means of the hydraulic power supplied by the Shawinigan Water and Power Company.

The Wabasso Cotton Company was the third of the industrial pioneers of this period.

The developments at Shawinigan Falls soon influenced the whole valley. Three new industries were established at Three Rivers in the year 1907 to 1910, the Wabasso Cotton Company, the Wayagamack Paper Company and the Canadian Iron Foundries. Farther upstream at La Tuque, in 1910 the Brown Corporation, then known

as the Quebec and St. Lawrence Industrial Company, began to produce fifty tons of sulphate pulp per day.

This industrial progress depended upon the growth of the hydro-electric output which was discussed in the preceding chapter. The production of electric power in the valley has given it its particular industrial structure. Broadly speaking the industries may be divided into three main classes, all dependent to a large extent upon a supply of cheap power. First is the pulp and paper industry which benefits from the abundant supplies of pulpwood as well as from the availability of power. Secondly the electro-metallurgical and chemical industries have come to the valley solely in search of power and, in order to do so, have been prepared, in the case of aluminum, to haul their raw materials over great distances. Finally the textile factories constitute the third important industry, and are to be found in each of the four main towns of the valley.

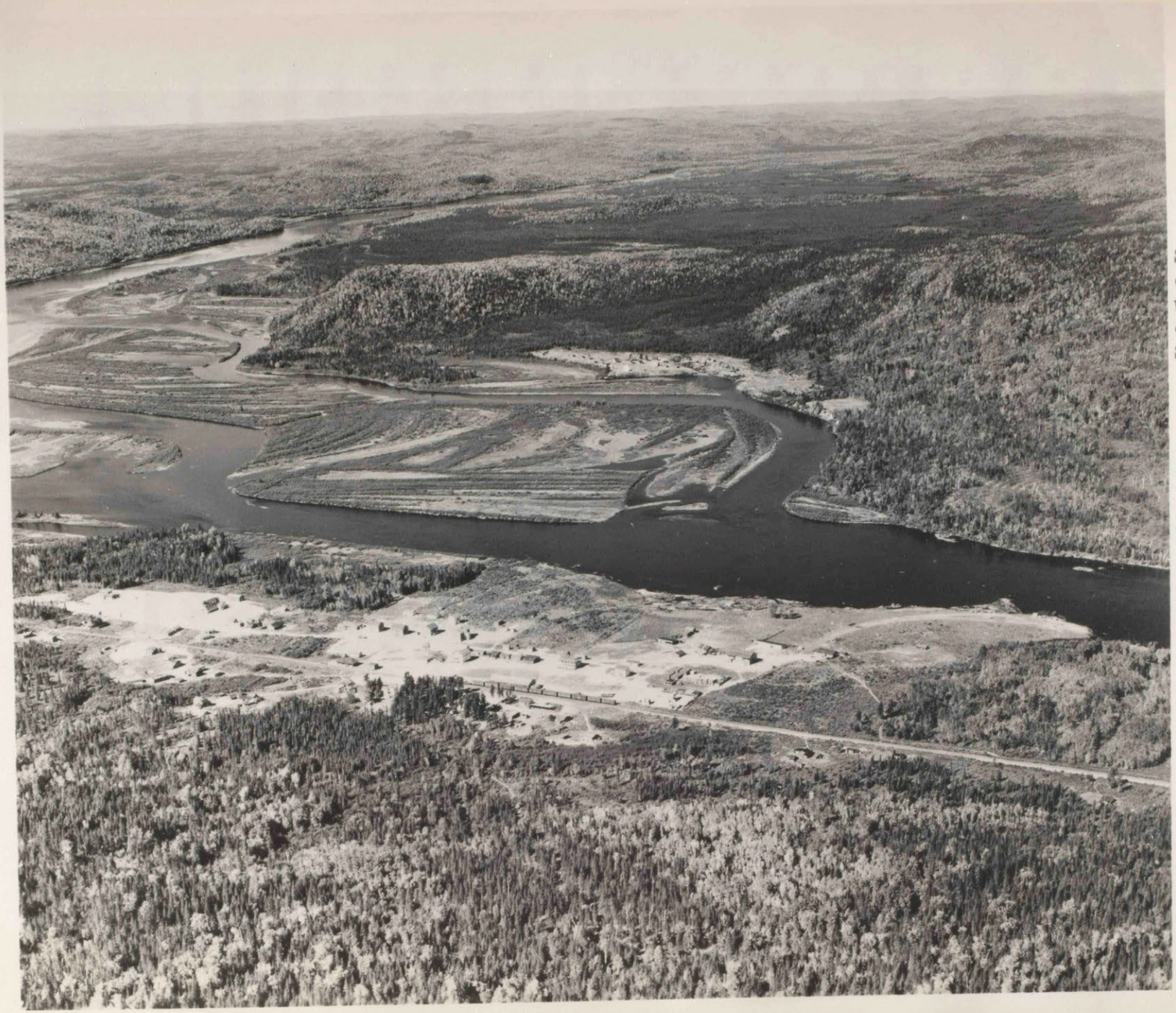
The pulp and paper industry is the greatest user of hydro-electric power; in 1948 it absorbed 44.6% of the total output of the valley. This was in spite of the fact that a number of boilers were using coal because of the lack of available electric power.

The industry is mainly dependent for its raw material on the forest of the upper valley. Generally speaking the forests

in the St. Maurice Valley above La Tuque are of northern softwood type and contain few hardwoods except paper birch and occasional aspen which has come in following burns. Below La Tuque there are other hardwoods such as maple and yellow birch. The Brown Corporation holdings in the Upper St. Maurice are typical of the kind of supply upon which the industry depends. The timber content of these holdings may be classed in three general types: softwood, softwood-hardwood and hardwood-softwood. The softwood (coniferous) stands are made up of spruce, balsam, and jack pine, about 90% of which is spruce and balsam and 10% jack pine. Of the spruce about 95% is black and 5% white. The softwood-hardwood type contains some hardwood such as white birch and, infrequently, poplar. The hardwood-softwood type includes stands of which more than 75% is hardwood. In the Brown Corporation holdings these three main types are distributed in about the following proportions: softwood, 35%; softwood-hardwood, 53%; hardwood-softwood, 12%.

About 200,000 cords of spruce, balsam and jack pine are cut annually from these holdings. Although white birch can be used for pulp production it is not cut because it will not float to the mill. About 65% of the wood used is spruce, mostly black; 25% is balsam and 10% jack pine.

The total area of the timber limits of the Brown Corporation is 3,306,615 acres of which 991,941 is freehold land, 2,249,998 acres



Sanmaur, a centre for wood operations on the Upper St.Maurice.

is leased land and 64,676 acres is held with freehold stumpage rights; part of these are on the St. Maurice River and part on the Bersimis. The St. Maurice limits are divided into two operations; one at Windigo, forty-five miles north of La Tuque, where there is comparatively little cutting at present, and the other at Sanmaur, seventy-five miles north of La Tuque. At Windigo the wood is driven down the Trenche River and its tributaries onto the St. Maurice; at Sanmaur it is also driven onto the St. Maurice through various upper tributaries. When the pulpwood reaches the mainstream, it is taken over by the St. Maurice River Boom and Driving Company which also handles drive operations for various other companies, Consolidated Paper Corporation, Canadian International Paper Company, and Howard Smith Paper Mills Limited.

The St. Maurice River Boom and Driving Company is an association of various pulp andpaper companies driving the St. Maurice River; each member delivers its marked logs to the river banks, where the Drive Company takes over from Sanmaur to Three Rivers. At one stage, from below Windigo to the power dam at Rapide Blanc, three tugs tow the log booms the length of the 26 mile lake made by the construction of the dam. The Drive Company maintains its own scalers and counters at each member's mill and the season's drive cost is split amoung the member companies in proportion to the log tally which each company receives.

Supplies for woods operations are transported to Sanmaur and Windigo by rail, and then to the various depots and jobbers'

camps by means of trucks. Altogether there are two hundred and fifty miles of woods roads throughout the limits. All operations are connected by telephone lines to Sanmaur and Windigo, the latter in turn being connected to La Tuque by a private line. In addition to stream driving, some of the operations are truck-hauled, and bull-dozers and graders are used to construct roads. On several of the lakes the Corporation also uses alligator boats to tow logs to the streams. The men are transported in from the railroad depots to the operations by means of 50 passenger, heated buses.

As the woods workers spend the summer months farming, the cutting season runs from September to the spring. Summer is used solely for improvement and maintenance work. An average number of 2600 men are employed by this company, with a peak of 4000 during the drive.

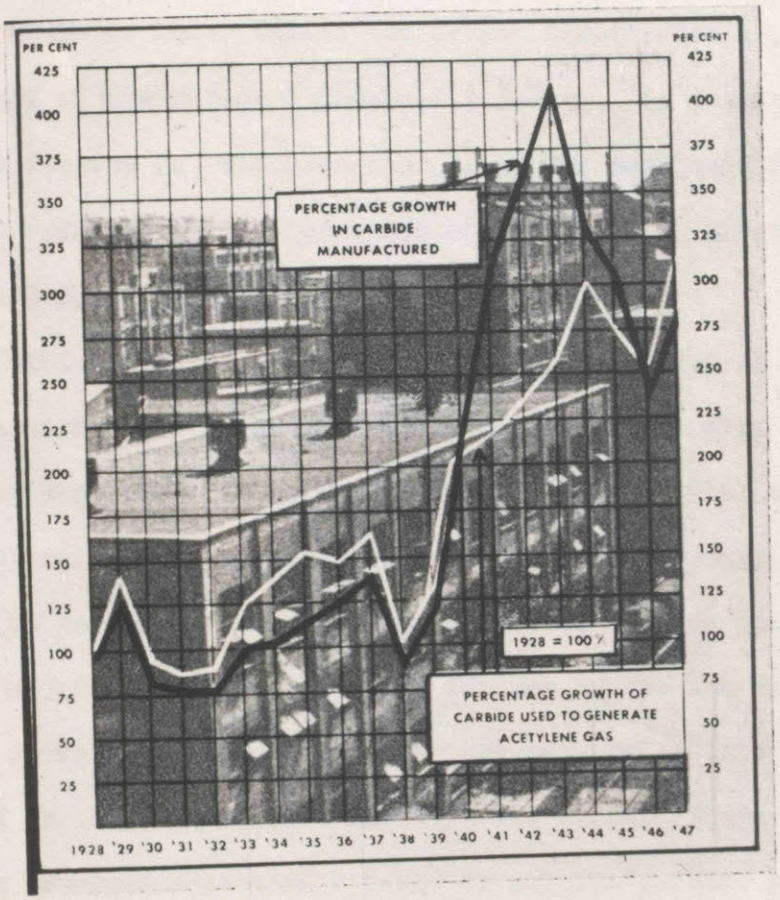
The fire protection of the limits is looked after by the St. Maurice Forest Protective Association Limited, Three Rivers. This association is composed of nine member logging operators who pool their resources and man-power for fire protection. The association began in 1912 and now maintains eighty observation towers linked by telephone, makes and extends roads and trails, and uses wireless telephone and airplanes in its fire prevention work.

The mill at La Tuque started production in 1910, and by 1920, was producing 170 tons per day of unbleached sulphate pulp,

and approximately 55 gallons of turpentine. In 1927 the Corporation installed a bleach plant and in 1928 produced the first bleached sulphate pulp in the world. In 1940 the Canadian Government adopted the use of a special type of wood pulp for the manufacture of cordite, and the La Tuque mill was one of the important sources of this material.

Up to the end of the 1946 fiscal year, the Brown Corporation had produced over one million tons of special fibres from kraft base pulp since 1928. At the present time the mill is producing daily 500 tons of bleached, semi-bleached and unbleached sulphate pulps; in addition, 140 gallons of turpentine are made, and 1,000,000 feet per year of spiral wound newsprint cores are manufactured. The turpentine is sold wholly in Canada and goes to paint manufacturers, railways, the textile industry and retailers; the cores are sold to Canadian Newsprint manufacturers and other paper manufacturers; the pulps are used for a variety of purposes from making of feed sacks to aqualized paper towels.

Although the other pulp and paper plants of the St. Maurice Valley vary in their end-product, their mode of operation is generally speaking similar to that of the Brown Corporation. At Grand'mere there is a plant of the Consolidated Paper Corporation which produces newsprint, cardboard, and pulp, and employs about 800 workers. The Belgo-Canadian Pulp and Paper Company in Shawinigan is also operated by Consolidated and produces newsprint.



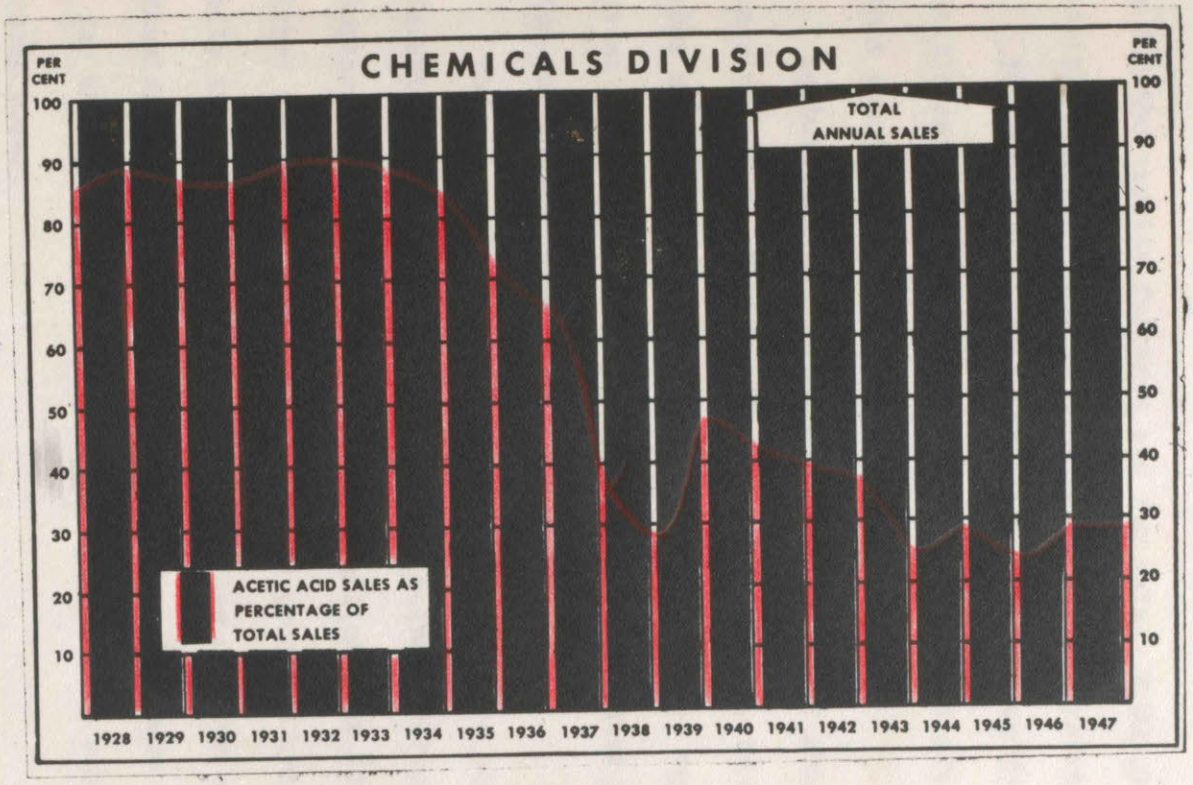
The above graph illustrates the growth of the carbide industry in Shawinigan since 1928, and also the increasing use of carbide for the production of acetylene gas.

In Three Rivers there are four large mills employing about 2100 workers, one of these the St. Maurice Paper Mills is located in Cap de la Madeleine.

Also among the first customers of the Shawinigan Water and Power Company was the new calcium carbide industry. The Shawinigan Carbide Company, later called the Canada Carbide Company, was the forerunner of the valley's chemical industry. It received its greatest impetus in 1915 when the demand for chemicals for war purposes resulted in the formation of the Canadian Electro Products Company.

Calcium carbide produces acetylene gas, which is converted by combination with water into acetaldehyde, this, with oxygen forms acetone, which is used in aircraft 'dope'. When the war ended the market for acetone disappeared and the company was obliged to develop a number of new products. Acetic acid was still of major importance, however, for use in the new cellulose acetate or celanese industry. At Shawinigan Falls this was produced in large quantities and at a low price. There are in addition twenty-one chemicals based on calcium carbide which are today offered for sale.

The raw materials of the industry are, electric power, water, coal, limestone and air. These with the exception of coal are abundant in the valley. The modern plant covers 65 acres and employs 1700 men. It absorbs 134,000 h.p. of electric power of



This diagram shows the decreasing importance of acetic acid in the chemical industry, and conversely the greater diversity of its products, over the last 20 years.

which 115,000 h.p. is used by five furnaces with a capacity of 200,000 tons of carbide per annum. Eight rotary lime kilns, with a total capacity of approximately 1000 tons of lime per day, supply lime for the carbide furnaces and for sale. 2,500,000 cubic feet of acetylene gas per day is used for chemical synthesis .

It is interesting to note that previous to World War 11, Britain's main source of carbide was Norway, and after the occupation of that country Canada took her place.

Carborundum is another Shawinigan product which requires large amounts of power. It is used for tool-grinding, as 10 ton synthetic grinder stones for paper mills, and in many other ways. Latest addition to the chemical industry is a new plastics plant, Canadian Resins and Chemicals Limited.

The second important representative of the chemical industry is Canadian Industries Limited, the principal product of which is cellophane. The first factory was established in 1931 and was followed in 1935 by another plant which produces hydrogen peroxide. Finally in 1939 the Alkali Division of the Company began operations in Shawinigan. Like the paper industry, cellophane is a natural one for the valley for it depends upon wood pulp and a good supply of cheap power.

The electro-metallurgical industry is closely allied with the chemical industry. In 1928 Shawinigan Stainless Steels and Alloys Limited was formed as a subsidiary of Shawinigan Chemicals

to manufacture Duriron and Stainless Steel, and to make equipment used to a large extent in the Chemical company. The union of the Canada Carbide Company and Canadian Electro Products took place in 1927 when Shawinigan Chemicals Limited was formed.

The aluminum industry began in the valley in 1899 when construction was commenced on Canada's first aluminum factory. The first ingots were produced in 1901. At this period only the raw ingots were produced but later cables were made. During World War 11 the industry was modified to suit war needs and produced most of the wire used in the rivets of the Canadian aircraft industry. In 1941, a new factory was built at St. Marc which was entirely devoted to the production of aluminum ingots. At the close of the war the No.2 factory was closed down but has recently been reopened. A four potroom smelter was also established at La Tuque during the war but no aluminum is produced there now, it is operated by the Northern Veneer and Plywood Company.

Canada Iron Foundries Limited is the decendant of the original iron industry of the valley. In 1863 Les Forges were bought by John MacDougall and Sons of Three Rivers, and were worked until 1883. At this time the Canada Iron Furnace Company was formed and foundries were established at Radnor and Drummondville. This company used local ores and local charcoal which was made in the vicinity of Grandes Piles.

In 1908 the Canada Iron Furnace Company amalgamated with several other interests to form the Canada Iron Corporation and a few years later it became the present Canada Iron Foundries Limited. It produces iron mouldings used in shipbuilding and marine motors, presses, papermaking machines. The industry at present employs about 1200 men and imports its raw material from Sidney, Nova Scotia. For power, like most of the other industries of the valley, it depends upon the hydro-electric developments.

The third main group of industries comprises the various textile factories of La Tuque, Grand'mère, Shawinigan and Three Rivers. They are located in the valley solely by reason of the availability of power, and are for the most part individually small but taken together form an important part of the valley's industry. For example, although the largest single plant of Grand'mère produces pulp and paper, the four small textile factories employ together a greater proportion of the town's population.

Soon after the establishment of the original Shawinigan power plant, a cotton mill was built in Shawinigan. In 1907 Wabasso Cotton Company built another mill in Three Rivers and in 1910 this company acquired the mill at Shawinigan. The Three Rivers factory was enlarged in 1912, in 1923, and in the past two years. Other notable textile firms are Grand'mère Knitting Company, Regent Shirts Manufacturing Company, Sterling

Shirt and Overalls Limited, Cap de la Madeleine, Textile Weavers Limited, Grand'mère, and the knitting mill at La Tuque. There are also shoe factories, one in Three Rivers, the Tebbutt Shoe and Leather Company, and one in Grand'mère.

These industries draw their raw materials from outside the valley and have been established in the present location because of the services available in connection with the primary industries, the most important of which is of course, electric power.

An interesting by-product of the valley's industrial expansion is the Shawinigan Engineering Company. Perhaps it may be more correct to describe this company as the architect of this industrial empire. However, that may be, the problems of developing the river's power were such that it was deemed advisable to form a separate company to be concerned solely with the engineering aspect. So great has been the expansion of the demand for power that hydro-electric engineering and construction work may be truly considered as a separate and permanent industry, especially since experience gained in the St. Maurice Valley has enabled the company to sell its knowledge all over Canada. Thus as an industrial product of the valley, we may reasonably list engineering 'know how'.

The installation of a power plant is a major operation as is well illustrated in the case of Rapide Blanc. The site

was 10 miles away from the railway and a modern highway was constructed through rough country in order to transport the necessary 100,000 tons of freight and 135,000 tons of sand. Single loads of up to 100 tons were transported in special trailers over this highway. Some 10,000 acres of bush and timber were cleared before raising the water at the dam. Four miles of transcontinental C.N.R. line was raised a maximum of 14' and a large bridge span moved to a new location without interference with train schedules. In the construction of the power plant several new techniques were employed. These facts serve to emphasise that with approximately one million more horsepower available on the river, engineering as an industry has a future in the valley. To date the value of work accomplished by the Shawinigan Engineering Company amounts to $83,000,000.00. As many as 4000 men have been employed and the average over twenty-five years amounts to 550.

The foregoing review of the industries of the valley illustrates two important points. First, the major industries are partly or entirely dependent upon the availability of electric power and of timber. Secondly, there is a considerable diversity of industry which has grown up in association with the basic industries.

The future supply of power seems assured and there are plans for considerable expansion, so that although the present supply is inadequate for all industrial needs, particularly those

of the pulp and paper industry there seems little likelihood of a serious shortage in the foreseeable future. The supply of power does vary with climatic changes and three or four drought years could be very damaging. A more detailed examination of riverflow with climate is made in Appendix B. Thus it may be said that the basis of the valley's industry, hydro-electric energy, although closely related to the physiographic form and climatic character of the valley, is not subject to the whims of nature or to damaging effects from man's exploitation.

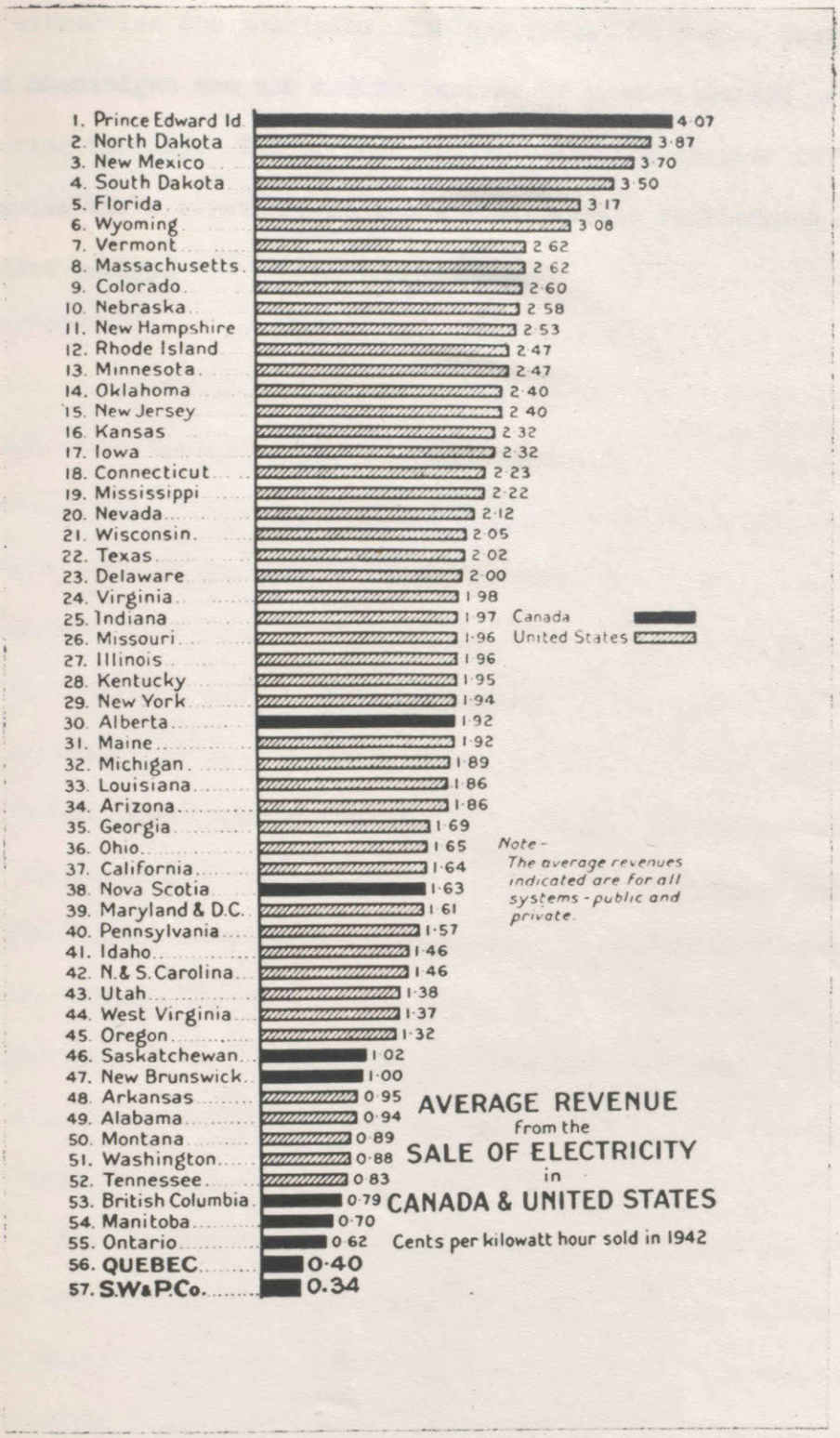
The raw materials of the forest are however a matter of concern to the industrial future of the valley. As many as eighteen million logs may pass down the river in a period of from two to four months, and one mill alone consumes 900 cords per day. It is estimated by the Association Forestière de Quebec that there is a net deficit when the annual cut is balanced against the estimated annual growth. This is in spite of the fact that a considerable proportion of the pulpwood used is imported from outside the valley. In the summer of 1948 as many as eleven carloads of pulpwood per day were arriving at La Tuque for the use of the Brown Corporation. This is in spite of the fact that on timber limits leased from the Provincial Government, "it is not permitted to cut yearly an amount greater than the annual growth".

The Brown Corporation states that 67% of their limits fall

within this category and that their annual cut falls well within this limit . Nevertheless, the Association Forestière is sufficiently concerned by the present state of affairs to recommend that a railway line be built over the watershed into Hudson's Bay territory in order that the forests of the St. Maurice may be spared the effects of over exploitation.

The diversity of the valley's industry is an encouraging characteristic and offsets the ill effects of too much dependence upon one industry which is disastrous in bad times. The fact that there is such a diversity may be attributed in part at least to the availability not only of a great deal of power but also the cheapest power on the North American continent. Fig.91a illustrates this point but it should be remembered that this figure is arrived at by averaging all sales including the sale of secondary or surplus power for which there is not always a customer in other areas.

Finally it should be noted that the geographical distribution of modern industry ignores the pattern of previous production. Only Three Rivers of the old settlements has had the qualities which fits it for a place in the modern scheme. These are largely involved in its location, it is the gate of the St. Maurice and will remain so. Grandes Piles on the other hand has become a relatively insignificant lumbering town, and les Forges form today an overgrown ruin which is



This diagram shows that the St. Maurice Valley is a paradise for new industries in that it has the cheapest power on the continent. It should be remembered that these figures include sales of secondary power.

an attraction for tourists. The new towns, La Tuque, Grand'mere and Shawinigan are the modern centres of production and are growing rapidly. The purpose of the following chapter is to examine their structure as the characteristic settlements of the modern valley.

CHAPTER VI

URBAN EXPANSION

Broadly speaking there are four main types of urban settlement in the St. Maurice Valley today. Les Forges is an example of a once flourishing settlement now completely unused because the basis of its economic life has disappeared. Ste. Flore, Grandes Piles and a number of other rural towns and villages are representatives of the lumbering era which at one time had a promising future. Today they are of minor importance because the economic structure of the valley has changed. Three Rivers is an example of the survival and continued growth of an old settlement because of certain permanent advantages in its location which are independent of technological developments in the valley. La Tuque, Grand'mère, and Shawinigan Falls are the new industrial towns which have grown up since 1898; they are the characteristic communities of the modern valley. Finally Rapide Blanc is an example of the latest addition to the cultural landscape, the company town, built in the wilderness for a specific purpose yet having all the amenities of a modern city.

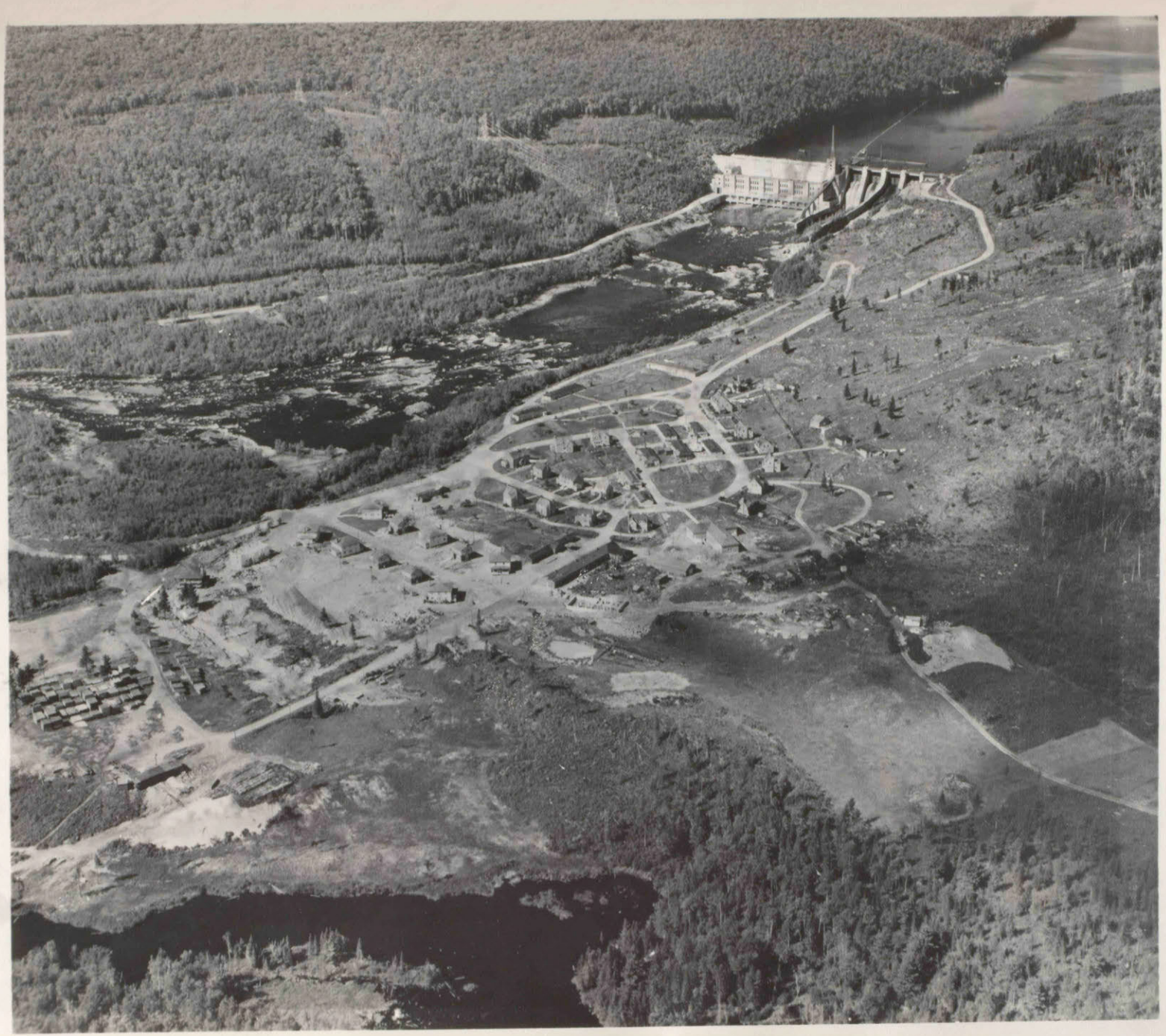
The village of Rapide Blanc consists of houses and institutional buildings for the staff of the hydro-electric plant, numbering about fifty men of whom about thirty eight are married. In addition it is intended eventually to house the staff of the projected Trenche

The site of Rapide Blanc before development.

power-house. It is situated on the East bank of the St. Maurice River a little below and south of the dam, on a southward sloping terrace 50-80 feet above the river. To the north the country is rough with rock outcrops and boulders, and to the south the Bouteille stream has been dammed to provide a water supply. The surrounding country is wooded with pine, spruce, poplar and birch. The nearest large town is La Tuque twenty-three miles to the east, there is, however, a camp one mile downstream which is seasonally occupied by the St. Maurice River Boom Co., and further down is the sawmill and camp of the Compton Lumber Company. The public and social services of this little community compare favourably with those of many large cities. Pleasant well-spaced cottages house the families of the plant employees, while a school, churches, recreation hall, and ski-chalet provide the basis of a satisfying community life.

Professor John Bland who has studied Rapide Blanc divides it up into four natural areas. One is residential and is made up of new brick houses. Then there is a second residential area made up of first and second streets which has less social prestige. Thirdly he suggests a recreational zone where the lumber piles are at present located. Finally an area is allotted to a farm, maintenance buildings, garage, and public services. He also recommends the improvement of the appearance of the town by the growing of trees.

The town is ten miles from the C.N.R. transcontinental



The Village
of
Rapide Blanc
today

railway and is connected with it by a modern concrete road. As a geographic feature the settlement is unique in the valley and is solely a product of the modern era of hydro-electric engineering. A big increase in its population is unlikely as industry is discouraged by its remoteness and lack of railway communication. There is, however, a possibility that it may attract a tourist industry because of its setting in good hunting and fishing country.

The town of La Tuque has been of some importance throughout the history of the valley. It was the site of early fur-trading posts and of later lumber camps, but it was not until 1907 when the Canadian Northern Railway built a branch line into the town that it began its present period of growth. In 1911 it was incorporated as a town with a population of 2,000. Since that date it has progressed steadily and, beside possessing a pulp industry, it is considered the gateway to the St. Maurice forestry operations.

The town occupies an unusual site on a terraced sandplain some 150 feet above the river[1]. To the west on the edge of the river is the granite knob which gave the town its name. To the east is the shield with rocky hills rising quite steeply from the

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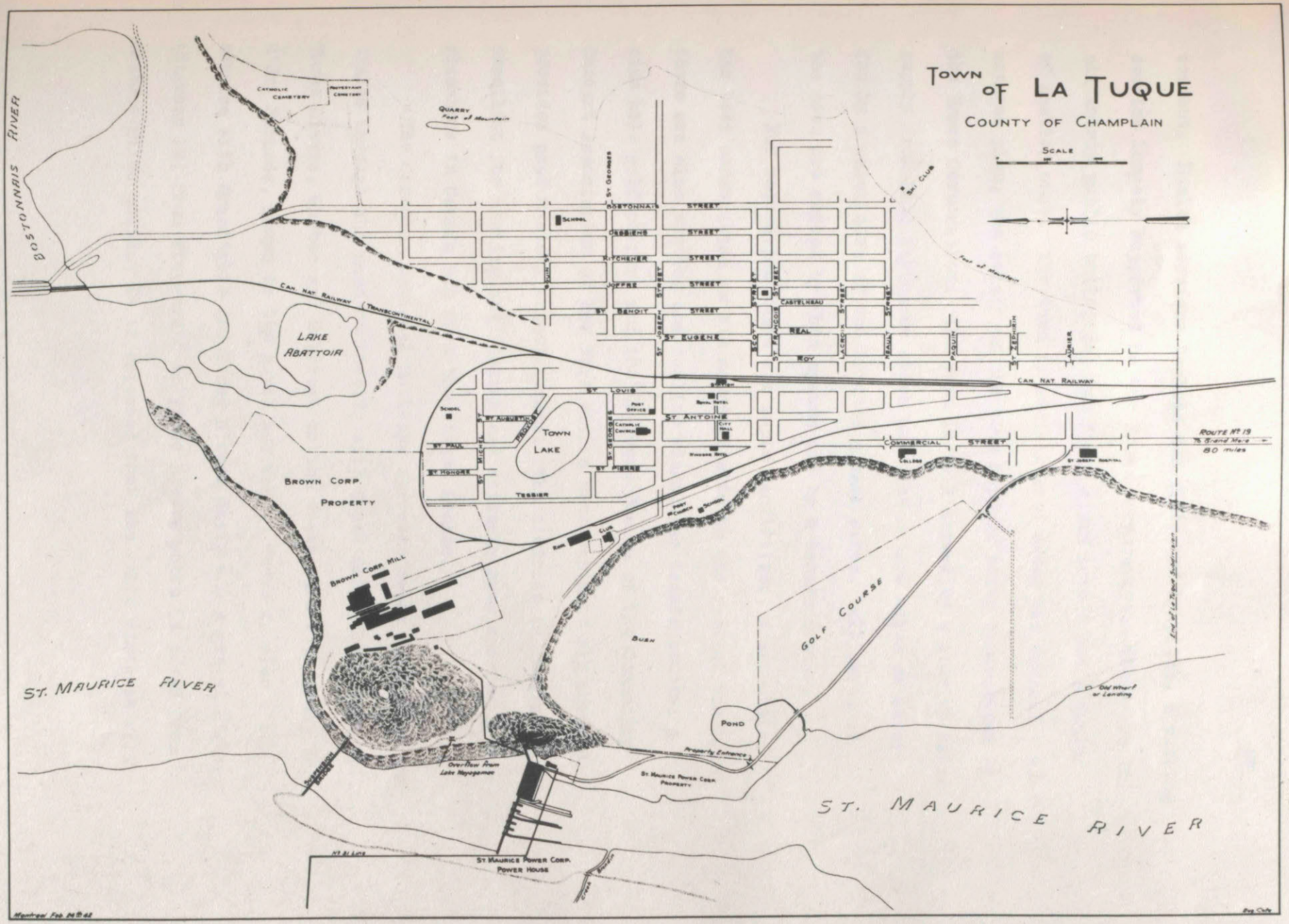
1 Cf. ante. page 4.

plain. The falls at the head of which the present power station is located are found a little to the south of the granite knob. All the buildings of the town have been constructed on the higher terrace with the exception of the golf club, the power buildings and one or two farms.

The Canadian National Railway track practically bisects the town. The area to the east being almost entirely residential with the exception of the new knitting mill. To the west are the main industries, the commercial centre, and the administrative buildings dominated by the plant of the Brown Corporation. There is in the centre of this section an interesting feature, Town Lake, which is doubtless of 'kettle' origin and is now used for recreation.

Houses are mainly of the wood-frame type and number approximately thirteen hundred with average rentals varying from $15. to $25. per month. It is difficult to divide the town into residential zones as it shows relatively little evidence of planning or natural selection. There is however one area of notably high class housing, strangely enough in the vicinity of the Brown Corporation plant, a little to the south and east of the granite knob. The houses are occupied for the most part by the plant executives.

There are five co-educational elementary public schools, one high-school, one technical school and one superior grade


TOWN OF LA TUQUE
COUNTY OF CHAMPLAIN
SCALE
BOSTONNAIS RIVER
CATHOLIC CEMETERY
PROTESTANT CEMETERY
QUARRY
Foot of Mountain
ST. GEORGES
ST. CLUB
ASBESTONNAIS STREET
SCHOOL
CROISIERE STREET
KITCHENER STREET
JOFFRE STREET
ST. BENOIT STREET
CASTELNEAU STREET
REAL STREET
ROY STREET
ST. JOSEPH STREET
ST. FRANCOIS STREET
ST. ZEPHIRIN STREET
CAN. NAT. RAILWAY (TRANSCONTINENTAL)
LAKE ABATTOIR
ST. LOUIS
ROYAL HOTEL
POST OFFICE
ST. ANTOINE
CITY HALL
CATHOLIC CHURCH
WINDSOR HOTEL
SCHOOL
ST. AUGUSTIN
TOWN LAKE
ST. PAUL
ST. HONORE
ST. PIERRE
TESSIER
CAN. NAT. RAILWAY
COMMERCIAL STREET
COLLEGE
ST. JOSEPH HOSPITAL
ROUTE Nº 19
To Grand Mere
80 miles
BROWN CORP. PROPERTY
RINK
CLUB
BROWN CORP. MILL
GOLF COURSE
BUSH
POND
Old Wharf or Landing
Property Entrance
Over-flow From Lake Hayogamac
St. Maurice Power Corp. Property
ST. MAURICE RIVER
ST. MAURICE RIVER
Nº 2 LOCK
ST. MAURICE POWER CORP. POWER HOUSE
Montreal Feb 24th 42
Eng. Chief
SHAWINIGAN ENGINEERING CO. File Nº 1010 Dwg. Nº S-56043

convent. Health services include one fifty bed hospital, a nursing service largely supported by the Brown Corporation. There are in all thirty public buildings, two first class hotels and a number of smaller ones. The town is administered under the council-town-manager plan, the salary of the town manager being contributed by the Brown Corporation. The town is well served by a gravity water supply from Lake Wayagamac which has nine square miles of water fed by a water shed of one hundred square miles. All parts of the town are served by this system and by a sewage system.

For recreation there are ample facilities. A ski-chalet has been constructed on the mountain side to the east of the town, there are also skating and curling rinks, two tennis courts, a nine hole golf course, and the La Tuque Branch of the Community Concert Association of New York with a membership of six hundred provides good musical entertainment. The district in general is excellent for hunting and fishing and attracts many sportsmen from elsewhere in Canada and from the United States.

The Canadian National Railways operates daily four passenger trains through the town connecting with Grand'mère, Shawinigan Falls, Three Rivers, Quebec and Montreal to the south, and with Amos, Val d'Or, Noranda, Rouyn to the north and west. There is also a bus service with Grand'mère and Three Rivers daily and a gravel highway (Highway 19) from Fitzgerald to Three Rivers which is paved from Grandes Piles south. It is expected that the whole distance will

La Tuque, looking North.

be paved in the near future.

The present true value of all property in the town is $15,000,000. and the value of manufactured products is $8,000,000.[2] La Tuque is thus a thriving young industrial town but is largely dependent upon one industry. There are signs however that its industry will become increasingly diversified with time. The new knitting mill and the Northern Veneer and Plywood Company are examples of the type of expansion taking place. Another possibility is that La Tuque may become a centre for the refining of ores from the Upper St. Maurice and Chibougamau districts, although this is largely a speculation.

Grand'mère was the first of the new towns of the valley to feel the impact of modern industrial developments. It had been important only as an auxiliary to the lumber industry previous to 1887, but in that year the Laurentide Paper Company built a mill at the site of the town. The mill was enlarged in 1898 and the village of Grand'mère was founded. By 1901 it had become a town and in 1920 it was honoured with the name of the City of Grand'mère. Today there is a population of approximately 14,000[3] living in the

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2 Report on La Tuque. Industrial Development Department. Shawinigan Water & Power Company. Not published.

3 Approximately 10,000 in the town alone.

town and parish of Grand'mère and this figure is increasing daily.

Set in the 'piedmont' area to the south of the Shield its site differs from that of La Tuque. Although, like La Tuque, it occupies a terrace above the river, there is no surrounding and forbidding Shield. Clays, sands and bedrock are all found within the city limits and produce various engineering problems. Although today most of the buildings are on the higher terrace the village had its beginnings near the water's edge in the vicinity of the Laurentide Paper Company's mill.

Like La Tuque, Grand'mère is laid out in the typical grid pattern of new North American towns. There is little evidence of planning but the town does fall into a number of natural regions. The higher class housing is almost entirely confined to the lower level near the river, and like La Tuque in the vicinity of the paper mill. Second class housing is for the most part found along the bluff overlooking the river, while the poorer housing is to the north and farthest from the river. The commercial centre is quite typically concentrated along one main street. Industrial establishments are not however confined to any particular section but are scattered everywhere throughout the town, and there is at present no zoning law in force. Homes are for the most part single family and of either wood or brick construction.

There are four schools teaching up to Grade 11 and four smaller ones teaching Grades 1 to 1V, as well as an Ursuline

The
City
of
Grand'Mère

B66

Convent which is affiliated with the Université de Montreal and is authorized to grant the B.A. degree. The Laurentide Hospital has twenty five beds and the Hôpital Laflèche which is at present under construction will have one hundred beds. There are six hotels the largest of which, the Laurentide Inn, has fifty rooms. Ample facilities exist for recreation, including an eighteen hole golf course, two swimming pools, six tennis courts and a hockey arena. Seven parks and playgrounds occupy twenty-five acres of the city.

The water supply of the city is derived from Lac des Piles which is seven miles away and provides for a daily capacity of three million gallons, but any expansion would demand a new source. Nineteen and one half miles of the streets are served by water mains and eighteen and one half by the sewerage system; four and one half miles are unpaved.

The city by virtue of its location has some advantage over La Tuque; it is six miles from Shawinigan and twenty-six miles from Three Rivers. Within a radius of ten miles from it there is a population of fifty-three thousand. The Canadian Pacific has a branch line from Three Rivers sending eight passenger trains per day and four freight trains. The Canadian National on its main line from Montreal to Quebec via Garneau Junction supplies six passenger trains per day and eight freight trains. There is a bus service with a frequent schedule to St. Tite, Shawinigan and Three Rivers, with connections to Montreal and Quebec, as well as five long distance

and four local trucking firms. There is in addition river transportation between Grand'mère and La Tuque which is the longest stretch of navigable water on the St. Maurice.

About twenty two hundred of the towns population is employed in its eighteen industries, and the gross value of production for 1944 was $14,000,000. The table at the end of this chapter gives the distribution of employees amoung the various industries.

Grand'mère has a much greater diversity of industry than La Tuque. It has also great advantages in its location nearer the heart of the St. Maurice industrial region. It therefore shows more obvious signs of growth than does La Tuque. A new factory of the Wabasso Cotton Company is under construction and will employ about two hundred persons. New streets are being opened to the north of the town, and it is expected that Grand'mère will continue to grow.

Shawinigan Falls is the largest of the new industrial cities and is second only to Three Rivers in population. In 1946 its estimated population was 26,200 and with the inclusion of adjoining parishes of Greater Shawinigan this figure is increased to 35,000. When it is remembered that there were only three buildings at the site of the town in 1898, the magnitude of the transformation wrought by the development of hydro-electric power is realized.

The centre of the town is situated on a peninsula which juts out into the river to the northeast of the falls. The first settle-

ment was not made here, however, but on the banks of the Shawinigan River to house employees of the Shawinigan Water and Power Company. By 1902 the centre of activity had moved over to its present position.

The peninsula is lowlying and backed by a steep bluff which continues along the river in both directions. At first this higher land was occupied only by factories but the city has expanded up over the bluff and into the parish of St. Marc. Shawinigan Falls thus presents a striking contrast to the other industrial towns to the north. La Tuque and Grand'mere are both laid out on flat ground with a very regular grid street plan. Shawinigan Falls on the other hand is divided into four, and if we include Almaville, five distinct sections.

There is the old section along the banks of the Shawinigan separated by the river from an area of fairly modern and high class housing which stretches from the No. 1 plant of the Aluminium Company to the Church of Saint Pierre. Then the peninsula may be considered as a unit although functionally it is varied. Finally the city has expanded into the parish of Saint Marc and into Almaville, these sections being functionally a part of the city but physically separated from it.

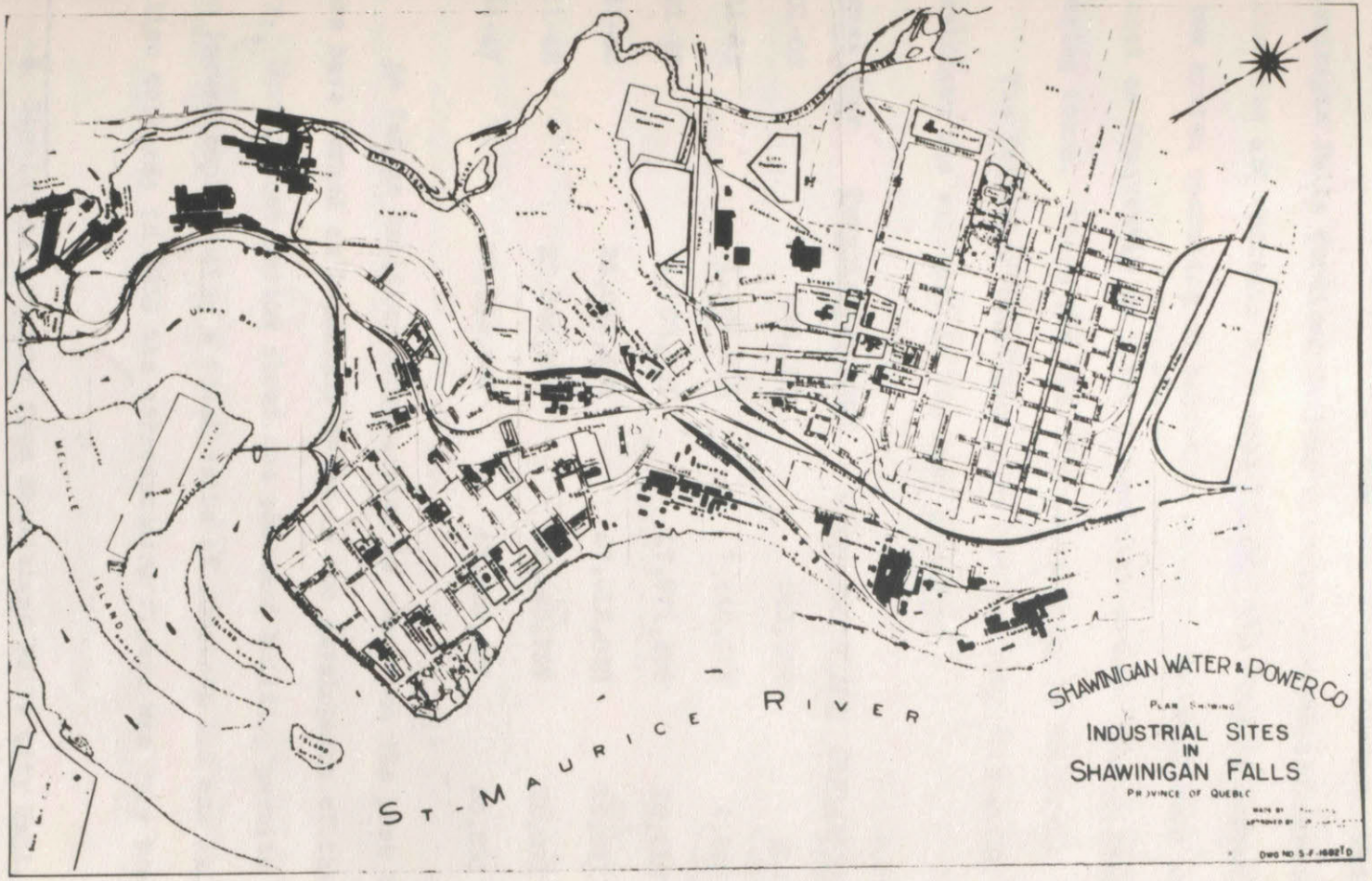
Although industrial establishments are to be found throughout the city limits there are two major concentrations. The first is near the power site and comprises the Aluminium Company and the Belgo-Canadian Paper Company. The second is east of Saint Marc

on the banks of the St. Maurice and is made up of various plants of the chemical industry.

It is not surprising that Shawinigan has outstripped the other new towns. It has the advantage of an excellent water-power site, but there are also definite advantages of location which are independent of this. Most important is the proximity of the port of Three Rivers, and the fact that Shawinigan is closer to the natural routes of land communication. It has today two railroads and a first-class highway system which are undoubtedly of importance in attracting additional industry to the area. Distances from the other main centres of population in Quebec are comparatively short

	Canadian Pacific Railway	Canadian National Railway
By Railroad to:-		
Three Rivers	20 miles	-
Quebec	121 "	89 miles
Montreal	96 "	89 "
La Tuque		78 "
By Highway to:-		
Three Rivers	20 miles	
Quebec	98 miles	
Montreal	105 miles	

The Canadian Pacific Railway sends eight passenger and three freight trains into the city each day, while the Canadian National



Principal Industries are shaded

Railway operates four passenger and two freight trains. The Shawinigan Falls Terminal Railway operates between the various industries and connects with both lines. The city is served by a bus system operating on half-hour schedule to Grand'mère and almost as frequently to Three Rivers with connections to neighbouring towns. There are also two trips daily to Montreal.

The following table indicates the rapidity with which Shawinigan has expanded in the last century:[4]

Fiscal Year	Taxable Property	Total Valuation	Population
1901-02	522,000	522,000	200
1911-12	1,265,625	7,442,578	4,229
1921-22	4,705,731	17,371,506	10,418
1931-32	25,061,428	27,612,028	15,571
1941-42	33,594,887	37,495,737	22,081
1946-47	38,580,937	43,950,437	26,200

As far as building construction is concerned the last ten years have formed an important stage in the development of the city. During that period about one thousand building permits have been issued representing a total value of fourteen and one half million dollars; in 1938 the corresponding figure was only two

4 Statistics obtained from Shawinigan Falls City Hall.

hundred and fifty thousand dollars.

The extent of recent industrial and institutional expansion is even more impressive as may be seen from the following figures:[5]

Expansion Underway

	COST
Shawinigan Water & Power Company	$12,500,000.
Canadian Resins & Chemicals	5,000,000.
Shawinigan Chemicals Limited	7,000,000.
Canadian Industries Limited	7,000,000.
Canadian Converters Company	New Plant
Consolidated Paper Corporation (alterations)	1,000,000.
City of Shawinigan Falls, New City Hall.	700,000.
do New water works, sewers and pavements	500,000.
Private construction - Dwellings, commercial.	2,000,000.
New Roman Catholic School	600,000.
Provincial Government - Bridge and entrance of city	1,500,000.
Research Building, Shawinigan Water & Power Co.	200,000.
	$38,000,000.

Many other projects totalling several million dollars are planned for the near future.

Shawinigan Falls is the heart of the modern valley. In a

5 Statistics obtained from Shawinigan Falls City Hall.

fourteen mile stretch of river centering upon it there is an installed hydro-electric capacity of 678,000 horse-power, and within a radius of twenty-five miles is a population of 170,000.

Indicative of the prosperity of the city is the new seven hundred thousand dollar city hall, a pleasant promenade and lawns along the water front, with swimming pools and fountains set in an attractive park. It seems likely that this prosperity will continue based as it is upon an abundant supply of power and an advantageous location, as well as the numerous other services which are associated with a well-established city.

Three Rivers is the most complex of the cities of the modern valley. This is largely because of its longer period of development and also because it functions as a port as well as an industrial town.

Between 1881 and 1891 the population of Three Rivers decreased by three hundred. This was a result of the crisis in the lumber industry. The best pine had been cut and by 1908 only one sawmill remained in the city. In that year a fire gutted the central part of Three Rivers and from its ashes the new modern industrial city has grown up. That Three Rivers is primarily an industrial town is illustrated by the fact that its seventy-three industries employ about 6,500 persons with a payroll of $10,000,000. and a gross production of $45,000,000.

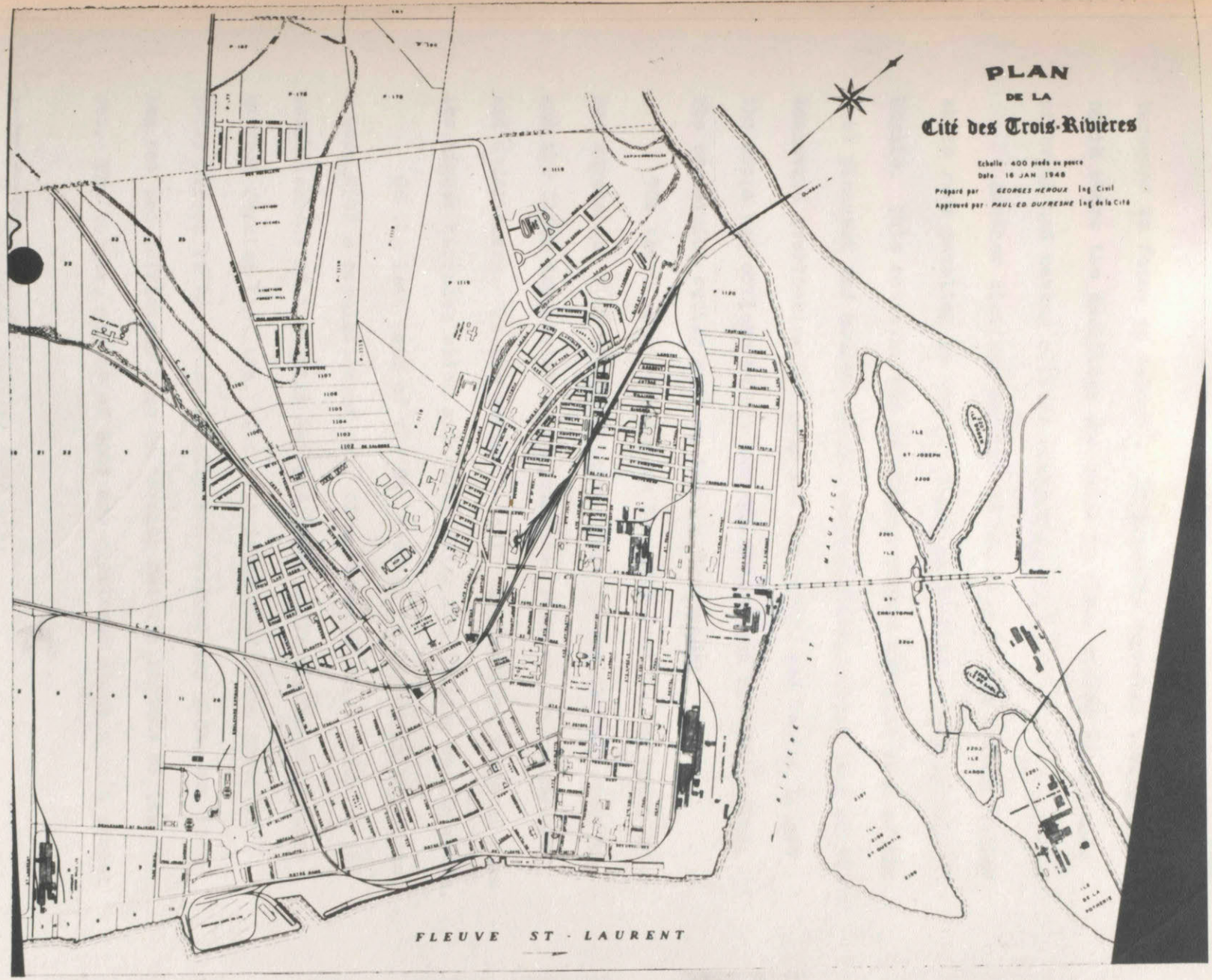
The city has a total population of 47,801 of whom about

94% are French-speaking; within a radius of twenty-five miles there live another 150,000.

The industries of the town are typical of the valley, and are largely dependent upon hydro-electric energy, pulp and paper, and textiles are the most important (see list at end of chapter).

The harbour facilities are adequate for ocean shipping and there is in all 9,280 feet of wharfage at which the water depth is 30 - 35 feet; there is also good anchorage two miles up river. The tides have about a one foot maximum and the current varies from 2½ - 9 miles per hour according to the season. The navigation season lasts from April 25th to December 1st. and tugs are not necessary to approach the harbour. Water, coal, fuel and diesel oil are available and the Canadian Pacific Railway is adjacent to all wharves; there are no slips or dry docks but minor repairs are undertaken.

The main industrial area is in the eastern part of the city on land which had not been built upon before this century. The factories in this section are those of International Paper, Canada Iron Foundries, Wayagamack and the Wabasso Cotton Company. Associated with these industries is a large working-class quarter which extends east from Laviolette Avenue. It is not a sightly section of the city and Blanchard describes it as follows, "on voit de petites maisons de bois sans grâce, souvent déjetées, vraies



Principal Industries are shaded.

baraques en forme de cubes"[6]. It improves somewhat toward the north where the dwellings are built in three storey blocks made of brick and having outside stairways.

Another distinct section of the city is 'la vieille ville' which runs parallel to the river and is limited inland by Rue Royale. This contains the commercial center and also some of the most pleasant old houses set in ample gardens. There is a short boulevard overlooking the quay and the river, and behind it are the shops and offices of the Rue des Forges and Rue Notre Dame. The commercial center ends at Rue Saint-Georges.

The third main division of the city lies to the north of Rue Royale and west of Laviolette. Here is the railway station and the older industrial establishments, such as the shoemakers and undertakers. To the north the city has begun to encroach upon the higher terraces which are ideal sites for housing developments.

On the left bank of the St. Maurice is Cap de la Madeleine, a town with a population of over nine thousand which prior to the establishment of the Saint Maurice Paper Mills housed only three hundred farming families. Like the industrial towns north of Three Rivers it has grown quickly and without any plan, and it has not had sufficient time to develop natural regions of its own. The houses, mostly of wood are clustered along a main street

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6 Blanchard, op.cit. page 174.

Three
Rivers.

parallel to the St. Lawrence, and on a number of roads running to the north. There is, as in the other new towns which have been examined, a higher class residential section close to the factories which houses the executives who are mainly English speaking.

In comparing the towns of the St. Maurice Valley it is evident that they have a number of features in common which are the result of their youth, and also of their relationship to the resources of the valley. They all show a lack of plan, not only in the sense of government planning, but also in that they lack the natural regions and fairly clear-cut structure found in most older towns which have had time to show the effects of natural selection.

There is also relatively little adjustment to the topography of the town sites. In almost all older towns the better class housing migrates to the terraces or higher sections. In the towns of the St. Maurice the reverse is sometimes true as in Grand'mere. The better housing is still associated with the factory sites, a state of affairs which will doubtless change as the towns grow and mature.

Finally all the towns are associated with hydro-electric power sites, with the exception of Three Rivers which is the port for the region. The size and prosperity of the towns appear to be proportional to three factors in the following order of importance, accessability, supply of power and proximity of raw materials.

PRINCIPAL INDUSTRIES OF LA TUQUE

Establishments	Payroll Employees	Product
Brown Corporation	845	Wood pulp, & turpentine-pulp is sold to other mills for the manufacture of high grade paper, etc.
St. Maurice Power Corporation	50	Electric power
George Gagnon	5	Lumberjack's boots
Joachim Crete	3	Machine Shop
Joseph Lafleur	5	Quarry
Messrs. Tremblay, Pelletier, & Guillemette	12	Doors, windows, etc.
Northern Veneer & Plywood Co.		Finished woods.

PRINCIPAL INDUSTRIES OF GRAND'MERE

Establishements	Payroll Employees	Product
Consolidated Paper Corporation	880	Newsprint, Cardboard, Pulp
Textile Weavers Limited	275	Spinning and Weaving Wool
Grand'mère Knitting Co.Ltd.	208	Knitted goods, gloves, etc.
Empire Shirt Mfg. Co.Ltd.	285	Shirts, Pyjamas, Shorts
Grand'mère Shoe Co. Ltd.	370	Shoes
Daurey Frères & Co. Ltd.	20	Spinning and Carding Wool
Laurentian Dowels Works	15	Turned Wood Products
Laurentide Paper Box Co.	12	Cardboard Boxes
J.T.A. Melancon	20	Concrete Blocks
H. Racine	8	Machine Shop

PRINCIPAL INDUSTRIES OF GRAND'MERE continued

Establishments	Payroll Employees	Product
Shawinigan Water & Power Co.	20	Power House
Can. National Foundry	32	Iron, Bronze, Aluminum castings
Grand'mère Foundry	12	Cast Iron
St. Maurice Appliance	15	Toasters, etc.
Wabasso Cotton Co.	200	Textiles
Grand'mère Welding	5	Steel Tanks
John Lewis Industries	65	Wood Products
3 Bottling Plants-4 Sash & Door Plants	50	

PRINCIPAL INDUSTRIES OF SHAWINIGAN FALLS

Establishments	Payroll Employees	Product
Shawinigan Chemicals Ltd.	1499	Calcium Carbide, Acetylene and allied chemicals, Stainless steel castings
Consolidated Paper Corp.	693	Paper, Sulphite Pulp
Shawinigan Water & Power Co.	300	Power House
Shawinigan Engineering Co.Ltd.	14	
Shawinigan Falls Terminal Rly.Co.	36	
Aluminum Co. of Canada Ltd.	982	Electrical Conductors, wire and cable.
Wabasso Cotton Co. Ltd.	378	Textiles
Canadian Carborundum Co. Ltd.	288	Abrasives
Canadian Industries Ltd.	555	Cellophane, Chlorine, etc.

PRINCIPAL INDUSTRIES OF SHAWINIGAN FALLS continued

Establishments	Payroll Employees	Product
Canadian Resins & Chemicals Ltd.	110	Plastics
Prest-O-Lite Company	12	Compressed Acetylene
Shawinigan Foundries Ltd.	35	Metal castings
Miscellaneous	175	Sash,Doors,Wood Products etc.

PRINCIPAL INDUSTRIES OF THREE RIVERS

Establishments	Payroll Employees	Product
Canada Packers	48	Poultry packing
J.C. Malone	475	Stevedoring
Gouin Lumber Co. Ltd.	40	Lumber
Carriere St. Maurice Ltee.	25	Limestone quarry
Tebbut Shoe Co. Ltd.	130	Shoes
Lampron Shirt Co.	105	Shirts
Regent Shirt Mfg. Co.	100	Shirts
Canada Iron Foundries Ltd.	900	
Consolidated Paper Corp.	800	Paper
St. Lawrence Paper Mills Ltd.	700	Paper
Can. International Paper Co.	1600	Paper
Wabasso Cotton Co. Ltd.	1550	Textiles
Beliveau Children's Wear	200	Clothing

PRINCIPAL INDUSTRIES OF THREE RIVERS continued

Establishments	Payroll Employees	Products
Girard & Godin	125	Caskets
Balcer Glove	100	Fine Gloves

CHAPTER VII

CONCLUSIONS

It has been the object of the preceding chapters to trace the evolution of the landscape of the St. Maurice Valley. The development of the present settlement pattern was a complex process and cannot be adequately explained solely in terms of the physical environment. Political and economic factors, as well as human caprice, played their part. Nevertheless it is evident that the physical characteristics of the valley have been of prime importance not only in their effect upon the location of urban settlements, but also because they have given a particular character to those settlements.

In review the dominant features of the valley's physical geography are the disturbed nature of the drainage and the forest cover of the shield. The cultural landscapes of the three periods which have been discussed were the result of the reaction of various types of people to this environment. The physical facts did not produce the cultural landscape but rather, in the words of Toynbee, the challenge of an environment evoked three different kinds of response from three types of people who were differently equipped to meet it. This does not, of course, mean that the divisions between the three periods were sharp and distinct, but only that the mental attitude of the pioneer of 1634 and his

technical equipment was different from that of the lumberman of 1852, who in turn differed from the electrical engineer of this century.

At first the French pioneer was solely interested in the fur trade and the geographical factor of prime importance for him was the location of Three Rivers in relation to the St. Maurice and its vast hinterland. With the establishment of the fort agricultural settlement began and some use was made of the rather barren soils. Several factors discouraged the spread of agriculture to the north. First there was the unsuitability of the land especially north of the shield, and the fact that there were abundant unclaimed areas along the St. Lawrence; secondly, there was a great problem involved in the transportation of bulk goods up and down the St. Maurice because of the numerous rapids.

With the decline of the fur trade the importance of the valley was maintained only because of its location midway between Quebec and Montreal. Economic activity was confined mainly to the exploitation of the iron ore and some farming. In the early nineteenth century when other areas were capitalizing on the forests, the St. Maurice Valley was ignored, again because of the difficulties of using the river for transportation.

The year 1852 marked a great change in the geography of the valley because from that time the challenge of the environment was accepted. For the first time men began to attempt to control and

use the river rather than submit to the limitations which it had previously imposed upon their activities. This was the result of technical advances, and also of the stimulus of a market for the timber. The prosperity which was derived from the forest was destined to be short-lived because it was based upon an exhaustible resource.

Finally the greatest advance of all was made when the river was harnessed for hydro-electric power. Although there had been some settlement in the Shawinigan Falls area, at such places as Ste. Flore, prior to this century, there were no truly urban developments. The supply of power, by permitting the exploitation of the pulpwood and the establishment of numerous other industries, made the growth of cities possible.

In a sense the cultural landscape of the St. Maurice Valley is polycyclic in the same way as its physical landscape. There are evidences of the earlier phases of its development; Grandes Piles is the notable example. In Three Rivers it is also possible to trace the history of the various types of exploitation and urban settlements which the valley has experienced. These traces are, however, largely obscured by the modern pattern.

The major towns and the greater part of the population are associated with the developments of this century. It is this immaturity which is the outstanding characteristic of the valley's urban geography. The words used by Blanchard to describe the new

Three Rivers may be aptly applied to the whole valley. "L'ensemble laisse une impression mêlée, commune aux agglomérations qui ont grandi brusquement, plus vite que les plans d'organisation urbaine.[1]"

Finally, the historical geography of the St. Maurice Valley also illustrates an important principle of human geography. The physical landscape offers a number of opportunities, what use is made of it by man depends upon his beliefs and abilities. There is thus nothing static in the relationship between the physical geography of the valley and its settlement patterns. Even as the later chapters of this study were written they became out of date. New roads, new industrial projects, new city planning developments promise to make the future scheme of things as different from the present, as the present is different from the past.

Nevertheless, as the preceeding pages have attempted to show, the physical facts of the valley have always been basic to its development, and a proper understanding of those facts is likely to be the best guide for the future.

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1 Blanchard, R. op.cit. page 176.

APPENDIX A

THE EARTHQUAKE OF 1663

A discussion of the physiography of the St. Maurice Valley would not be complete without some reference to a controversy which has continued for some time between the historians on one hand, and geologists and geographers on the other. It concerns the effect of earthquakes upon the landscape of the region in historic times.

In 1663 there was apparently a very violent earthquake of which detailed accounts have been preserved in the various writings of the time. From these writings it seems possible that there has been, as the result of the earthquake, a major change in the river regime. In particular the Rapides des Gres appears to have been much more prominent at one time. Almost every historian who has written of the region agrees that the Rapides des Grès were very much more prominent prior to 1663. Caron[1], Sulte[2], and Cloutier[3] are the most important of those who have supported this view. Gerard Filtreau[4] in a recent work on Shawinigan has denied this, and Raoul Blanchard[5], the French geographer has scoffed at Sulte's "typical impetuosity" in accepting the 'catastrophic' theory.

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1 Caron, N. Deux Voyages sur le Saint Maurice 1889.
2 Sulte, B. Chroniques Trifluviennes.
3 Cloutier Histoire de la Paroisse de Champlain 1915.
4 Filtreau,G. L'Epopee de Shawinigan 1944
5 Blanchard,G. Le Centre du Canada Francais

The earthquake was described by Mère Marie de l'Incarnation as follows, "Dans ce violent transport, il s'est fait un tel debris, qu'à peine un arbre est demeuré entier, étant pour la plupart débités en longeur comme des mats de navire.....le ravage est encore plus grand et avec des circonstances plus surprenantes vers la rivière de Batiscan.... avec des bruits comme une grande nombre de canons.....d'autres m'ont assuré qu'ils avaient vu des montagnes s'entrechoquer et disparaître à leur yeux"[6]. The controversy centres, however, around the writings of Père Buteux, a missionary who travelled up the river in the early seventeenth century. After a day's journey he wrote in his diary, "Nous recontrâmes, à une lieue de notre gite (resting place) une chute d'eau qui nous boucha la passage, il fallut grimper par dessus trois montagnes, dont la dernière est d'une hauteur démésurée. C'était pour lors que nous ressentions la pésanteur de nos traines et nos raquettes. Pour descendre de l'autre côte de ces précipices, ~~il n'y avait pas d'autre côte de ces précipices~~, il n'y avait pas d'autre chemin que de laisser aller sa traîne du haut en bas, qui de la raideur de cette chute allait au de la du milieu de la riviere, qui en cet endroit peut etre de quatre cents pas"[7].

Caron and Sulte both identify this stopping place as

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6 Tessier, Three Rivers Four Centuries of History.
7 Filtreau,G. op. cit.

Rapides des Grès, partly from the description, and partly on the grounds that Pere Buteux could not have travelled as far as Shawinigan in a day. Caron further maintains, on the basis of evidence from the Jesuit Relations, that the collapse of two mountains in vicinity of La Gabelle caused the river to change its course.

Both historical and scientific evidence, however, seem to discount any such catastrophe. As Filtreau[8] has pointed out, the description given by Père Buteux fits Shawinigan as well as des Grès and the three rapids which the missionary mentions later could well have been, les Hetres, Grand'mère and les Piles. He further identifies the three hills and then admits rather diffidently that perhaps the region had been completely changed (bouléversée) by the earthquake. Nevertheless, in spite of the fact that M. Filtreau is not completely convinced by the evidence, when his reasoning is strengthened by that of Prof. Blanchard[9] there seems little doubt that Caron and Sulte were overimpressed by the highly coloured and somewhat exaggerated accounts of the time. As Prof. Blanchard points out the disposition of the terraces and bedrock indicate no such catastrophe as recently as three hundred years ago. He believes that nothing more serious than a landslide in the vicinity of Rapide des Grès took place.[10]

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8 Filtreau,G. op.cit.
9 Blanchard op.cit.
10 Blanchard. Personal Communications 1948.

Reference to a standard geological text such as Holmes reveals that the amount of displacement along a fault-line during the most severe earthquakes on record is very slight[11]. On balance therefore it seems unlikely that the St. Maurice has suffered any such major changes.

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APPENDIX B

RIVERFLOW AND PRECIPITATION

The following figures illustrate the variations from month to month in the water-yield[1] of the Rapide Blanc-La Tuque section of the St. Maurice. Particularly noticeable is the high yield in March, April and May when the snow is melting. There does appear to be some correlation between precipitation and yield (note for example the low August rainfall and the low September yield), but the correlation is complex and not obvious in most cases. Variations in air temperature and vegetable cover produce variations in run-off and percolation which are not easily traced. The effect of a pronounced drought, however, is soon felt, but unless it is prolonged it has no great effect on the total flow of the river but only on the yield of a particular section. This of course is because the reservoirs are used to compensate the loss in run-off.

1946	Yield (1000 cu.ft.per.sec.)	Precipitation
January	1.93	2.37
February	1.35	2.17
March	7.	2.77
April	9.20	3.90
May	10.59	2.40

1 The yield figures were obtained by subtracting the flow of Rapide Blanc from the flow at La Tuque for corresponding dates.

1946	Yield (1000 cu.ft. per.sec)	Precipitation
June	6.37	2.10
July	5.31	4.56
August	4.92	1.82
September	2.48	5.44
October	4.76	4.18
November	6.24	2.82
December	4.27	3.96

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MAPS FOR REFERENCE

AVAILABLE IN DOMINION ARCHIEVES[1]

1104
Carte Regionale de la Province de Quebec, comprenant les comtés de Portneuf, Quebec, Montmorency, Charlevoix, et partie de ceux de Saguenay, Chicoutimi, Champlain, et St. Maurice. 4 miles: 1 inch, 1887.

3811
Details of various bridges

335
Front of certain tracts of land in the Seigniory of Cap de la Magdelin on the River St. Maurice. Ten chains to an inch. 1872.

1378
Linear Protraction of the Route passed along, from the Head of Grenville Canal to the St. Maurice Forges, by the exploring party employed by the St. Maurice and Ottawa Commissioners, 1830, to ascertain the facilities afforded to the formation of a new Grand Road along that tract of country ....and exhibiting the natural obstacles to be counteracted should such a work be ordered. 1 mile : 1 inch , 1831.

4083
Maps of Canada. Appendix to the report of the Commissioner of Crown Lands Part 11, 1857. The St. Maurice

1326
A map of all the conceded and surveyed territory to the north of the Rivers St. Lawrence and Ottawa lying between the Head of Grenville Canal and the River St. Maurice. Exhibiting also the line of route, in strong black of a party employed in Sept. Oct. and Nov. 1830 to trace a new Grand Road through the back settlement of that tract of country under the instructions of Messrs. Pothier de Rocheblave and Larocque. Commissioners for exploring the country between the Rivers St. Maurice and Ottawa., Quebec Sept. 25,1831. $2\frac{1}{2}$ miles: 1 inch $50\frac{1}{2}$ x $27\frac{1}{2}$

1330
Mouth of the St. Maurice River. With remarks 1873. 5 chains: 1 inch.

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1 Numbers refer to Catalogue.

1329
Plan d'une partie de la Rivière St. Maurice près de la chute, La Grand'Mère et des terrains environnant la dite chute. 1858. 6 chains : 1 inch.

1381
Plan of part of the St. Maurice from the Grandes Piles to the Mouth 1855. 40 chains : 1 inch.

1382
Plan of the St. Maurice Territory from the Grandes Piles to the mouth. 4 miles : 1 inch 1856.

1384
Plan d'une partie de la Rivière St. Maurice près de la chute de Shawinigan et des terrains environnant la dite chute. 2 arpents au pouce. 1858.

1385
Plan of part of the St. Maurice Territory. 4 miles : 1 inch. 1862.

1386
Plan of part of the St. Maurice Territory 4 miles : 1 inch. 1862.

1388
Plan of Part of the St. Maurice Territory. 4 miles : 1 inch.

1327
Plan of the River St. Maurice, Surveyed from its mouth in the River St. Lawrence, near Three Rivers, to its source at the height of land. Pierre C. Bourke. Crown Lands Dept. Montreal 28 July 1848. 2 miles : 1 inch.

1328
Plan of the Islands, and Booms at the mouth of the River St. Maurice 1853. References and notes. 8 chains : 1 inch.

1387
Plan of part of the St. Maurice Territory. Showing site of the Boom at Trois Rivières. 4 miles : 1 inch.

1383
Plan d'une partie de la Rivière St. Maurice pres de la chute de la Grand'Mère et des terres avoisinant la dite chute. 1858. 2 arpents : 1 pouce.

1380
Plan of Slide, Booms and Piers etc. for the improvement of the St. Maurice River at the Shawinigan Rapids. 1851. 100 feet : 1 inch.

1379
Sketch showing the relative position of the Lands of the Forges St. Maurice with Caxton and other lands adjacent. 8 miles : 3 inches.

1325
St. Maurice Territory. A Map of all the conceded and surveyed territory to the north of the rivers St. Lawrence and Ottawa lying between the head of the Grenville Canal and the River St. Maurice. Exhibiting also the line of route, in strong black, of a party employed in Sept. Oct. and Nov. 1830, to trace a new Grand Road through the back settlement of that tract of country under the instructions of Messrs. Pothier de Rocheblave and Larocque, Commissioners for exploring the country between the Rivers St. Maurice and Ottawa. Quebec, Sept. 25,1831. 1 mile: 1 inch.

RECENTLY PUBLISHED MAPS

Old Geographic Series, Scale 3.95 miles to the inch. Quebec 11 N.E. and Scale 7.89 miles to the inch. No. 11 Mtl.-Quebec.

Map no. 2, north of Montreal 1940. Comprising the countries of St. Maurice, Maskinongé, Berthier, Joliette, Montcalm, l'Assomption, Jacques-Cartier, Hochelaga, Laval, Terrebonne, Soulanges, Vaudreuil, Deux-Montagnes, Argenteuil, Labelle, Papineau. Between latitudes 45° and 47° north and longitudes 72° -10' and 75°- 30' west. Scale 3 miles to the inch. Department of Lands and Forests, Quebec.

Map no. 3, 1943. Comprising the countries of Portneuf, Lake St. John, Quebec, Montmorency, Charlevoix and part of Saguenay, Chicoutimi, Champlain, St. Maurice. Between latitudes 47° and 49° north and longitudes 69° -30' and 73° - 00' west. Scale 3 miles to the inch. Department of Lands and Forests, Quebec.

National Topographic Series.

Scale 1 mile to 1 inch.

Shawinigan, No. 31-1-10, Lat. 46°30' to 46° 45', Long. 72° 30' to 73° 00'. Contour interval 25 feet.

Three Rivers, No. 31-1-7, Lat 46° 15' to 46° 30; Long 72° 30' to 73° 00'. Contour interval 25 feet.

Scale 2 miles to 1 inch.

Grand'Mère, No. 31-1/NE, Lat. 46° 30' to 47° 00', Long. 72° 00' to 73° 00'. Contour interval 100 feet.

Kempt Lake, No. 31-O/SE., provisional edition, Lat 47° 00' to 47° 30' Long. 74° 00' to 75° 00'

La Tuque, No. 31-P/SE., provisional edition, Lat 47° 00' to 47° 30', Long. 72° 00' to 73° 00'.

Three Rivers, No. 31-1/SE., Lat. 46° 00' to 46° 30', Long. 72° 00' to 73° 00'. Contour interval 50 feet.

Scale 4 miles to 1 inch.

Gouin Reservoir, No. 32-B, provisional edition, Lat. 48° 00' to 49° 00', Long. 74° 00' to 76° 00'.

Scale 8 miles to 1 inch.

Ottawa-Montreal, No. 31-SE, Lat 44° 00' to 46°00' Long. 72° 00' to 76° 00'. Contour interval 250 feet. Quebec and Ontario.