FISHERIES AND MARINE SERVICE

Translation Series No. 3811

Environmental study on the Romaine-Churchill diversion project. Report and opinion

Anonymous

Original title: Etude D'Environnement sur le projet de derivation Romaine-Churchill. Rapport D'Opinion

From: Dessau Environement Ltee, environment and ecology consultants. 129 p., 1975

Translated by the Translation Section
Department of the Environment

Department of the Environment
Fisheries and Marine Service
Biological Station
St. John's, Nfld.

1976

129 pages typescript

#1230724

HYDRO-QUEBEC
ENVIRONMENT BRANCH

ENVIRONMENTAL STUDY ON THE ROMAINE-CHURCHILL DIVERSION PROJECT

REPORT AND OPINION
first version

R-5502-7

Dessau Environnement Ltée
September 22, 1975

DESSAU ENVIRONNEMENT LTEE
ENVIRONMENT AND ECOLOGY CONSULTANTS

September 22, 1975

To: Mr Roger Larivière
Group Head - Environmental Engineering
Environment Branch
Hydro-Quebec

Subject: Romaine River - Environment
Report and opinion

Dear Mr Larivière:

Enclosed you will find ten copies of the first version of the report and opinion on the environmental study of the Romaine-Churchill diversion project. We are submitting it for comment to the Comité de Coordination de l'étude (study co-ordination committee), of which you are chairman.

Since the staff of Dessau Environnement has been unable to complete the workshop discussions on the summary and conclusions of the report, we will be submitting that first section of the report to you on Wednesday, September 24.

As of Thursday we will be at your disposal for discussion of this report with the co-ordinating committee.

Yours sincerely,

(signed)
Pierre Dumas, Engineer
President and General Manager

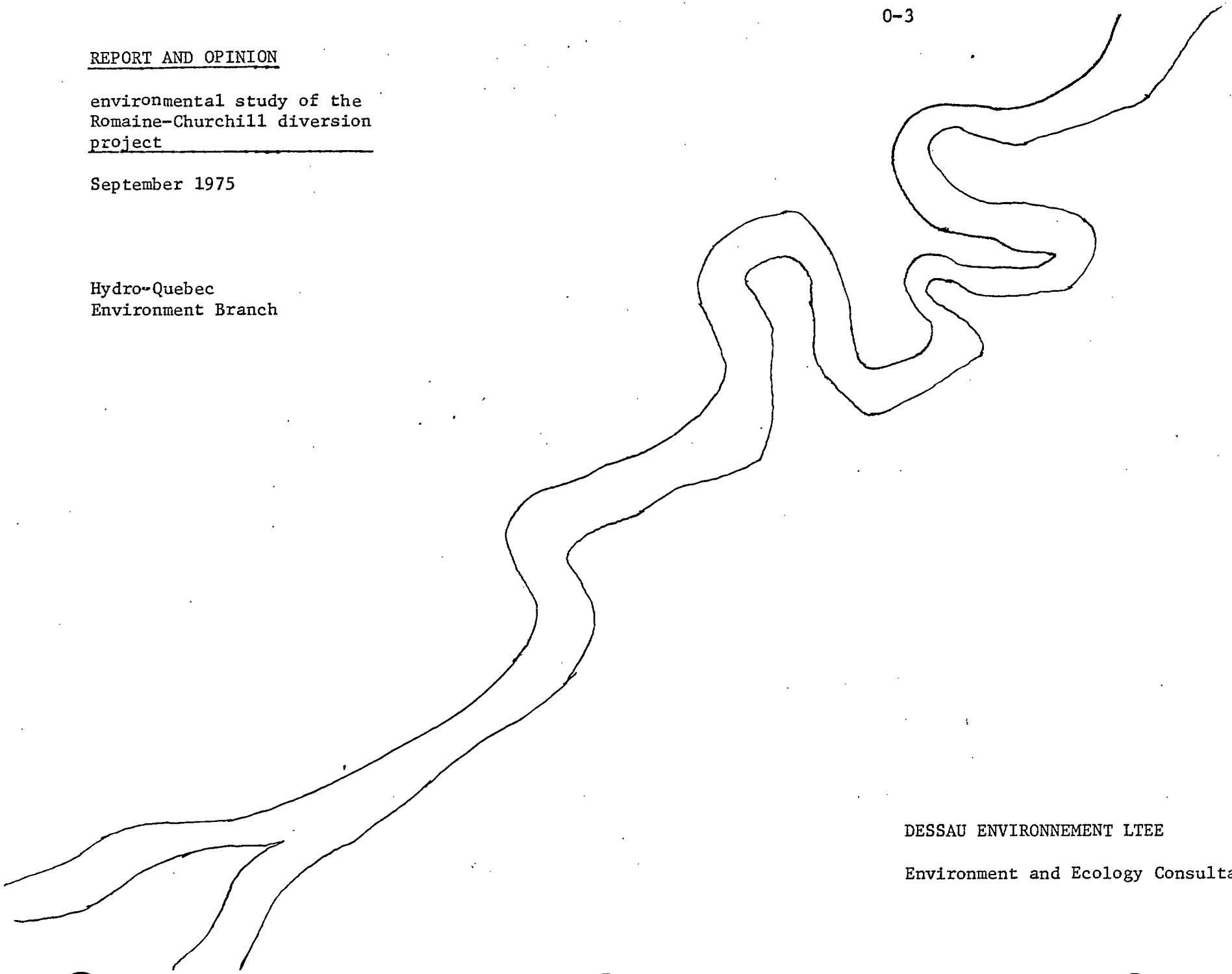
PD/lc
cc Mr Gaston Galibois

REPORT AND OPINION

environmental study of the Romaine-Churchill diversion project

September 1975

Hydro-Quebec
Environment Branch



DESSAU ENVIRONNEMENT LTEE

Environment and Ecology Consultants

ENVIRONMENTAL STUDY OF THE ROMAINE-CHURCHILL DIVERSION PROJECT

REPORT AND OPINION

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1 SUMMARY AND CONCLUSION

The project under study is the diversion of the waters in the Romaine River's upper basin, on the Quebec North Shore, to the Churchill Falls generating station in Labrador. The average flow at the mouth of the Romaine River will as a result be reduced by about 50 per cent.

At first glance the impact of this project on environmental resources does not appear sufficiently serious for the project not to be carried out, although its cumulative effects will reduce the productivity of the Gulf of St Lawrence. Various compensating and other measures will have to be contemplated, especially concerning the caribou and waterfowl in the interior and the salmon in the estuary.

The local and regional economic spinoff will probably not be very great. Indirectly, however, the project could open the way to development of the resources of the Middle North Shore. On the other hand, the reduced flow in the estuary could put restrictions on industrial growth in the area of Havre-Saint-Pierre; remedial measures could be planned in this regard.

From the legal and political points of view, and from the point of view of public opinion, the project will likely raise once more the problems of the Quebec/Labrador border and Indian rights, with all the social implications for the populations concerned.

Impact on environmental resources

Table 1.1 on the following page summarizes the total impact of the project on animal, economic, human and tourist resources, in each

TABLE 1.1

OVERALL IMPACT -- ENVIRONMENTAL RESOURCES

		SECTORS					
		1 CHURCHILL	2 JOSEPH-ATIKONAK	3 UPPER ROMAINE	4 LOWER ROMAINE	5 ESTUARY	6 ST-JEAN
ANIMAL RESOURCES	FISH						○
	MAMMALS						
	Caribou						
	Moose				○		○
	Fur-bearing animals		○				
	BIRDS	○			—		
	OTHER					—	
ECONOMIC RESOURCES	WATER						
	FORESTS				○		○
	MINERALS						
HUMAN RESOURCES	HUMAN OCCUPATION		—	—	—	○	
	CHOICE LANDSCAPES			○		—	
	HISTORIC AND ARCHAEO-LOGICAL SITES				○		○
	RECREATIONAL SITES				○	—	
	LANDMARKS			○	○		

	Major	Moderate	Minor
Positive		✣	+
		○	—

of the geographic sectors involved in the project. The table shows how the extent of each resource in the natural state is altered by the project, as discussed in section 5 of this report.

This table shows that land animals (caribou, moose, and fur-bearing animals) as well as waterfowl are particularly affected by the raised level of Atikonak Lake in the spring as well as by the creation of the Romaine reservoir, which also affects some bird colonies that nest on the islands in the lakes. The overall effect of the reservoir and of the diversion on fish in the area is practically nil, whereas the reduced flow of the Romaine is likely to have a negative effect on salmon, which use the lower part of the river for reproduction.

As far as the economic resources are concerned, the project, and especially the creation of the reservoir, will not submerge any commercially valuable forest or known mineral deposits. The development of the hydro potential of the upper Romaine sector is the reason for the project, but leaves unused the hydro potential of the lower Romaine and the St-Jean; these potentials are not irretrievably lost if the diversion is only temporary.

The small winter low-water flow in the Romaine estuary greatly reduces the amount of available fresh water in this sector, and is thus an obstacle to the establishment of certain types of industry.

As for tourist resources, the reduced flow of the Romaine will reduce the grandeur of the scenery, especially in the deeply embanked section of the river and in the falls and rapids farther downstream; archeological sites will be lost in the area of the reservoir and immediately below the cut-off point; on the other hand, the new shut-off structures will be a tourist attraction in an area that has rather few such attractions.

In the course of the study several ways of correcting some of these consequences will be considered: there will also have to be an evaluation of the social justification of these remedial measures:

- an increase in the flow of Atikonak Lake could limit the seasonal variations of the level of this lake and also nullify the impact of the diversion on the caribou and waterfowl in this sector;

- damming off of* the shallow bays in the Romaine reservoir, to keep them free of tide level variations, could compensate for the loss of habitats for the waterfowl and small mammals in this sector;

- selective grading and clearing of the bottom and banks of the reservoir as well as of future islands could be done to improve the appearance of the banks, limit erosion, promote the spawning of certain fish species and productivity for land animals, facilitate navigation and fishing, and so forth;

- the partial regulation of the remainder(?) of the Romaine River basin and the creation of sills to maintain the level in certain sections of the river could help limit the impact on the appearance of the river, the recreational potential, the salmon in the estuary and the industrial water supply. Such measures would also be good for the river's waterfowl and fish;

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* or "building embankments around" - Tr

- in addition to the specific measures mentioned above, all of Hydro-Quebec's general directives on environment protection that are applicable to the design, construction and use of the various types of works and structures will of course have to be enforced. The directives are not listed in this report.

Socio-economic impact

The main areas of the project's socio-economic impact are summarized in table 1.2 on page 1-6.

From the point of view of the Middle North Shore, the Romaine-Churchill diversion project could turn out to have only a small impact over and above the strictly economic spread effects. This possibility arises from the nature of the project which, once it is completed, may leave a vacuum behind it if no other project is tacked on to it while it is still in progress.

The limited supply of fresh water that will result from the reduction of the flow of the Romaine will have a negative effect on the development of Havre-St-Pierre.

On the other hand some spread effects will come into play in urban services, transportation and infrastructures.

The chief development prospects opened by the project are occupational, educational and regional in nature. To the 850 permanent jobs in Havre-St-Pierre will be added 350 temporary jobs. The project could inject about 10 million dollars in four years into the area, whereas the total annual wage bill of Havre-St-Pierre is now about 5 million dollars.

Table 1.2

Summary - Socio-economic impact

Jobs	- Few or no permanent jobs created. - Maximum of 350 temporary jobs for 2 years.
Economic Activities	- Increase in service and support activities. - As a result of the reduced flow (Romaine), serious limitations on the industrial development of Havre-St-Pierre. - Minor economic spinoff.
Economic Structure	- Temporary reduction in the size of the mining sector. - Strengthening of the current trends in Havre-St-Pierre's economic structure - Economic diversification of Rivière-St-Jean and Mingan.
Community Services	- Installation at Havre-St-Pierre of administrative offices and consequently of municipal infrastructures. - Possible utilization for other purposes of the workers' camp after the worksite is closed down.
Territorial Integrity	- Simultaneous problems of the Indian land-title claims and the Quebec-Labrador dispute.
Education Training	- Training of local manpower in special skills. - Possible reuse on other projects.
Culture Tradition Lifestyle	- Changes to and adaptation of local populations. - Disturbance of the native people's use of the land.
Regional Development	- Promotion of the development of the interior's recreational, forest and mineral resources, as a result of road construction

- Changes in level of expectations.

The prospects for regional development are associated with the establishment of a permanent access road. There will be either a favourable impact or none at all in the Middle North Shore, depending on whether the road starts at the shore.

Finally, the expectations for any project in the Middle North Shore are likely to be high. We are in fact dealing with a geographically marginal population whose expectations may be far above the actual possibilities of any project.

The Gulf of St Lawrence

The biological production of estuaries constitutes a large part of the total production of the oceans.

The fresh water brought down by the St Lawrence is responsible for the productivity of the Gulf at the time of the spring flood. At a time when there is still no stratification, the flood speeds up the disappearance of the ice and through mechanical stirring up of the waters, brings about a redistribution to the upper (productive) layers of the captive nutrients in the lower (unproductive) layers.

A positive correlation has been established between the flood volume and the production of commercial species in the Gulf. The regulation of the flow of many of the St Lawrence tributaries and of the St Lawrence itself is already reflected in a substantial lowering of the temperature of the Gulf.

Regulation of the Romaine, tiny as it may be when the present hydrological conditions of the St Lawrence are looked at as a whole, must be considered part of a cumulative phenomenon diminishing the productivity of the Gulf.

Regulation of the Romaine, unimportant as it may be when the present hydrological conditions of the St Lawrence are looked at as a whole, must be considered part of a cumulative phenomenon diminishing the productivity of the Gulf.

It must be taken for a fact that the regulation of the Romaine river will have a very serious impact on the Gulf of St Lawrence.

2 INTRODUCTION

2.1 Descriptive sumary of project

The Romaine-Churchill diversion project comprises the installation of a shut-off dam, at mile 164.5 of the Romaine River, that would create a reservoir of about 350 square miles. Because it would cross the watershed, the reservoir would divert on average about 5000 cubic feet per second, or 50% of the flow of the Romaine river, to Atikonak Lake in Labrador (figures 2.1 and 2.2).

These waters will be fed to turbines in the Churchill generating station and the proposed generating stations downstream at Gull Island and Muskrat Falls. The additional power obtained from these three plants will probably be about 500 mW [sic] and the additional energy generated annually will be about 4.8 tWh. No increase in power generation or transmission equipment will be necessary at Churchill Falls and the other two generating stations will be designed to take this additional flow. Hydro-Quebec owns 35% of the Churchill Falls generating station and might be a buyer of part of the power generated in the other stations.

Eventually, if the needs of the Hydro-Quebec system require it, the Romaine river itself can be harnessed. The reservoir initially created for diversion purposes will then be used as a reservoir at head for regulation of the flow of the Romaine, which would be determined by passage through four hydro generating stations.

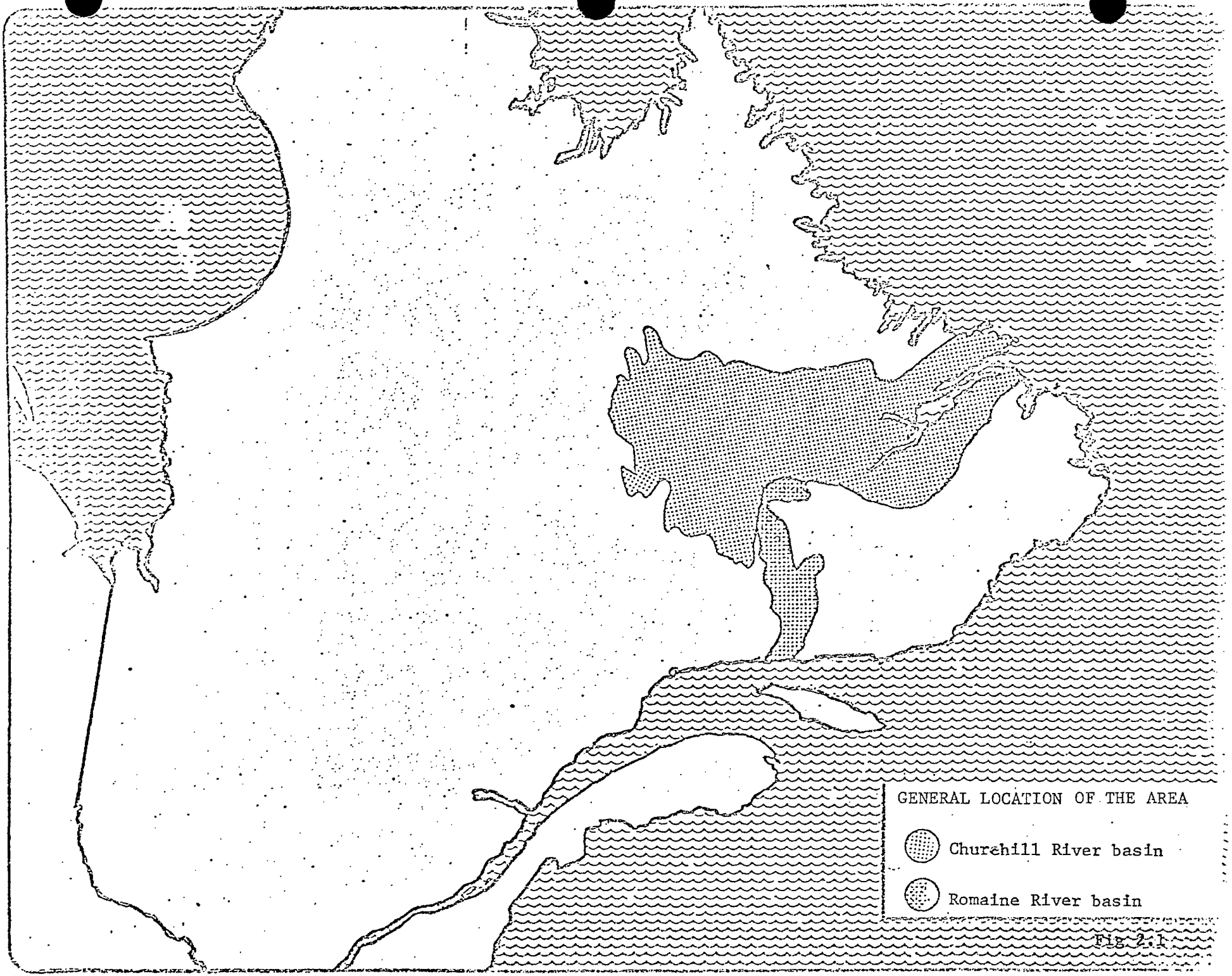
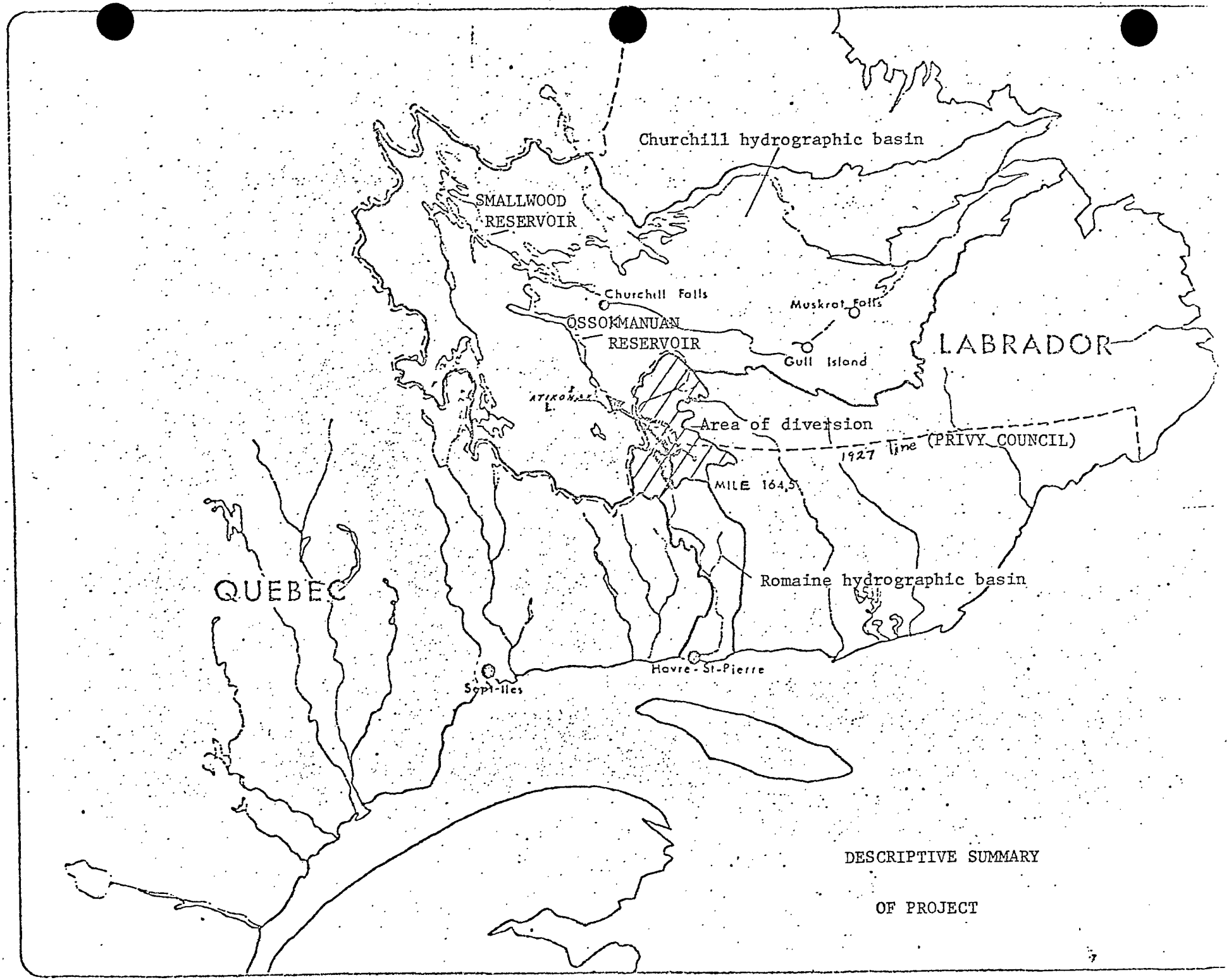

GENERAL LOCATION OF THE AREA
Churchill River basin
Romaine River basin

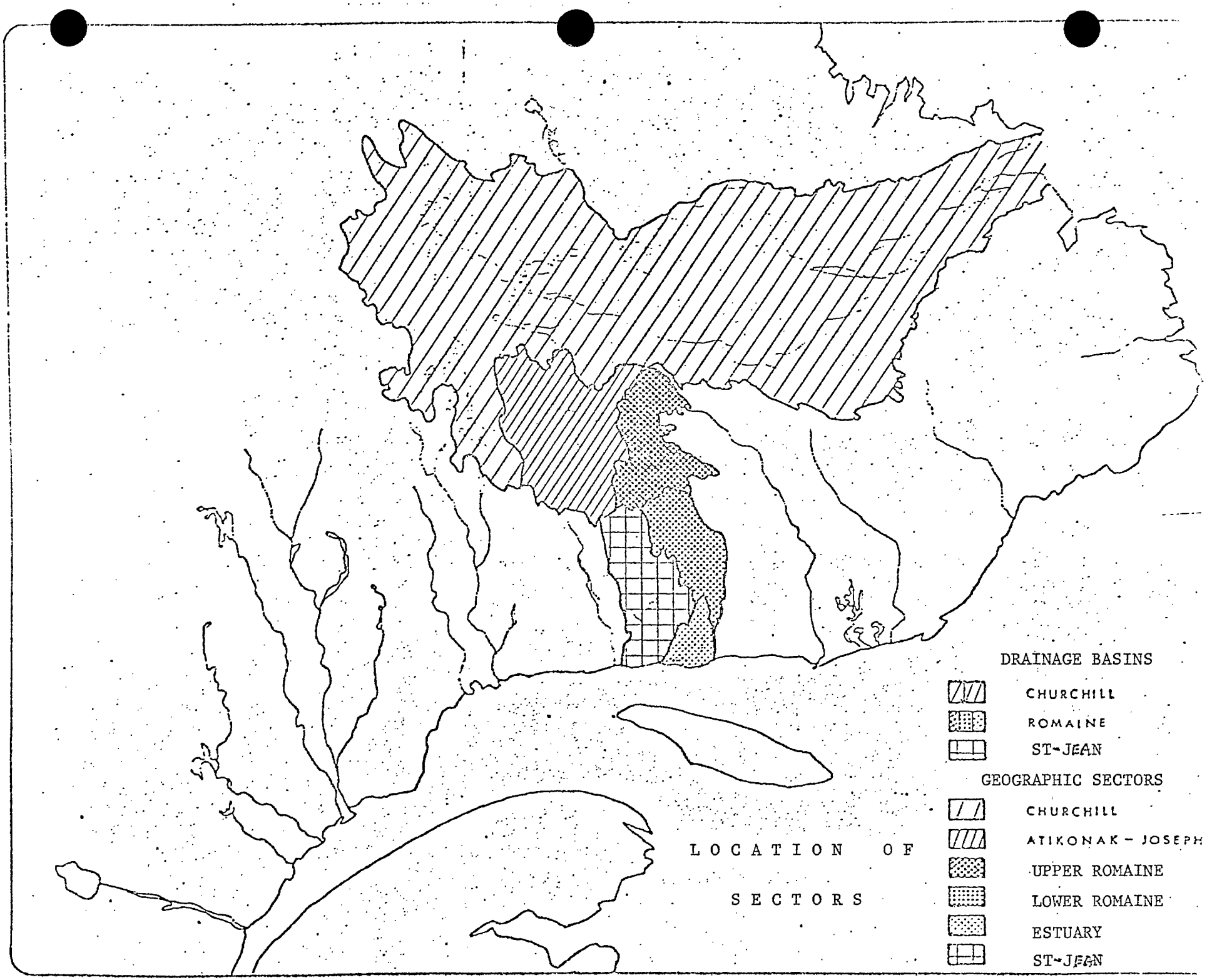
Fig. 2.1



DESCRIPTIVE SUMMARY

OF PROJECT

Fig 2.2


DRAINAGE BASINS
CHURCHILL
ROMAINE
ST-JEAN
GEOGRAPHIC SECTORS
CHURCHILL
ATIKONAK - JOSEPH
UPPER ROMAINE
LOWER ROMAINE
ESTUARY
ST-JEAN
LOCATION OF
SECTORS

Out of the engineering studies will come a technical opinion on the diversion about October 15 and a preliminary report around March 1976.

2.2 The Environmental study

In June 1975, the Environment Branch commissioned Dessau Environnement Ltée to carry out an environmental study on the diversion project, in co-operation with Hydro-Quebec. The study includes the following main activities:

- drawing up of part of the biophysical inventories required for improved knowledge of the territory affected by the project, and to make possible a preliminary determination of the project's potential impact on the environment;
- submission of a report and opinion in September 1975;
- submission of a final report in February 1976.

The Environment Branch, besides actively participating in this study, is also working on a study of a proposed total development of the Romaine. A progress report on the latter study should be submitted in February 1976.

The methods used for these two studies will have to be compatible at each stage, for the purpose of comparative evaluation of the impact of the two projects.

The aim of the present study, which is limited to the diversion project, is not to choose between alternatives but to make a definite determination of the consequences of the project and to develop selection criteria which will be used at a later stage in the comparative evaluation of works [?] programs.

2.3 Report and opinion

Within this context, the purpose of this report is to sketch out the chief consequences that the project will have for the environment, on the basis of a summary compilation and analysis of the data accumulated to date from readings and inventories as well as the preliminary engineering data.

There will therefore be some intuitive elements in the report, whereas the final report will be based on a detailed and systematic analysis of the ecological data and a clearer setting out of the technical data of the project. On the other hand, it is hoped, if not predicted, that the detailed analysis will lead to conclusions that will to a large extent confirm the statements in this report.

This report is for the internal use of Hydro-Quebec and its objectives are as follows:

- to inform Hydro-Quebec's management about the project's impact on the environment as perceived at a preliminary stage of the study;

- to serve as reference material for the Environment Branch in its functional liaison with other Hydro-Quebec groups such as engineering, planning, construction, and operations--in the course of the project study in which all these groups will be participating;

- to lay the methodological basis for the final report;

- if necessary, to pinpoint the needs for additional data of any kind that may be essential for carrying through the study.

2.4 Sources of information

This report relies on various information sources and opinions that are reflected in a general way, although not referred to specifically.

Bibliographical references: Appendix 1 contains the list of works and reports consulted to date that pertain to the description of the area affected by the project. Most of these references have been summarized and published by Dessau Environnement in the form of two collections of reference cards.

In addition, several series of aerial photographs and topographical maps have been used for the study and have not been explicitly mentioned in the bibliography. The scale of the photographs varies from 1:15,840 to 1:60,000, while the scale of the topographical maps varies from 1:50,000 to 1:1,000,000.

Biophysical inventories: The raw data provided by the biophysical inventories made by Hydro-Quebec and Dessau Environnement in the summer of 1975 were set down in preliminary notes by those responsible for the programs. These programs are as follows:

- Hydro-Quebec

  Limnology, ichthyology, bathymetry, small mammals and various observations along the Romaine River and its tributaries below mile 164.5, inventory of the caribou in the upper Romaine and Joseph-Atikonak sub-basins, and physical and chemical measurements along the Romaine River.

- Dessau Environnement

  Waterfowl inventory in the upper Romaine and Atikonak sub-basins, inventory of the vegetation in the Romaine basin and the Atikonak sub-basin, ichthyology, bathymetry, and limnology of the Romaine River, its tributaries and its head lakes above mile 164.5.

- Other consultants

  Survey of the use by salmon of the lower Romaine basin (G Shooner). Survey and expert opinion on the water animals in relation to the Romaine River diversion project (I W Dickson). Oceanological survey of the Romaine estuary (P Legendre).

The detailed scientific reports of each of these programs will be published in the coming weeks and will be used for the detailed preparation of the final report.

Various studies by the Generating Station Projects Branch:

In order to give a better idea of the initial technical conditions produced by the projects, particularly in the fields of hydrology, hydraulics, climatology and ice, and to answer certain other questions posed by the Environment Branch, Hydro-Quebec's Generating Station Projects Branch, and particularly its Hydraulics Department, have published a number of reports that are listed in appendix 2A.

Meetings and workshops: For the duration of the study, a co-ordinating committee and subcommittees were formed according to need, from among representatives of the following groups: the Environment Branch, Dessau Environnement, Churchill Falls Labrador Corporation, and the Generating Station Projects, Construction, Planning, and Operations branches of Hydro-Quebec.

The meetings of these committees were forums for discussion and exchange of information with the results being recorded in reports.

In addition, early in September a series of workshops was held in which the groups mentioned above took part. The objective of these workshops was to sketch out opinions on various aspects of the project by geographical sector. The following workshops were held:

- technical aspects of the project;
- aquatic ecosystems;
- terrestrial ecosystems;
- human
- socio-economic
- methods for integrating and synthesizing results.

A report was drafted for each of these workshops.

Finally, following the publication of a preliminary version of this report, various meetings were organized for the collection of comments from the scientists who participated in the study; reports were made of these meetings, and the conclusions were incorporated into the present final version.

2.5 Study methods

The study methods contemplated for the final report are shown in table 2.1 and, for the purposes of the study, introduce the following notions:

- the region affected by the project may be divided into a number of geographic sectors; this facilitates the presentation of the data and the description of the alterations caused by the project;

- the environment is composed of a group of interrelated physical, biological and human elements that may be defined in each of the geographical sectors of the study;

- various elements of the environment may be grouped together to constitute environmental resources that characterize each sector and, by definition, are perceived in a positive manner by at least one social stratum on at least one level (local, regional, national...);

- the project imposes new initial conditions in each of the geographical sectors;

- these initial conditions produce alterations in elements of the environment, either directly or as a consequence of alterations of other elements;

- the alteration of elements implies a positive or negative alteration of the resources defined by them;

- on the other hand, the project falls within a human context in which various populations at various levels (local, regional,...), are given a particular identity by a group of socio-economic and cultural characteristics;

- the project may bring about, directly or indirectly, positive or negative alterations of these socio-economic characteristics;

- finally, the dynamically evolving reference populations possess a vision of their individual and collective futures that leads them to attribute a certain amount of importance to the alterations in their evnironmental resources and their socio-economic environment;

- when the magnitude of the alterations in the environmental resources and in the socio-economic characteristics is combined with the importance given to them by the various reference populations, an overall evaluation of the impact of the project can be arrived at.

STUDY METHODS FLOW DIAGRAM

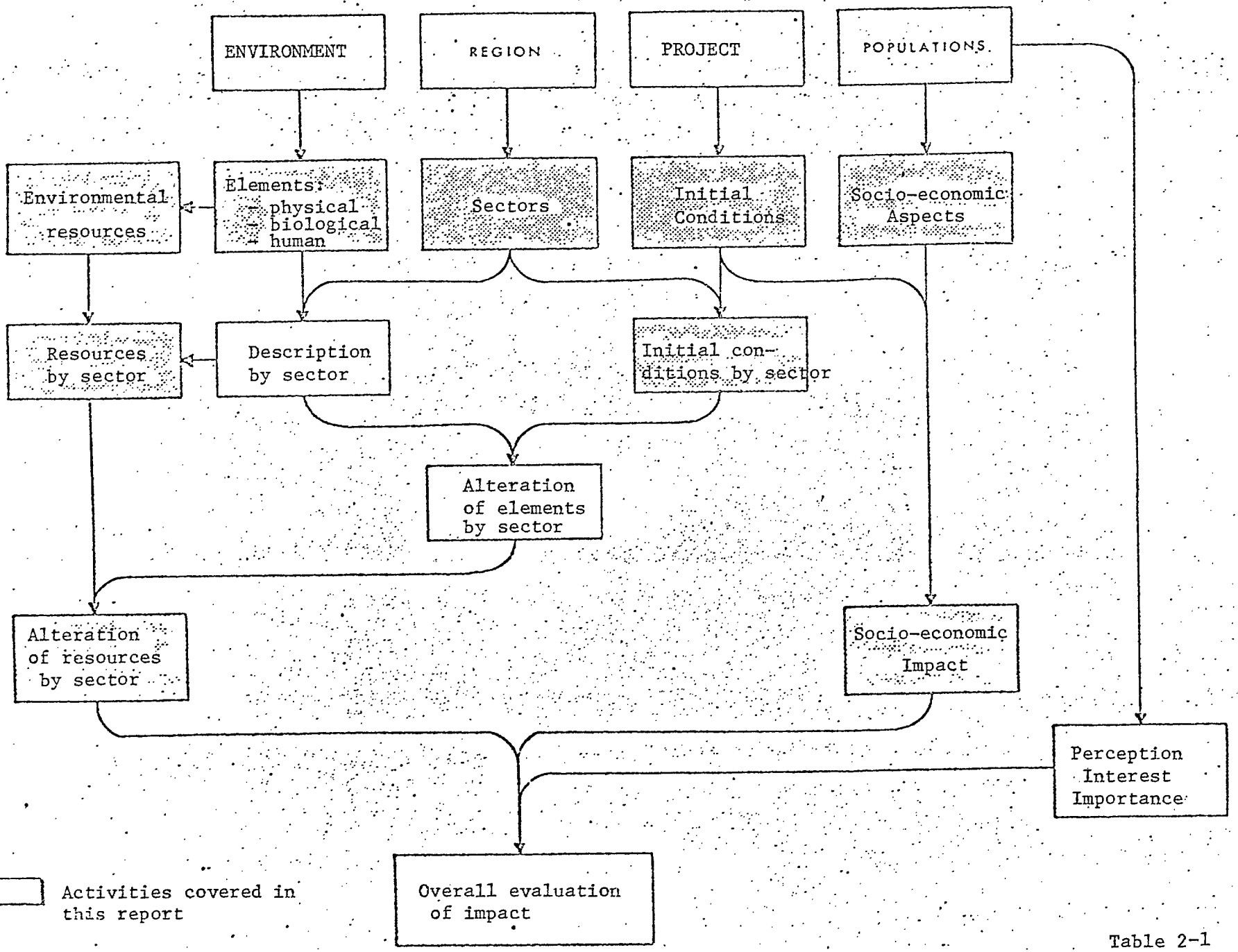


Table 2-1

With a similar approach, it is possible to judge what environment protection methods should be contemplated:

- for the impact on the environmental resources as well as for the socio-economic impact, remedial measures can be envisaged that will reduce the negative impact, and improvements that will maximize the positive impact;
- when the interest of the reference populations is known, it is possible to judge the social advantage or the socio-economic benefits of the possible remedial measures.

These methods imply certain assumptions that underlie the conclusions of this report:

- even a major alteration of any environmental element is of no consequence unless it helps to alter an identifiable environmental resource;
- any alteration in an environmental resource or socio-economic aspect is more serious if that resource or aspect is perceived as important for one or more reference populations.

Methodological context of the report: For the purposes of the report, only the activities shaded in gray in table 2.1 that identify the alterations in the environmental resources and the socio-economic impact will be dealt with; specifically:

- there will not be any detailed treatment of the rules by which the environmental elements combine to form the environmental resources;

- the mechanisms for the ecological alterations brought about by the project will not be described; there will be only a general statement concerning the impact on the terminal resources; [?]

- there will be some observations concerning the importance of certain resources or socio-economic aspects for various reference populations; there will not, however, be any systematic evaluation of the interests of these populations that would permit a pronouncement on the overall impact of the project.

Geographic sectors: The various points in the report about methods will be defined as they are taken up. It would, however, be useful to define immediately the geographical sectors that will be used; these sectors are delimited in table 2.2 and illustrated in figure 2.3.

TABLE 2.2

DELIMITATION OF SECTORS

SECTOR 1 Churchill	Basin of the Churchill River except for sector 2;
SECTOR 2 Joseph-Atikonak	Sub-basin controlled by the estuary of Atikonak Lake;
SECTOR 3 Upper Romaine	Sub-basin of the river controlled by mile 164.5 of the Romaine River;
SECTOR 4 Lower Romaine	Sector between the Grand Falls (mile 32.0) and mile 164.5 of the Romaine River;
SECTOR 5 Estuary	Sector comprising the St Lawrence shore in front of the Romaine River estuary and that part of the river below the Grand Falls;
SECTOR 6 St-Jean	Sector comprising the St-Jean River basin and the land between that river and the Romaine River basin.

3 THE ENVIRONMENT: A DESCRIPTIVE SUMMARY

Although it has been agreed that the conclusions of this report will not be supported by a detailed description of the environment, it is not a bad idea at this stage to draw a very general picture of the various environmental elements pertaining to the project, to provide the reader with a clearer understanding of the situation.

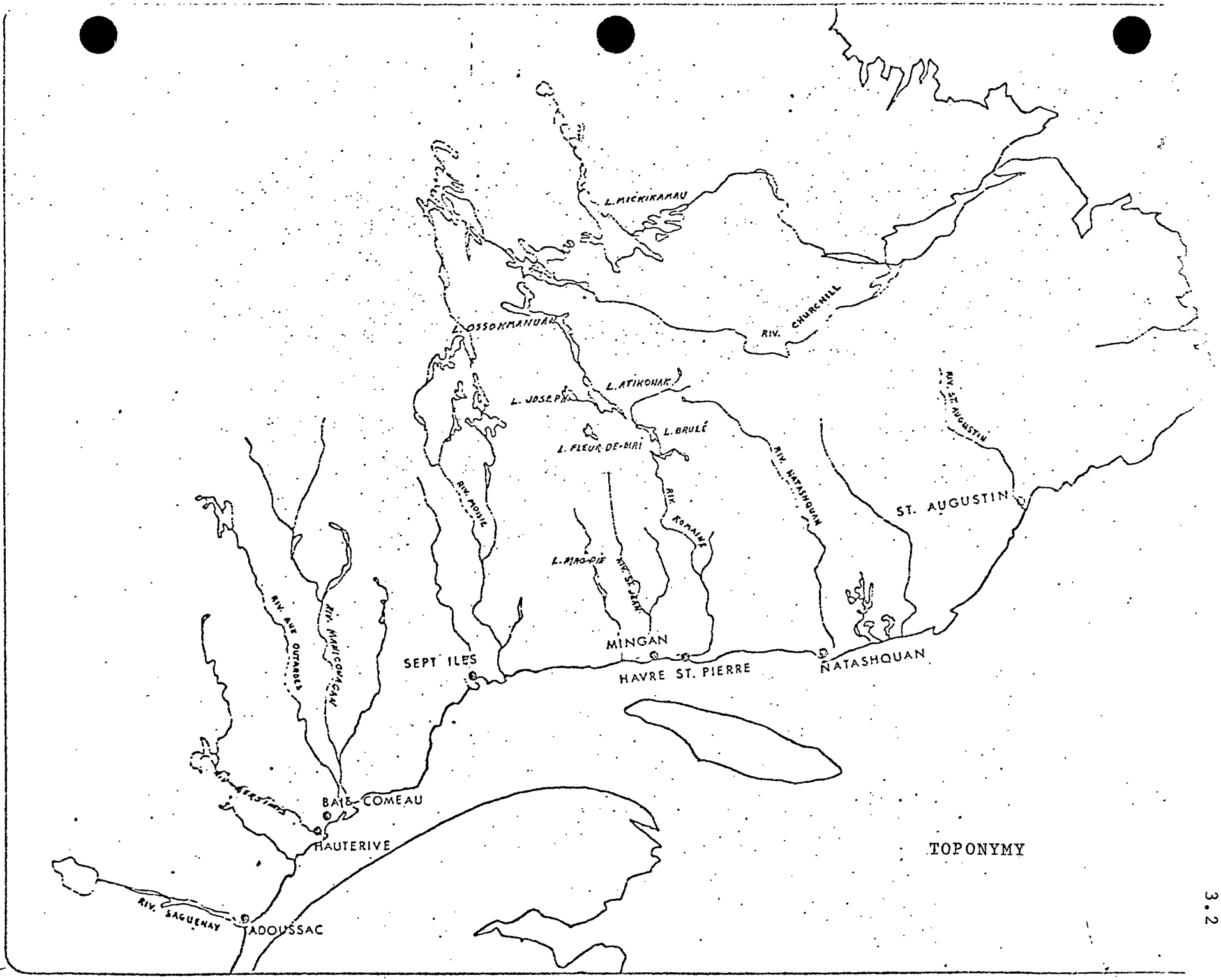
The area under study comprises the drainage basin of the Romaine and part of the Churchill basin. It is situated between 50°10' and 53°15' north latitude and between 62°50' and 65°5' west longitude; it forms part of the Middle North Shore and of South Labrador. The description of the Middle North Shore will be more detailed because that is where the initial conditions created by the project will be concentrated. Figures 3.1 and 3.2 show the respective toponymies of the area under study and of the Romaine River.

3.1 Environmental elements

3.1.1 Physical

The Romaine basin is representative of the Middle North Shore as regards the physical elements: relief, bedrock type, loose deposits, climate and hydrography.

Topography: Skirting the shore there is a narrow plain which gives way on the north to a mountainous region with altitudes of up to 3,000 feet (about 1000m). This plateau is dissected by a very dense network of valleys,


L. MICKIKAMAU
RIV. CHURCHILL
OSSOKMANUAN
L. JOSEPH
L. ATIKONAK
L. BRULÉ
L. FLEUR-DE-MAI
RIV. MOISIE
RIV. ROMAINE
RIV. NATASHQUAN
RIV. ST. AUGUSTIN
ST. AUGUSTIN
L. MIROIR
RIV. ST. JEAN
RIV. AUX OUTARDES
RIV. MANICOUAGAN
SEPT ILES
MINGAN
HAVRE ST. PIERRE
NATASHQUAN
BAIE COMEAU
HAUTERIVE
RIV. SAGUENAY
ADOUSSAC
TOPONYMY

3.2

Fig 3.1

Figure 3.2

Toponymy - Romaine River

(to come)

which break up the landscape. North of the source of the Romaine, the altitudes fall again to between 1,000 and 2,000 feet (around 300m to 600m).

Ecology: The bedrock, part of the Grenville geological province, is composed of lithological units dating to the Ordovician period of the paleozoic era. It is mainly gabbro and gneiss, except for the Trenton limestone on the shores of the Mingan Islands. There are numerous, often large fractures.

Loose deposits: The landscape was greatly marked by glaciation. The advancing glacier worked on the fractures in its path, forming spindle-shaped hills. It left behind moraine deposits clinging to the sides of the hills and sometimes to the flat summits. The melting, retreating glacier left fluvio-glacial deposits, especially in the low spots. This explains the large accumulations found upstream in the Atikonak-Burnt Lake area. These deposits are seen in the numerous eskers and other sand and gravel materials that carpet the bottom of the valleys.

The drainage system is reshaping itself around these deposits with some difficulty; drainage is poor in the places where the slopes are shallow. This allows marshes and peat-bogs to develop in the low parts between 52^{o} and 53^{o} north latitude, where the climate helps promote their formation.

Climate: The prevailing climate in this territory is subarctic. The average temperature is above 10°C in July and around -16°C in January, the coldest month in the year. The length of the mean annual frost-free period is only 80 days (140 days for Montreal). The mean annual precipitation is 1000mm (as in Montreal) whereas the usual winter snowfall is 375 cm (250 in Montreal).

In winter, the continental polar air mass comes from the north-northwest and passes over Hudson Bay. In summer, it comes from the west-northwest and passes over James Bay.

Hydrography: The Romaine is part of the drainage basin of the Atlantic. The area of its basin, 5490 square miles (14,219 km^2), is about the same as the areas of the neighboring basins of the Moisie, 7400 square miles (19,166 km^2) and of the Natashquan, 6490 square miles (16,809 km^2). This area is small compared to that of the Saint-Maurice basin, 16,500 square miles (42,735 km^2) or the Churchill basin, 30,800 square miles (79,772 km^2).

The length of the Romaine, 280 miles (451 km), is close to that of the Moisie, 276 miles (444 km) and the Natashquan, 240 miles (386 km).

The source of the Romaine is a branching system of small lakes and brooks located at an altitude of 2100 feet (about 700 m) and at about 52°50' north latitude and 63°40' west longitude. It is merely a deeply embanked stream running from east to west until it forks at Lac Long, where its volume is greatly swelled by that lake's drainage basin. On leaving the lake, it takes a general north to south direction.

In the upstream section, it goes through a series of lakes of which the largest are Marc, Burnt and Lozeau, which help provide natural regulation of its flow. Where it enters Burnt Lake, it forms a wide, sandy delta of particular ecological interest. Where it leaves these lakes, and in the first part of the downstream section, its gradual embankment by loose fluvio-glacial material has allowed the formation of a series of terraces, the lowest of which, however, seems to be composed of alluvial material.

The embankment of the Romaine begins at its confluence with the West Garneau River. There the Romaine runs through a more undulatory region that has only small accumulations of loose deposits. Its valley narrows, deepens and becomes picturesque with its course being cut by sills.

Finally, at the estuary, the Romaine runs through a vast deltaic accumulation that was formed by the river itself, before the glacial retreat, when the shoreline was higher. Following the isostatic upcast [?] connected with the retreat of the glacier, the river became embanked in its own sediment and found its new base level. The marine clay and shallow slope meant poor drainage, which led in this sector to the formation of marshes and peat-bogs.

3.1.2 Biological

Vegetation: The vegetation on the North Shore is that of a

forest zone in which black spruce is the predominant tree species. White spruce and balsam fir are rare. Groves of white birch are found generally, but the other northern hardwoods, aspen and black poplar, are less frequently encountered, save in the immediate vicinity of streams and the shores of lakes. Apart from where there are rock outcrops, the humus-bearing podzols show their usual development. To the north, starting at the Quebec-Labrador border, there is an immense subarctic forest strip. Closed [?] conifer populations as in the south are no longer found but instead the "forest park" of black spruce over pale lichens. It is a mosaic of lakes, rivers and peat-bogs of all kinds.

Limnology: Until now there have not been many limnological studies. Nevertheless, the Matamek drainage basin has been studied and the lakes there exhibit oligotrophic characteristics. And to the north, in Labrador, limnological studies have been made of the Churchill sector, following the creation of the Ossokmanuan and Smallwood dam lakes. Again all these lakes may be characterized as oligotrophic.
According to the preliminary studies made in 1975, the lake systems of the Romaine basin do not seem to differ appreciably from those in the two preceding sectors; the waters are very low in minerals and the productivity is low.

Ichthyology: Canada is the last country to possess waters that are highly favorable to Atlantic salmon, and a good part of these waters consists of the rivers on the North Shore.

These rivers, however, do not all have the same potential. Salmon can run up the Romaine River only as far as Mile 30 because of the insurmountable falls, but can get much farther up the Moisie, St-Jean and Natashquan rivers.
All the drainage basins of the North Shore rivers are, as has been said earlier, oligotrophic. The productivity of the fish populations is low. The Romaine is no exception to this rule. The most abundant family is the Catostomidae. The Salmonidae, except for the whitefish, are sparse; speckled trout, lake trout and ouananiche are poorly represented.

Birds: About a hundred species of birds nest in the area under study (some 250 bird species nest in Quebec province). Many species nest only on the shore; others breed only in the northern part of the region and still others nest all over the region.
Many species, on the other hand, are seen on the North Shore only at the time of their spring and fall migrations. Finally, some birds winter in the region and return farther north to nest.
The important habitats are the coastal marshes and the lakes of the Labrador plateau, where Gillespie and Wetmore (1974) estimated the densities to be as follows:

Species	Number of adults per 100 sq mi July 20-27, 1970
Canada goose	174
Black duck	50
Diving ducks (aythya, oldsquaw, common goldeneye, merganser and scoter)	33

Mammals: There are three main caribou herds on the North Shore: one at Manicouagan, one at Magpie and one in the Mealy Mountains on the Lower North Shore. The Magpie River herd, estimated in 1972 at about 5000 head (Brassard, 1972), uses the area around Atikonak Lake and Lac Joseph as calving grounds. In winter, this herd migrates to the southeast, passing through the Lac aux Sauterelles region to get to its wintering grounds on Magpie Lake and Magpie River. In the spring the herd migrates chiefly westward, by way of Lac Fleur-de-Mai, to get back to the lands around Atikonak Lake and Lac Joseph.

Brassard's moose inventory (1972) established that in a large part of the Romaine basin the density of this species varies between 0.3 and 0.5 per square mile, the greatest density in the whole North Shore region.

Among the economically useful species in the region are the beaver, muskrat, otter, American sable, American mink and weasel. The estuaries of a number of North Shore rivers play an important role in the life cycle of various marine mammals. The white whale, for example, uses this area for reproduction. We are at present ignorant of the exact role played by the Romaine estuary in the life cycle of marine mammals. It is more than possible, however, that this estuary serves some purpose.

3.1.3 Human

The area under study is located entirely outside the province's continuous ecumene and therefore has what are often referred to as marginal characteristics with respect to the human population: remoteness of the large cities, feeble integration of the infrastructures and only sporadic use of the land.

The North Shore is divided into coastal regions (Upper, Middle and Lower North Shore) and an interior region. Labrador South may be divided into the region along the Churchill River and an interior region adjacent to the North Shore.

The Upper North Shore runs from Tadoussac to Moisie, the Middle from Moisie to Natashquan and the lower from Natashquan to Blanc-Sablon.

Population: The populations in the territory are given in Table 3.1, where the whites and the Indians are shown separately. Figure 3.2 shows their geographical distribution.

Since 1970 the population of the North Shore has passed one hundred thousand; this represents hardly more than a fiftieth of the population of Quebec province.

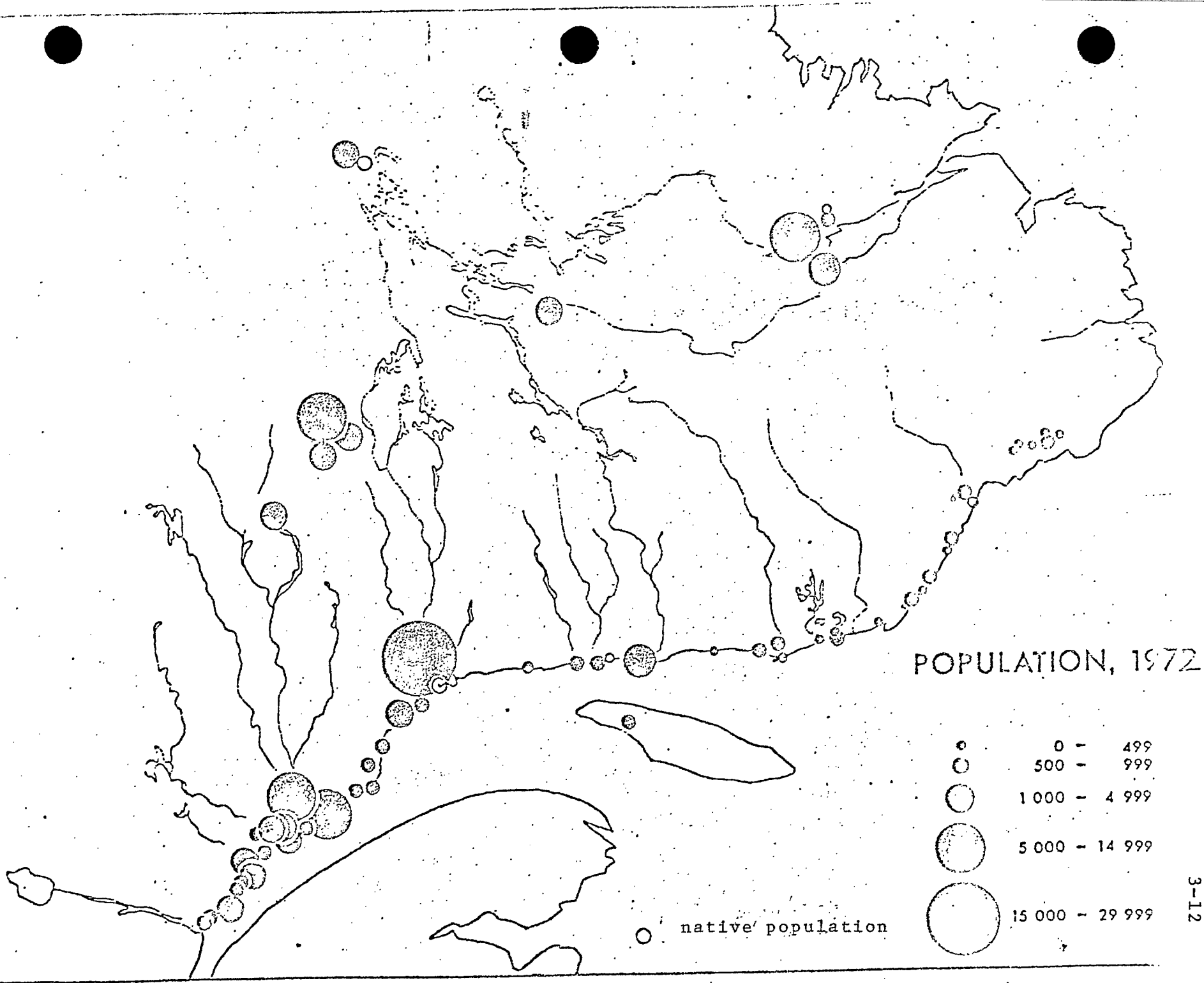
TABLE 3.1

POPULATION OF THE TERRITORY - 1972

(preliminary figures)

		WHITE	INDIAN	TOTAL
NORTH SHORE	Upper	85,797	2,666	88,463
	Middle	7,732	546	8,278
	Lower	5,276	477	5,773
	Interior[1]	9,853	705	10,558
	SUBTOTAL	108,678	4,394	113,072
LABRADOR SOUTH	Shore	7,134	325	7,459
	Interior	12,209	-	12,209
	SUBTOTAL	19,343	325	19,668
TOTAL		128,021	4,719	132,740

[1] Because of its natural dependence on the North Shore, Schefferville, although it is part of New Quebec for administrative purposes, has been included in this region.


POPULATION, 1972
0 - 499
500 - 999
1 000 - 4 999
5 000 - 14 999
15 000 - 29 999
native population

3-12

Fig 3.3

This population is distributed among settlements dotted along the coast and in a few interior centres, and the North Shore is thus one of the two regions of Quebec province with spotty settlement, the other being the Abitibi-Temiscaming region.

Similarly, there are some 20,000 people living in Labrador, grouped in coastal settlements or in a few isolated centres in the interior.

The population growth of a number of North Shore communities is rapidly approaching zero, except for some centres like Sept-Iles, Baie-Comeau and Havre-St-Pierre which have become sufficiently large that they get the people who are leaving the small, isolated communities.

As to composition and origin, the North Shore population is much more disparate than that of Quebec in general. Of the Middle and Lower North Shore 1971 population of about 12,000, 42 per cent were of Acadian origin, 25 per cent from Newfoundland, 16 per cent from Quebec and finally, 16 per cent divided equally (8 per cent and 8 per cent) between persons of Anglo-Saxon and Amerindian origin.

The Upper North Shore, with a slightly less heterogeneous population, is the only truly populated region, with about 90,000 inhabitants.

Infrastructures: Because of its remoteness, the North Shore has infrastructures in which railroad, harbour and aviation facilities predominate..

The absence of roads in the area from Havre-St-Pierre on (except for short stretches at Natashquan, La Tabatière and Blanc-Sablon) has definitely encouraged the development of marine and air transportation. During the last decade, however, freight and passenger transportation have increasingly tended to be by plane rather than by boat. From Sept-Iles on, about fifteen communities are served a minimum of five times a week by airlines. Most of these communities, some of which have a population of less than two hundred, would certainly not enjoy such service anywhere else in Quebec. There is also a twice-weekly marine service linking the North Shore communities.

General merchandise represents only one twentieth of the total traffic of the North Shore; the transportation infrastructures are based on the shipment of raw materials. The three railroads in the region (Sept-Iles-Schefferville, Port-Cartier-Mont Wright, Havre-St-Pierre-Lac Allard) are strictly for mining purposes.

The North Shore harbours are among the largest in the Americas. Sept-Iles (over 18 million tons) is Quebec's second port after Montreal (22 million tons), but the combined tonnage handled by the trio of Port-Cartier, Pointe-Noire and Sept-Iles is among the highest in the world. It should be noted that Havre-St-Pierre is the most "domestic" of the province's ports; of the more than 2 million tons it ships annually, 90 per cent is shipped to and from points in Quebec.

Because its products represent heavy cargo exclusively, the North Shore is the region of Quebec *that* most easily managed without road infrastructures. The territory in fact contains no road apart from a few forest roads barely penetrating the interior of the shore region and a road that follows the shoreline (and which will be completed in 1976). Because of the heavy snow cover, there are no winter roads.

There is a road, however, in the interior of Labrador that connects Goose Bay - Happy Valley with Esker via Churchill Falls. Quebec now has under study a "Trans-Quebec" project that would use parts of this road:

from Gull Island on the east to St-Augustin, from there to Blanc-Sablon, and from Churchill Falls on the west through Fermont, Gagnon and Manicouagan to Hauterive.

Land use: Traditionally, the Indians have used the inland areas, with seasonal trips to the shore area, while the Whites have made intensive use of the shore before penetrating the interior, which they have done during the last two decades only.

North Shore: Originally, it was from the ocean resources that the North Shore was peopled by the Whites and developed; it was the hinterland, however, that was to make possible the development of this region. Historically, there were four types of use in succession:

- coastal and deep-sea fishing
- forestry
- mining
- generation of electric power.

Fishing was centered mainly on Havre-St-Pierre which sheltered up to 25 coastal boats in the 1880s. The fishing waters extended from the coast of Newfoundland to the Magdalen Islands. This was the period of greatest activity and fishing continually declined from that time on. The North Shore now produces no more than ten per cent of the Quebec catch. Cod represents 57 per cent of the catch and salmon 17 per cent, while seals account for 30 per cent of the value of landings.

On the Middle and Lower North Shore, fishing is still very important for the local economy in all places where it has not been possible to develop any other activity.

Forestry began to develop at the turn of the century and from 1950 on, 50 million cubic feet were cut annually by about fifteen companies located mainly on the Upper North Shore.

After Rayonier-Québec was given a guarantee of two million cords of wood from Crown forests annually, forestry took a new turn. Cutting is now being done in the Port-Cartier area and is expected to be extended to the Rivière-au-Tonnerre

region in 1978.

The development of the mineral resources of the North Shore began in 1948 with the exploitation of the ilmenite ore at Lac-Allard.

The biggest mining operations would later be developed in the interior of the territory (iron deposits at Gagnon, Fire Lake and Mont-Wright).

Hydro-electric resources began to be developed as well in the '50s in the Upper North Shore region (Bersimis) and development was to continue in that area (Manicouagan, Outardes). Sixty per cent of the hydro potential of the North Shore rivers has now been developed.

Labrador: The development of Labrador, just like that of the North Shore, came from the resources of the sea. The coast of Labrador was peopled by even fewer isolated groups than was the shore of the St Lawrence, but Lake Melville especially was able to retain people (North West River, Goose Bay). By comparison with Quebec there were hardly any commercial forest operations and Labrador's development was to come from mining (iron from Wabush, Labrador City, Schefferville) and hydro-electric power development (Churchill Falls).

Use by Indians: The earliest occupants used this territory for its natural traffic paths (rivers and portages) giving access to a hinterland plateau of lakes corresponding to the near-endorheic system of the Churchill River and constituting a nodal [?] region.

According to various works on the anthropology of the area, the Moisie, Mingan, St Jean and Natashquan Rivers from the south, the Churchill River from the east and at times the Naskaupi River from the north (Lake Michikamau) all led to the upper Romaine-Churchill area.

Although the native peoples have gradually abandoned their seasonal migrations, they nevertheless still continue to trap as far in as the lake area.

The entire area is, in fact, divided into hunting grounds. The North Shore is part of the Saguenay beaver reserve and comprises four sections: Sept-Iles, Mingan, Natashquan and the Romaine.

The value of the catches for each hunting and trapping territory shows that the area of maximum use is in the Mingan sector and coincides with the valley of the Romaine. After that come the Upper Churchill and Lower Natashquan areas.

3.2 Socio-economic aspects

3.2.1 Characteristics of local populations. The North Shore has a young, active, rapidly growing population.

Although it has the advantage of enormous iron deposits in its subsoil, as does New Quebec, the North Shore does not have a diversified industrial structure; fishing is losing momentum and the pulp and paper industries are not managing to compete with mining development as a growth factor. The only comparable activity is the construction of hydro power plants.

Finally, the North Shore has few manufacturing establishments. Except for the pelletizing and chemical pulp plants (Pointe-Noire and Port-Cartier respectively), there are almost no processing industries.

The Middle North Shore region is characterized by a gradual abandonment of fishing and the absence of any industry to replace it, if we exclude Havre-St-Pierre,

where the shipping of iron and titanium ore has been filling the gap since 1950.

Havre-St-Pierre is now an important industrial and administrative centre. Long considered the capital of the region between Sheldrake and Natashquan, Havre-St-Pierre has the regional offices of a number of government departments. It is, moreover, a strategic transfer point for transportation and a key communications relay point.

The arrival of the Société de Fer et Titane du Québec transformed the self-sufficient economy into a true market economy, which lacked, however, the secondary processing activities that would give it long-term stability.

Nevertheless, the metamorphosis of this fishing village into an industrial community has not begun to undermine the traditional basis of social relations: the extended family and community stability.

Churchill Falls, as compared to Havre-St-Pierre, appears as a more artificial community, created from scratch solely for the needs of the power plant, and does not seem destined to possess greater economic diversity at some future time.

All the residential and infrastructure facilities are owned by the Churchill Falls Labrador Corporation. This factor is what decides the direction taken by the development of this community which is really not a community but a grouping in space and time of employees of the same company, employees whose social relations mirror their relations at work.

The Mingan Indians have suffered profound alterations in their way of life since the end of the Second World War; hunting and fishing trips are still being made but their scope cannot be measured against the nomadism of long ago.

They are a young population, with a trend to normalization of the natural growth curve and to stabilization of the mortality rate profile that is comparable to that of the large urban groups.

The Indians no longer produce the goods necessary for their subsistence, but depend instead on external (government) bodies. To make matters worse, they do not have access to the wage-labour market, first because there is no work available for them (they have no recognized trade skills), and second because of their cultural beliefs, which render them almost immobile.

"The economic disorganization and intensive schooling of the young people are the dominant factors that have influenced and will continue to influence the evolution and organization of this community"[1] (like the neighbouring white community of Longue Pointe de Mingan).

[1] Noël-Bouchard, 1972

3.2.2 Prospects for development

The foreseeable development of the Middle North Shore is tied to the following projects (some of which are underway):

- completion of Highway 138 between Sept-Iles and Havre-St-Pierre (expected in the fall of 1976);
- putting into service of a regional airport at Mingan or Havre-St-Pierre;
- construction by SOQUEM of a pilot plant for the exploitation of a deposit of iron and titanium in the St Jean basin;
- possible forest operations by ITT in the North Shore Crown forest;
- development of the tourist potential of the Mingan Islands and Anticosti Island, for which Havre-St-Pierre is a natural take-off port;
- creation of a national park east of Havre-St-Pierre.

Development will probably take place first in the tourist sector and consequently in the services sector.

The result would be the gradual widening of the occupied strip of land along the shore and the installation of new services and facilities between Sept-Iles and Havre-St-Pierre, making possible the consolidation of most of the villages located along the strip.

The new stretch of road will lead to the development of Havre-St-Pierre, which is at the road's end, as a geographic and socio-economic pole of attraction.

In another direction, the growth of the mass media generally, and of television in particular, as well as the greater accessibility of higher education and occupational training, will dictate the speeding up of social and cultural development at Havre-St-Pierre.

This centre is already in a state of growth, change is expected, and the municipality has a very positive attitude and view of the future with regard to development, as evidenced by the town plan.

3.3 Legal aspects

Any project for the development of the Middle and Lower North Shore falls within the context of the Quebec-Labrador dispute, and Indian claims on the territory.

Since these are basically legal problems, there is no intention of explaining them here in greater detail.

In an environment study, however, it is worth while identifying these problems as such, in the event that they have a social or cultural impact on the populations concerned.

4. DESCRIPTION OF THE PROJECT

4.1 General

The structures at Mile 164.5 of the Romaine River will include two main till core rock-fill dams, 20 feet wide at the top; one of the dams will be 145 feet high and the other 175 feet high. There will be a spillway with a capacity of 90,000 cubic feet per second to take away exceptionally high floods and direct them to the Romaine River.

The reservoir thus created, at a maximum level of 1,632.5 feet, will make it possible to move the waters over the watershed. Engineering studies will show whether this maximum level can be reduced by lowering of the watershed through excavation and whether a control structure should be considered that would modify the diversion flows.

Construction will take about four years, if a rapid method of temporary diversion can be used and if the dam equipment is installed and the reservoir filled at the same time.

4.2 Initial conditions created by the project

For the purposes of an environmental study, it is useful to describe the project in terms of typical initial

conditions that may obtain within a given geographical area. These conditions may be causes (location of the works) or effects (ecological changes); their typical impact can more easily be predicted by comparison with similar projects. The concept of initial condition covers both the construction and the operation of the works.

In the case of the Romaine diversion project, the initial conditions created are identified in table 4.1 which shows the geographical areas in which the conditions obtain. Each initial condition is described in greater detail in the sections that follow.

4.2.1 Romaine Reservoir

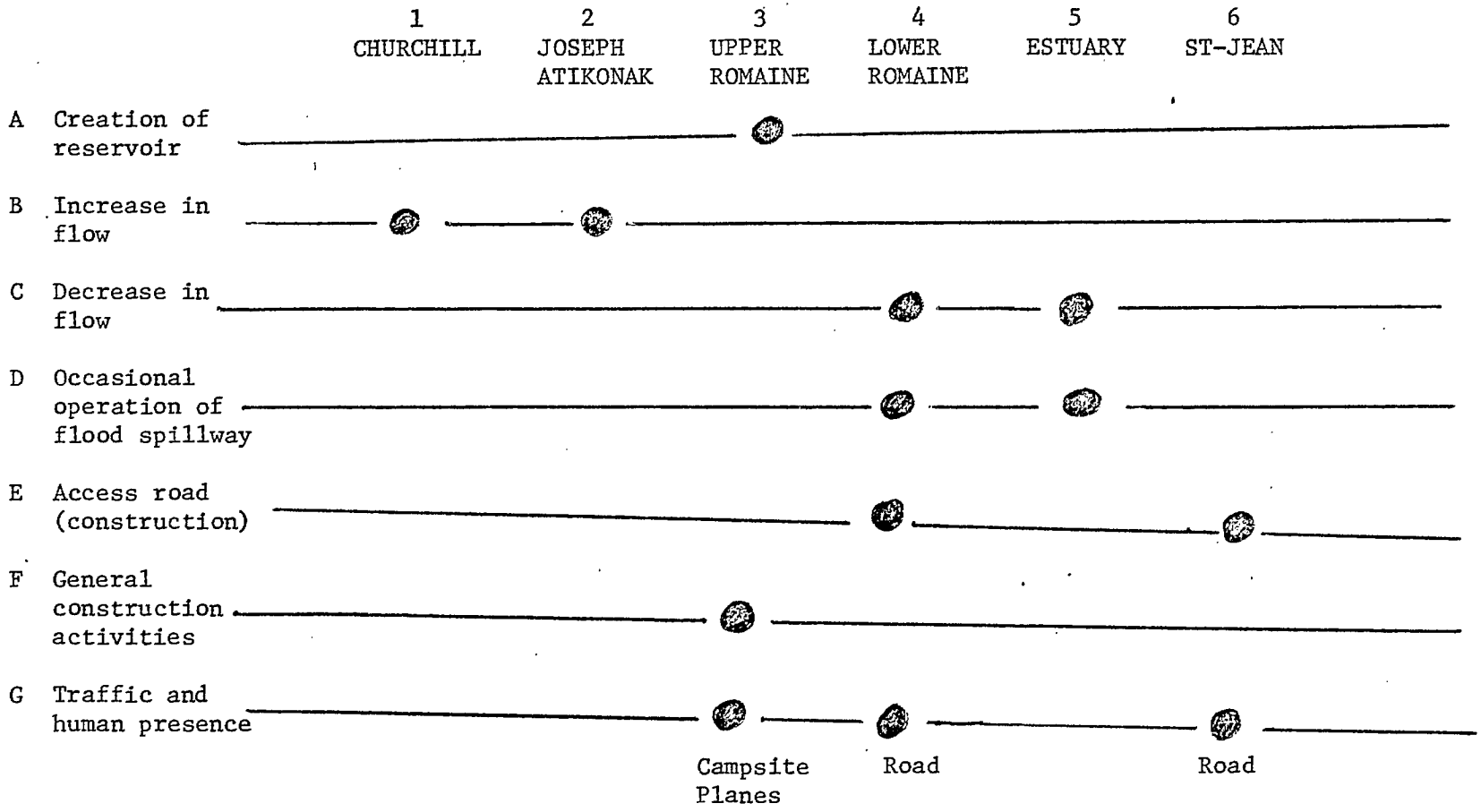
At a maximum depth of 1,632.5 feet, the area flooded by the reservoir will be about 350 square miles including 100 square miles of natural lakes and rivers (figure 4.1).

The volume of water will rise from about one cubic kilometre in natural conditions to ten cubic kilometres in the reservoir. If there is no control work, the level of the reservoir will fluctuate around seven to eight feet in a cycle that would be similar to the natural cycle. The initial filling of the reservoir will be done over a period of two years.

If the diverted flow to Atikonak Lake is modified by a control work, the fluctuation in the Romaine reservoir level will probably be greater.

TABLE 4.1

SUMMARY OF INITIAL CONDITIONS IN EACH SECTOR



In the zone affected by the reservoir's operations, the variation in area will be about five square miles for each foot of change in the water level.

4.2.2 Flow increase - Atikonak

The mean diverted flow will be about 5000 cubic feet per second. If there is no control structure on the diversion channel, the mean monthly flow could vary between 1300 and 7000 cubic feet per second according to the season. It is intended that the diversion will take the Romaine's 50-year flood. For greater floods, a maximum flow of 5000 cubic feet per second will be postulated.

As a consequence of this diversion, the level of Atikonak Lake, which has an area of about 160 square miles, will be raised about ten feet every spring. The rise now averages about six feet each spring and about ten feet every ten years. There will therefore not be any rise in level greater than the maximum encountered under natural conditions. The average rise in the summer will be about one and a half feet.

The effect of the increased flow on the Ossokmanuan and Smallwood reservoirs will not be great. In extreme floods, for example, the level in these two reservoirs will be less than a foot higher than it would be under existing conditions.

After more detailed surveys and studies have been made, the installation of some judiciously located sills might

be required between the Smallwood reservoir and the Churchill Falls generating station, for the purpose of reducing the run-off surface left exposed in winter. This would prevent partial flow retention in winter, caused by frazil, and the consequent flooding of the road in this area.

Since the winter flows restored by the Churchill Falls generating station will be much greater than the natural flow of the river, very special attention will have to be given to control of the ice generated by the river and its tributaries below the generating station in connection with the Gull Island and Muskrat Falls generating station developments; the increased flow deriving from the diversion of the waters of the upper Romaine basin could worsen these control problems.

4.2.3 Flow reduction - Romaine

The flow reduction will be around 100 per cent at the shut-off point and 50 per cent at the river mouth. The flood flow will be reduced about 50 per cent while the low-water flow before the snow melts will be around 70 per cent of the low-water flow under natural conditions. In winter, on the other hand, the minimum low-water flow could still be lower than what would be expected from the hydrological conditions, because of a greater freeze-up of the river.

The reduced flow will cause the Romaine River to dry up almost completely from the cut-off point to Mile 132, where

the river is wide and shallow and runs over a bed of sand and gravel. In the mountainous part of the river's course, the sections controlled by sills can probably maintain their natural level in large part, while in the other sections, the river bed will narrow and meanders will form. At the river mouth the tide, which has a mean of 5.6 feet and an instantaneous maximum of 11.76 feet, may reach slightly above the rapid located at the spot where the Romaine flows into the St Lawrence. The tide, and therefore the salt water, will not be able to go beyond this point, for even in future conditions, the river's mean rate of flow will still be sufficiently greater than the critical speed of climb of the salt wedge.

The Romaine Estuary itself seems very limited in size in natural conditions, with the river's fresh water quickly mingling with the salt waters of the St Lawrence. The reduction in the fresh-water flow of the Romaine River will therefore cause only a very localized readjustment of the ocean currents.

Moreover, when the reduction of 50 per cent in the flow of the Romaine River is added to the effects of the regulation of the Great Lakes, the upper Ottawa, the Lake St John basin and various rivers on the North Shore, the cumulative effect will be to reduce the difference between the flood flow of the St Lawrence and that river's mean annual flow.

4.2.4 Flood spillway - Romaine River

The Churchill Falls system is said to be able to take the 50-year flood. Bigger floods will be evacuated into the Romaine River . It is believed that for any flood greater than the 50-year flood, the flood crest can be reduced by up to 40 per cent of the maximum flow, by adjustment of the Romaine reservoir operation.

The maximum 10,000-year flood flow into the Romaine River after diversion will be around 90,000 cubic feet per second, whereas the maximum 10,000-year flood flow in natural conditions is 95,000 cubic feet per second.

4.2.5 Access highway

When the research began, it was expected that the access highway to the shut-off structures would link the Sept-Iles-Schefferville railroad to these works, taking a west-east direction.

Following the deliberations of the co-ordinating committee for the environmental study, Hydro-Quebec's environment branch asked the generating station projects branch to examine as an alternative a route from the south that, for various reasons, might be more advantageous for the environment and for land use.

This alternative, which at first glance seems disadvantageous because of its economic and technical characteristics, appears more attractive when looked at again, and is in fact considered the final choice for purposes of the overall analysis of this study.

As at present contemplated, the highway route would start at Mingan and follow the bed of the St-Jean as far as Lac Coupeaux, meet the Romaine River near mile 140 and follow that river to the site of the shut-off structures.

If an access road to the Romaine reservoir control structure is required, it will be a winter road starting at the site of the dam, at the railroad or at the Churchill Falls highway and going along the Ossokmanuan reservoir and Atikonak Lake.

4.2.6 General construction activities

Under this heading fall activities such as installation of the shut-off structure, embankments and cofferdams, dynamiting during construction, secondary roads required at the site of the works, creation of a temporary camp and an airport, and the clearing and use of borrow pits [?].

At this stage it is not necessary to describe each of these items exactly, except to mention that a landing strip about 3500 feet long is expected to be available near the shut-off structures during the construction,

and most of the borrow pits required for the construction of the main dam will be located within a one-mile radius of the site.

4.2.7 Traffic and human presence

This heading applies to a temporary camp of about 75 workers in winter, an average of 600 during the year and a maximum of 800 at the height of the season, an average of one regular flight per day of a DC-3 or Hercules to supply the worksite and carry personnel, less regular flights of light aircraft, and heavy and light vehicle traffic on the access road.

4.3 Economic spinoff

Manpower: The estimated number of workers required for construction is as follows:

	Height of season	Winter
First year	250	250
Second year	450	300
Third year	800	150
Fourth year	800	150

At the height of the season, this staff will be composed of about 25 per cent office workers, supervisors and inspectors (one third of whom could come from the region) and the rest equally divided among skilled workers (part of whom could be trained in the region) and unskilled workers.

The last two years, about 350 jobs could be available for the local population.

Most of this staff would live at the worksites, at least during the week, while about fifty of them would be assigned to a project office at Havre-St-Pierre.

If a winter road is used for access to the project, from fifty to two hundred persons will be needed each winter for four winters; if a permanent road is used, it will take three years to construct and should be ready for the first year of the project.

Supply: Heavy equipment, reinforcing and structural steel, cement, wood, prefabricated camp facilities and fuel will very probably be imported from outside the region. There is some possibility of local supply for light tools and small supplies.

The cafeteria, laundry and store would be leased out for operation.

Heavy equipment maintenance will be done at Sept-Iles which is well equipped for such work. The amount of such work, compared to the amount of maintenance already being done in this region, especially for the forest and mining industries, will not be great enough to require the planning of additional facilities for the purpose. Maintenance of light equipment will be done at the project workshop.

5. IMPACT ON ENVIRONMENTAL RESOURCES

As stated in the study methods outlined in section 2.5, the project's impact on the environment will be identified and evaluated in relation to the environment's identified resources.

An environmental resource is defined as any aspect of the environment which is considered important by one or more of the reference populations with respect to their work and recreational activities and, more generally, with respect to their concept of a high-quality environment.

Table 5.1 gives a preliminary list of environmental resources as identified by the experts. On the basis of this list, a team of sociologists from Hydro-Quebec is carrying out field work on the way in which the local and regional populations perceive these resources and it is possible that these consultations will lead to changes to the list.

TABLE 5.1

LIST OF ENVIRONMENTAL RESOURCES

ANIMAL RESOURCES

are of particular interest to humans

- for their commercial value
- for sport hunting and fishing
- as a source of subsistence
- for conservation purposes:
  - fish (trout, whitefish, pike, salmon)
  - mammals (caribou, moose, fur-bearing animals)
  - birds (Canada goose, duck, partridge, snipe)
  - other species

ECONOMIC RESOURCES

related to primary economic activities

- water (hydro, industry and consumption)
- forests
- minerals

HUMAN AND TOURIST RESOURCES

- human settlement (communication routes, ownership of property, urban development and resort areas)
- scenery
- historic and archeological sites
- recreational sites
- landmarks

Table 5.2 summarizes this section in diagram form; it shows:

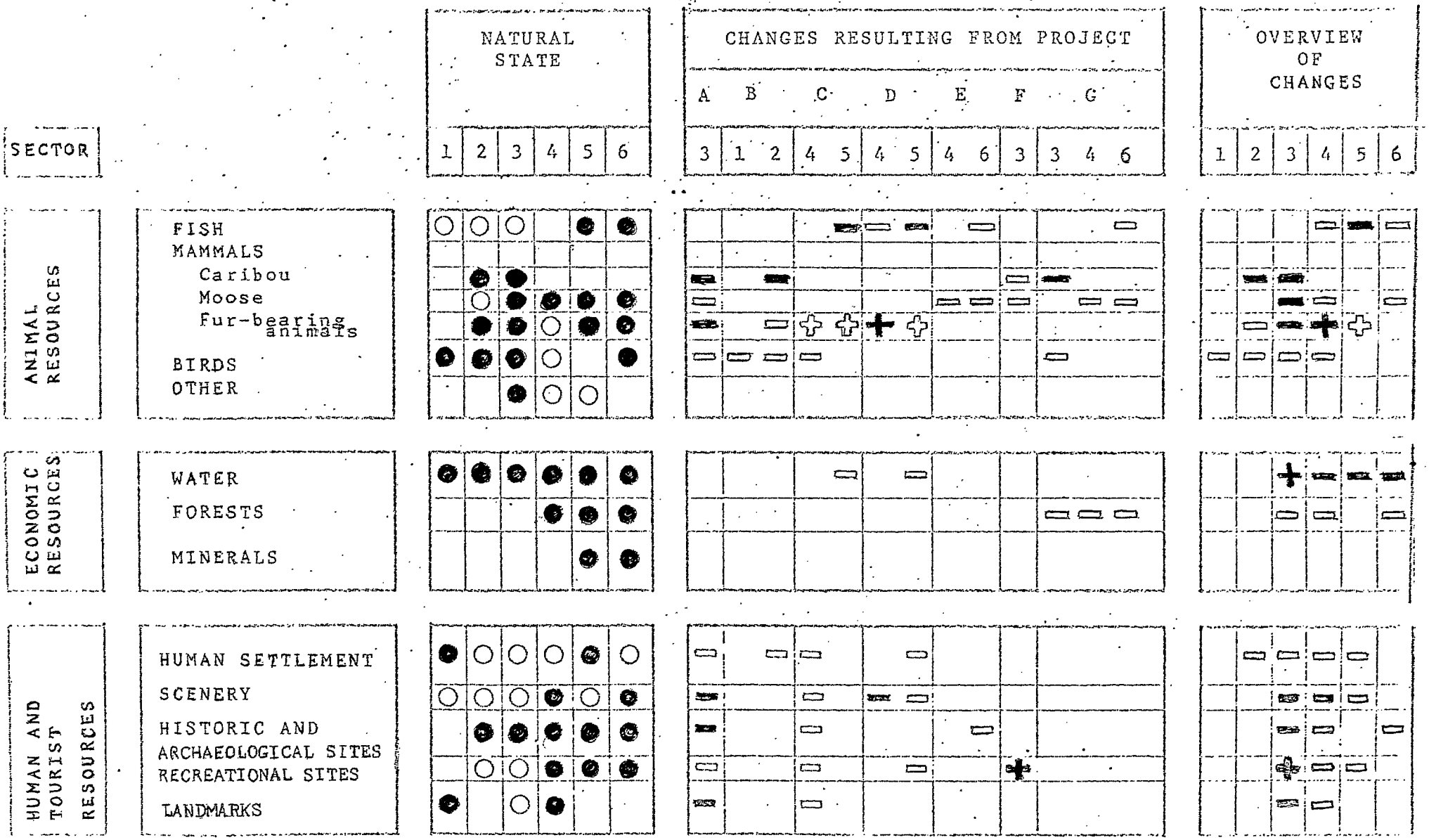
- the relative importance of each resource in its natural state, in each sector; generally, this evaluation is made by taking the average state of this resource on the North Shore as the basis for comparison;

- the importance and the effect (positive or negative) of changes brought about by each initial condition of the project in each sector;

- an overview of changes in each sector.

TABLE 5.2

OVERALL IMPACT - ENVIRONMENTAL RESOURCES



MAJOR
MINOR
Positive
Negative

1 Churchill
2 Joseph-Anikonak
3 Upper Romaine
4 Lower Romaine
5 Estuary
6 St-Jean

A Creation of reservoir
B Increase in flow
C Decrease in flow
D Occasional operation of flood spillway
E Access Road (construction)
F Construction in general
G Traffic and human presence

5.1 Fish

In the Churchill sector, the 5000 cu ft/sec diverted from the Romaine comprises only a very small part of the flow of the Churchill river and will cause no noticeable change in the level or in the physical and chemical properties of the waters; thus the effect on the fish of this sector will be negligible.

The fish biomass of Atikonak Lake is low and little use is made of it, so that increases in levels and in flow should not have any significant impact. Lac Joseph will not be affected by this deveolpment.

The waters of the Romaine basin are, in general, low in minerals; they have a low productivity and a short growth season. Thus the growth of fish is slow and the biomass small. The main species sought by sport fishermen are speckled trout, ouananiche, salmon, and to a lesser extent, lake trout and pike. There are almost none of the first two in the Romaine's waters; only specimens of small size have been captured. Lake trout and pike do not seem to attain the record sizes sought by sport fishermen. Salmon can swim up river as far as mile 31 and into some tributaries.

It is the only species fished commercially.

The creation of a resevoir in the upper sector will probably result in an increase in productivity which will last approximately ten years, followed by a drop in productivity to a level comparable to or slightly lower than the present level. Following the increase in the volume of available water, an increase in the biomass should normally ensue unless the reservoir creates conditions hostile to the reproduction or feeding of some of the existing species; this will be studied in further detail in the final report.

The shutting off of the dam will leave a zone of approximately thirty miles below the shut-off point dry, eliminating the fish. It is in this region that the road will be built; its impact will obviously not be significant. The decrease in flow will be very significant in the entire lower sector but as the fish population is not very large either qualitatively or quantitatively, the impact will be minor.

This decrease in flow below the shut-off point could perhaps limit the migration of salmon to their spawning grounds or render the latter unusable. If the area available for spawning of salmon is decreased considerably, it will be necessary to study the

possibility of creating artificial spawning grounds or other structures which will allow the salmon to run to sectors of the river and its tributaries which are presently inaccessible.

The possible formation of jams in the rapids of the lower sector and the consequent reduction in flow and level could cause great harm to the salmon by drying out the eggs in the spawning grounds.

The decrease in flow caused by the diversion could affect the salinity in the estuary where a salinity gradient develops that is necessary for the salmon's adjustment before it enters fresh water; further studies will produce more definite information on the subject.

If use of the flood spillway results in the sudden release of a large volume of water, the impact on the salmon spawning grounds could be very serious. It would be reduced if the discharge of water were staggered more, to avoid complete disruption of the spawning grounds or any great drifting of debris which could, upon settling, bury the spawning grounds. Rivière St-Jean shelters a

salmon population that is considered fairly important. The access road will have to be planned so as to limit the impact on the salmon, and provision will have to be made for protection against poaching in this sector.

Since the human presence related to the project will be of short duration, it should produce only minimal impact on the existing populations, that is, if there is adequate protection against poaching.

.2 Mammals of economic value

5.2.1. Caribou

The caribou trails observed during the continuous surveys made in July have revealed that the area is used by the Magpie River herd. The caribou use specific habitats throughout the area to varying degrees depending upon the season. The upper Romaine sector falls within a zone of average occupancy while the Atikonak-Churchill sector falls within a zone of high occupancy, mainly in spring and summer.

On the basis of caribou observations throughout the area containing signs of occupancy, the density was estimated at .05 caribou per square mile (0.19 caribou per sq. km) the time of the study.

The creation of the reservoir will result in a net loss of habitats. In the Joseph-Atikonak sector, the increase in flow will have a dual impact: firstly, the rise in the water level in spring will submerge the lands probably used for calving; secondly, the diversion channel will be located in a zone of average occupancy and may have a major impact on the caribou population, particularly

on the young caribou which might encounter difficulties in swimming the channel during migration.

The planning of an access road from the railway route to the diversion project must also take into account the migratory routes, the wintering grounds north of Magpie Lake and the calving grounds.

In the upper Romaine sector, the herd may be affected by hunting, poaching and noise as a result of general construction activities, traffic and human presence. It must be noted that the caribou population appears to be stable and in harmony with its environment.

Ideally, construction of the discharge structures should be carried out with an eye to the movement of caribou in the area. On the other hand, few remedial measures can make up for the loss of habitat.

5.2.2. Moose

More than 50 per cent of the zone above the Romaine basin is a region of burnt-out land presently at the secondary succession stage whose vegetation is predominated by shrubs. Moose are

extremely partial to such a habitat (approximately 0.4 per square mile according to Brassard 1972).

Observation of the summer habitat along the river and the headwater lakes have revealed that only the very steeply sloped section of the river from mile 50 to mile 110 (km 80 to km 177), appears to be unsuitable for supporting a substantial moose population.

It can be expected that the creation of the reservoir will be the initial condition with the greatest impact on the moose because it will submerge a favourable habitat.

The path the road takes must be chosen so as to avoid the moose yards and thus reduce the impact on this species.

Traffic and human presence will entail risk of collisions with moose and increase pressure on them through hunting.

Surveys of the wintering grounds and the main yards are required if the project's impact on this species is to be established more precisely.

5.2.3. Other mammals of economic value

Several species of economic value are found in the Romaine basin as shown by the trapping data from the Fur Division of the Quebec Department of Tourism, Fish and Game giving the total catches for five seasons (from 1969 to 1974):

Species	No of catches
Beaver	1071
Muskrat	594
Weasel	91
Mink	61
Otter	60
Marten	60
Squirrel	40
Red Fox	33
Wolf and Lynx	14
Bear	1

Nearly 40 per cent of the catches were taken in the upper Romaine sector and 39 per cent in the lower Romaine sector. Incomes from the hunting grounds located in the upper Romaine sector

have been reported as ranging from $500 to more than $3000 on a quadrennial basis.

Between 1969 and 1974, the Romaine basin accounted for 26.7 per cent of the total catches from the Middle North Shore.

Other species of economic value are also found in the Romaine area. In light of the number of observations, the black bear seems more abundant in the lower sector than in the upper. The American hare is a cyclic species and can be found in abundance throughout the area approximately every ten years. Several signs indicating the presence of this species were observed. There were few signs that would make it possible to establish the number of wolves but we do know that they are present in the Romaine basin.

The construction of a road is not expected to cause a major negative impact on these mammals; it is even possible that certain animals will be attracted by the clearing created by the road. In addition, beavers are particularly fond of culverts.

The major impact on mammals will be caused by the reservoir, which will totally submerge a favourable habitat.

In the Atikonak sector, certain riparian and insular habitats will no longer be available to mammals in the spring.

5.3 Birds of economic value

Flying over the Atikonak sector, we were able to count only a relatively small number of ducks and Canada geese. However Atikonak Lake, with its many islands, may attract a significant number of birds of economic value during migrations and the breeding season.

A part of the low-lying area in this sector, flooded every 10 years in natural conditions, will be flooded every spring; this area includes the banks and islands. The vegetation in this area is not adapted to these conditions and will take several decades to do so. This change will have repercussions on the nesting of Canada geese, ducks, ptarmigans and riparian birds. The silt suspended during the filling of the Romaine reservoir and carried along by annual floods could lead to an increase in turbidity; it is difficult to judge if this temporary increase will have a net favourable or unfavourable effect on the water fowl which depend on aquatic plants and animals for food.

In the upper Romaine sector, the islands in the large headwater lakes of the Romaine river are important for the nesting of Canada geese, ducks and riparian birds.

The lakes are bodies of water that can be used during the moulting season and migrations. Within the area studied is the reservoir zone, more particularly the Burnt Lake delta, which has proved to be very rich in waterfowl.

These habitats will eventually be flooded and replacements have little chance to be rebuilt on the steep banks of the future reservoir and around its islands; thus there will be a net loss of habitat and consequently, a decrease in the number of birds of economic value in this sector. The body of water created will probably be less used than the present lakes as locations for migratory rest, sleep and moulting by the waterfowl. If the clay and silt are suspended, it could have a negative effect on the feeding of certain birds. Increased pressure from hunting in this sector can be expected with the project, which, in addition to waterfowl, would affect the Galliformes and the riparian birds.

In the lower Romaine sector, changes will be localized along the river edge, particularly at the dam at mile 132, and consequently the impact will be minor.

The marshlands along the shore and the peat bogs of the estuary are much used by birds, particularly during the Autumn migrations. However no significant change caused by the project is foreseen except for a very localized readjustment of aquatic vegetation in the estuary, due to a change in the movement of the fresh and salt-water currents.

Provisions for the birds on the new islands created in the Romaine reservoir could partially compensate for the loss of habitat. In addition, controls on hunting could also help to reduce the impact. The usefulness of building artificial nesting structures, for example, or banking certain shallow bays created by the reservoir, must also be studied.

5.4. Other Animals

In addition to the waterfowl, the birds most adversely affected by the project will be the Arctic tern and herring gull. These species nest in colonies on certain islands in Burnt, Mark and Anderson lakes, which will be totally submerged by the creation of the reservoir. If required, methods of providing for these birds could be planned so as to maintain these colonies.

It should also be mentioned that the bald eagle and osprey nest throughout the region.

In addition, all other species of birds which presently nest in the reservoir area will be affected by submersion of their habitats, among them the common loon, the red-tailed hawk and a number of passerine species.

The trapping method used has not enabled us to discern any great density of small mammal population. However, one can expect to find many species of rodents and insectivores which are valueless for their furs but important in the food chain. The impact on these

populations will probably be similar to that on fur-bearing animals as previously discussed.

Since neither the use of the Romaine estuary by marine mammals nor the changes in this area by the 50 per cent decrease in flow at the mouth are precisely known, it is difficult to specify the project's potential impact on marine mammals. For example, it appears that since the flow of Rivière Manicouagan has been regulated, a negative change has been observed in the food chain in its estuary; the caplin population has disappeared along with its predator, the Beluga whale.

5.5 Water

Water has always been very closely associated with Quebec's industrial development: at first, just as a mechanical force for lumber and flour mills, then as a means of producing hydro-electric energy. In the future, its importance will probably continue because of its great potential as a coolant for nuclear generating stations.

Water was an essential condition for industrial development of the North Shore, firstly because it made it possible to float lumber cut in the interior right to the North Shore, then because it supplied the energy necessary to start up mining and papermill operations. With hydro-electric installations on the Bersimis, Outardes and Manicouagan rivers, the North Shore has become an important producer of electricity supplying _____per cent of Quebec's production.

Labrador South has experienced the same dependence on water. It was the construction of the Ossokmanuan Reservoir and the Twin Falls hydro-electric generating station which enabled the Wabush and Labrador City mining operation to develop; suffice it to mention

the world records held by the Churchill Falls complex in the field of hydro-electricity.

Reduced to its energy aspect alone, the Romaine diversion project adds a production capacity of approximately 500MW to Churchill Falls and the two generating stations planned for downstream.

On the other hand, this leaves untapped the energy potential of the lower Romaine and the upper portion of the St-Jean whose waters could be diverted into the Romaine River if the latter were fully developed.

This potential will not necessarily be left untapped because there will remain the possibility of reversing the diversion and harnessing the Romaine, with or without the St-Jean.

Aside from hydro-electricity, the water of the Romaine is not used for any other industrial or domestic purpose. Reduction in flow of

this river, especially during the winter low-flow period when it may be critical, could seriously compromise the establishment in the Havre-St-Pierre region of any industry which depends to any degree on a supply of fresh water.

5.6 Forests

The North Shore basin forest is one of Quebec's main forest reserves. It is subdivided into several concessions from the Saguenay to the Manicouagan (for example, Forest Industries Limited, Anglo-Canadian Pulp and Paper Mills Limited, Consolidated Bathurst Ltd and Industries de Luceville Incorporée).

It is crown forest from the western boundary of the Manicouagan River basin to Lourdes-de-Blanc-Sablon. The land in the western section is leased to Quebec North Shore Paper Limited except for some small pockets of private forest, while the major portion of the land to the east of the Toulmstone River is reserved for Rayonier-Québec Inc.

The commercial forest covers a total surface area of 86,110 sq mi (4,030 in the Romaine basin), of which 51,403 (60 per cent) are considered productive (2,418 sq mi or 60 per cent for the Romaine River).

The non-productive land is situated north of the 52nd parallel and along the shore. It is dotted with peat bogs and lakes and goes back 15 miles.

On March 10, 1971, the American multinational ITT (International Telephone and Telegraph) announced its intention to invest over the following 15 years some $600 million in the North Shore forest products sector, provided that an annual supply of 2,000,000 cords from the crown forest was guaranteed.

The forest thus represents an important economic resource for the region being studied, particularly in the lower Romaine and St-Jean sectors.

The Churchill sector is located in an area of sparse Boreal forest. It is a transition zone between the dense Boreal forest to the south and the tundra of the far north where no major change resulting from the project is anticipated.

The Joseph-Atikonak and upper Romaine sectors form a unit with regard to the type of forest cover. In the lower areas are found forests of mature conifers which are of little economic value and burnt areas which have regenerated poorly or hardly at all. Only the hills are covered with economically valuable forests.

The Romaine reservoir will submerge only those forests deemed commercially useless.

In the lower Romaine sector between mile 132 and the installations extends an important area of commercially valuable conifers. This is around a deeply embanked section of the Romaine, where clumps of trees rise on each side of the river. This forest will not be subjected to any change from a reduction in the present flow of the river.

The construction of an access road that runs along the Rivière St-Jean and then crosses over to follow the Romaine could accelerate commercial exploitation of the forest in these sectors.

The traffic on the access road will increase the risk of forest fires; this effect could be minimized by adequate controls, and the presence of a road could facilitate fire-fighting.

Finally, the estuary sector overlaps an area of commercially useless conifers (to the south of lakes Allard and Puyjalon) and a barren coastal area where peat bogs and marshland predominate; these will not be affected by the diversion project.

5.7 Minerals

There is mining and prospecting in the southern portion of the region. The locations which have aroused interest are the following:

- the Lac Allard iron and titanium mines which are presently in operation. Note that prospecting continues in this sector between lakes Allard and Puyjalon.

- the SOQUEM company is making a preliminary study of the possibility of exploiting a deposit 85 miles (126 km) from the shore in the St-Jean basin. A pilot refinery could process 10,000 tons of ore in 1977. The ore is 44 per cent iron, 11 per cent titanium and 11 per cent aluminium oxide. Treatment of it would require the use of salt from the Magdalen Islands. The energy required will be 500 megawatts at the permanent refinery on the shore and 50MW at the mine.

- limestone giving a high lime yield and of considerable thickness could be commercially valuable on the Mingan Islands and here and there in Havre-St-Pierre.

The project for harnessing the Romaine can have only a beneficial effect on the development of mining in the region. The submerged portion does not contain any known deposit and southern mining operations will benefit from any infrastructure and any source of energy which might be developed in the area.

5.8 Settlement of the land

A distinction must immediately be drawn between the settlement of the area by native peoples and other types of settlement. The first can be defined as extensive and complete use of the land area while the second give rise to periodic and intensive use of land.

Settlement by Indians in the interior is reflected in the use of trapping grounds held by individuals, in physical structures (winter caches, temporary dwellings) which have not been mapped, and finally in the use of certain travel routes, particularly lakes and rivers.

As for areas directly affected by the project and settled by Whites, in the interior there are three outfitting posts at Atikonak Lake and one at Lac Lavoie.

In comparison with other sectors, the estuary and the shore are much more intensely settled: the urban areas of Havre-St-Pierre, Mingan and Longue-Pointe, the railway and mining operations of Lac Allard, the use of the entire Mingan Archipelago for fishing and recreation,

the cottages along the shore and the snowmobile trails in the estuary hinterland and sometimes on the islands when shore ice permits.

The creation of the reservoir will completely submerge the post at Lake Lavoie and structures belonging to the Indians which may be found in this sector. Certain navigation routes could be made more difficult to pass, particularly between the dam and mile 132 of the Romaine.

The outfitting posts at Atikonak Lake might be only slightly affected by seasonal increases in the level of this lake.

As for Havre-St-Pierre, it is only in the case of exceptionally large flood overflows that property could be affected, particularly property close to the estuary. It will be necessary to check whether the municipality's water intake is in any danger of being affected by the decrease in flow.

5.9 Scenery

The Romaine basin offers outstanding scenery both at individual sites and in entire sectors. The hills to the south of Atikonak Lake and at Lac Long are cut by deep valleys through which rivers flow; they will not be affected by the creation of the reservoir or by the increase in flow. As for Atikonak Lake, which is only of small value as scenery, it will be altered only slightly by the increase in flow.

On the other hand, the creation of the reservoir will result in merging a series of lakes into a single lake; this will result in submersion of the Burnt Lake delta, which shelters waterfowl in rather attractive greenery, and of a meandering section of the Rivière aux Sauterelles. The steep banks of this large lake will decrease the beauty of the scenery; this will be of particular importance if the road provides permanent access to the reservoir. It will be necessary to provide for selective clearing of the reservoir's banks in locations which will become accessible or visible.

From below the dam to mile 132, the Romaine River is wide with a sandy, flat bed and it flows through an open valley; the large decrease in flow will result in an almost complete drying up of the river bed.

From mile 122 to mile 75 approximately, the Romaine flows through a steeply-embanked gorge of great beauty: the river curves in wide meanders and we find varied and even rather splendid scenery with high cliffs jutting out over the river and small waterfalls cascading from them. The valley is fairly narrow, with slopes covered by vegetation, or escarpments where the rock is exposed, and there are numerous rapids and falls. The decrease in flow will reduce the width of the bed but the rapids, acting as a natural control, will decrease the extent of this change. The control of the waters in the other parts [?] of the Romaine basin and the creation of artificial sills to maintain the level in certain sections of the river could, among other things, help to limit the impact of the reduction in flow on the beauty of this section of the Romaine. In the zones not regulated by means of sills, the river is going

to narrow; shrubs and small vegetation will grow on the unused banks and meanders will form. But the very high quality and great variety of the scenery in the rest of the sector will minimize the importance of these changes.

In the estuary, the Romaine flows through a plain; and willows, unusual* in this region, cover its banks. It does not appear that this vegetation will be affected by the decrease in flow of the river.

Finally, we would point out the beauty of the Allard and Puyjalon Rivers whose sources are to be found in the hilly zone and will not be changed by the project.

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*or perhaps 'of a kind unique to this region' -tr

5.10 Historic and archeological sites

It is thought that the first groups of Amerindians arrived on the North Shore around 5000 BC, leading to the formation of various societies. Some groups adapted to the resources and conditions of the interior (caribou, small mammals, fish) and others to the shore resources and conditions (marine mammals, fish, birds). The groups adapted to the shore resources disappeard about 500 BC, whereas those which had adapted to the resources in the interior survived until the arrival of Europeans in the 16th century.

On the shore, the prehistoric archeological sites located closest to the mouth of the Romaine are those at Mingan (Lévesque 1971), Kegashka (Wintemberg 1942), and the EbCx-1 site (near the Romaine). Near the source of the Romaine, prehistoric sites on lakes Sandgirt, Lobstick, Michikamau and Ashuanipi (Macleod 1968) are known. Trading posts (17th and 18th centuries) were established at Mingan, Baie Quetachu, Winikapau Lake (on the Churchill) and Ashuanipi Lake (Voorhis 1930). In 1896, A.P. Low described the migration routes the Amerindians used in the interior of the Romaine basin to travel back and forth between the shore and the hunting grounds in the interior. Great use was made of Burnt Lake and Atikonak Lake and

the navigable portions of the river itself.

These observations tend to indicate that the zone being studied is highly likely to contain archeological sites around the headwater lakes of the Romaine and along the river north of mile 132. Most of the sites are located near the water (horizontally and vertically), and the creation of the reservoir will result in permanent loss of all the archeological sites located near the dam and in the flooded area. In addition, the sites located on the Romaine River between the shut-off dam and mile 132 could be destroyed by wind erosion and subsidence of the banks after the flow of the river has been reduced.

These sites constitute part of the national cultural heritage; they ought to be identified, excavated and salvaged before any work which might affect them is begun.

The results of these excavations would be a positive contribution of the project; they would improve historic and archeological knowledge of this region with information which otherwise might not be revealed in as much detail for several decades.

5.11 Recreational sites

Among recreational activities, swimming, canoeing, climbing and skiing are popular in the area being studied.

Almost all the lakes and rivers in the basin have sand and gravel beaches suitable for swimming. The limitations on this activity are inaccessibility (distance, lack of roads, marshlands or peat bogs on the banks), the water temperature and a too short summer season. The creation of the reservoir will decrease the number of beaches as a result of the formation of a single lake from several lakes, and the composition and type of the future banks.

The Romaine River is navigable by canoe for a distance of 80 miles from Lac Buit to the St Lawrence. It is a great attraction for experienced canoeists because it is still a wilderness area and it offers challenges and numerous possible sites for camping in the wild. Some portages are necessary to avoid rapids or falls, for example in the area around the installations. The decrease in flow in the navigable section could necessitate some additional portages, by making it impossible to shoot some rapids, but the river will continue to be an attraction.

The initial conditions created by the Romaine diversion project will not lessen participation in recreational activities on land. The mountains throughout the basin and particularly along the gorges of the Romaine and the St-Jean offer some steep rock faces which could attract skilled climbers. There are potential ski sites close to Havre-St-Pierre in the hills around lakes Allard and Puyjalon.

For all these activities, the road which will link the reservoir site to the shore will have a positive impact in particular because it will make recreational sites more easily accessible to the public.

As for strictly tourist activities, these are centred in the built-up areas on the shore, which will become more easily accessible with completion of the road from Sept-Iles. The Churchill Falls site, not easily accessible, is of very great tourist value and the shut-off structures of the Romaine would be a major attraction in a region relatively devoid of interest.

.12 Landmarks

Churchill Falls, which are bypassed by the diversion, are without doubt the most outstanding single feature of the entire sector under consideration. The appearance of these falls can be restored at any time by working the control structure located some miles up river; thus the falls will remain for future generations.

There are two arresting sights at the location of the future reservoir. First there is the large Burnt Lake delta, a formation unique in the whole of the North Shore. Its size, vegetation and bird life make it a great potential attraction. Second, several miles from its confluence with the Romaine River, the Rivière aux Sauterelles spreads out, in an open valley, into a long series of narrow meanders with a very rich vegetation on its banks. These two formations will be completely submerged by the reservoir.

Further down river, there is the region of the installation, [?] with a series of rapids approximately five miles in length, and the Grand Falls, with a drop of approximately 150 feet. These are points of interest whose splendour will be diminished by the reduction in flow.

The project's impact on the beauty of the steeply-sloped section of the Romaine river between the installation and mile 132 has been discussed in a previous section; here we will look at the uniqueness of this wilderness area of the river.

Without being unique, the Romaine river is among the most beautiful rivers of the North Shore east of Manicouagan. Its deeply-embanked section (with a drop of more than 1,000 feet) is surpassed in length only by the Ste-Marguerite (51 miles), the Moisie (98 miles) and the Natashquan (135 miles). In addition, the average drop in the deeply-embanked section of the Ste-Marguerite (1,500 feet) and the Moisie (1,700 feet) is greater than that of the Romaine (1,200 feet); the Moisie even has drops of 2,400 feet.

Finally, it should be pointed out that the deeply-embanked section of the Ste-Marguerite is close to the sea (11 miles), as is that of the Moisie (48 miles), whereas the deeply-embanked sections of the Romaine and the Natashquan are much farther inland (75 miles and 95 miles respectively).

These few observations lead us to think that it would be advisable, at the beginning of the period of industrialization of the Middle North Shore, to set up a zoning plan for future use of these rivers, keeping in mind among other things the beauty of the scenery. In this way, it will not be too late if it is decided that one of these rivers should be preserved in its entirety.

6. SOCIO-ECONOMIC IMPACT

The characteristics selected to identify the socio-economic impact of the project are:

- the permanent or temporary jobs directly created by the project;
- the economic activities attracted or restricted by the project;
- the project's total impact on the local and regional economic structure;
- the community services or the urban infrastructures which either remain the same or are developed because of the project;
- the social impact with respect to problems of territorial integrity;
- the project's contribution to education and training;
- the impact on the culture, traditions and lifestyles of the groups concerned;
- the project's role in regional development.

6.1 Jobs

The project will not create any permanent jobs. However, 350 temporary jobs could be available locally during the last two years of construction and a lesser number in the preceding years. This figure can be broken up into some fifty administrative positions (office employees, managers and inspectors) and 300 jobs for manual workers of which half will be skilled. The road construction will require from 50 to 100 people annually if a winter road is to be built, and approximately 200 men during the three years before the opening of the site if it is to be a permanent access road.

The effects which will really be felt in Havre-St-Pierre will be those that increase job opportunities for students during the summer. The Société de Fer et Titane du Québec (Quebec Iron and Titanium Company) could be faced with competition in hiring. The residents of Havre-St-Pierre will have a choice of jobs and there is the possibility that the SFTQ will have to fill its manpower needs from elsewhere in the region.

If the project is scheduled to begin operations for 1980, the construction period would coincide with work on several other large engineering projects (such as James Bay, Outardes 2, Gull Island). During this period, all the skilled labour of dam builders would be fully employed and additional manpwer would have to be trained.

6.2 Economic activities

Hydro-electric projects do not in themselves inject any motor force into the regional economy and in general, they leave little behind after completion, just jobs for the few people required to operate and maintain the installations.

The Romaine project will be no exception to this rule. Local supplies are insufficient, so the site will get its provisions almost entirely from outside the region and it is only indirectly that the local economy might benefit.

Independent truckers may benefit from the project to the extent that the access road can be used permanently. The port of Havre-St-Pierre may be called on to act as a forwarding point for a portion of the site's provisions but only a small portion. The local businessmen, hotels and restaurants will see their turnover increased to a certain degree. But it is not expected that industries or service infrastructures will be created or enlarged during or after the project.

On the other hand, the restrictions on establishing new industries in the Havre region, as a result of a decrease in the flow of the Romaine (see section 5.5), will be a major negative impact of the project.

The possibilities for the area must be studied in depth and a policy for providing goods and services must subsequently be recommended, that will allow the economic spinoff of the project to be maximized on a regional scale.

In addition, the partial regulation of the rest of the Romaine basin, bringing in certain other objectives (environment protection)[?], could help partially remove the restrictions on the establishing of new industries in this sector.

6.3 Economic structure

The occupational structure of Havre-St-Pierre is that of a strictly residential and tertiary built-up area. Income is derived from working in the Lac Allard mine or in the service

industries, as shown in this rough table compiled from local information:

ACTIVITY	% IN OCCUPATION
Mining sector	50%
Institutional and administrative sector	25%
Commercial and service sector	20%
Hotel and restaurant sector	5%
TOTAL	100%

According to the municipality's master development plan, there were five main types of land use at Havre-St-Pierre in 1974:

USE	OCCUPIED SPACE
Residential	67.4%
Warehousing	25.2%
Commercial	4.8%
Institutional	2.4%
Industrial	0.2%
TOTAL	100.0%

The major portion of the town's periphery is occupied by residential buildings and by warehouses, sheds and depots: these two land uses take up nearly 93 per cent of the space. The rest is divided between commercial and institutional use. Finally, the buildings classified as industrial (0.2 per cent) are not connected with any industrial jobs since they belong to Hydro-Quebec

(service industry) and to the Société de Fer et Titane (primary industry).

Havre-St-Pierre is basically a dormitory and service town whose spatial growth can only be attributed to mineral transfer and institutional operations (the Gulf regional school board, the shore hospital, and so forth).

The Hydro-Quebec project should change the occupational structure for a time since it will reduce dependence on the mining sector. In so doing, it will swell the tertiary sector so much that the working population can be expected to divide into three occupational groups of comparable importance (33 per cent of the labour force in each case): mining, institutional and commercial work (the last includes services and the restaurant industry).

Keeping in mind the restrictions on water supply mentioned in the preceding chapter, it is difficult to anticipate whether or not the secondary sector will be affected in any way by the project. The initial conditions will mainly encourage eventual industrial development in the Rivière-St-Jean and Mingan region.

In short, the structural changes resulting from the project are going to diversify the sources of employment even more and temporarily ensure the town of Havre-St-Pierre a greater autonomy in relation to its employers. The spatial layout of the municipality should not be changed much from what is outlined in the master development plan.

6.4 Community services

The Romaine project will require the development of community services connected with the housing of approximately 150 people when an administrative office for the construction site is set up in Havre-St-Pierre.

In the master development plan, there is already the outline of a system of municipal zoning and plans for residential developments within the present urban centre. The municipality has also planned to set up a mobile home park immediately north of the landing strip. It should also be pointed out that the infrastructures of the work camp at the site of the shut-off structures could be salvaged or used for other purposes, as was done with several other sites in the past.

6.5 Territorial integrity

Aside from the legal implications, which exceed the terms of reference of this study, the problem of the Quebec-Labrador border will be posed in new terms with the Romaine diversion project and could without doubt give rise to political disputes.

Public opinion in Quebec and in Newfoundland may well crystallize around this problem and may even require the governments to redefine their respective positions.

The Romaine project may well start up an old political dispute again and produce emotional reactions with respect to safeguarding the integrity of the national territory.

In the same line of thought, possible native land claims, and the steps that may be taken to arrive at a settlement of these claims, may be a source of stress.

In several other similar cases, it seems that such steps were accompanied by negotiations and legal proceedings, which can be tedious and in the long run provoke a certain amount of racial animosity.

On the other hand, the Romaine project could be the opportunity to attain a final settlement of these claims and to clarify, in the words of the Dorion Report, "the many aspects of Indian land titles" on the North Shore.

6.6 Education and training

As previously stated, the project should require additional skilled labour.

Hydro-Quebec usually carries on training programs for skilled labour at the construction sites. Apprenticeship in construction, familiarization with heavy equipment and experience acquired

during the project will be a few of the advantages from which the local population can benefit. For the region and the province, the project will produce trained workers who can be employed afterwards on other projects.

6.7 Culture, tradition and lifestyles

The people of the North Shore are of Acadian and Newfoundland origin but their lifestyle is that of the Gulf of Saint-Lawrence.

They are a people who have traditionally lived from the sea, which has inspired their traditions and provided the necessities of life.

They are also the group in Quebec which, through trapping and hunting, has perhaps been the most closely exposed to the life of the native peoples. In the third place, they are a people who have lived sufficiently withdrawn into themselves to develop certain characteristic traits, a specific dialect and accent, a need for seasonal outdoor activities, a sense of family lines, and so forth. Originally island people, the residents of Saint-Pierre have recreated on the shore of the St Lawrence a community that looks out on islands and has its back to the interior. They have combined activities and lifestyles representative of nearly all the surrounding populations into a real cultural melting-pot. Fishermen like the inhabitants of Gaspé, they were also seal hunters like the Eskimos, trappers and hunters like the Indians, woodcutters in winter in the nearby hinterland, and smugglers.

They sailed coastal boats and sold their goods on the Quebec City and Halifax markets, and now they have been miners for more than a decade.

The residents of Havre-St-Pierre have adapted to work in the mines without either their social structures breaking down or any apparent ensuing problems; this gives us an idea of their versatility and ability to adapt to change. However, it must be said that work in the mines has not involved any basic change in their traditional social structure, in spite of the contacts they have to maintain with the outside world. Despite the arrival of the mine, "traditional social structure as a whole has not been changed"[1]. Havre-St-Pierre has preserved a non-industrial lifestyle and has remained a community which while being exposed to outside influences, nevertheless continues to rely only on itself.

The people have been able to work in the Lac Allard mine without leaving their region or even changing their place of residence, but this will not be the case for those who work on the Hydro-Quebec project. In addition, completion of the road will come soon after and probably coincide with other activities promoted from outside the area (mines, forestry and tourism); this combination of events will be the most important change in their history that this group of people has had to confront.

1 Beaulieu and Joubert (1968)

These are the reasons why it is thought that even if the population were to identify closely with the development of their region, and be aware of the importance of the Romaine project, the project could have the effect of reinforcing the internal cohesion of the social structures.

As for the native peoples of Mingan, their customs could be changed somewhat after the construction of a road, which would provide them with easier access to the interior, and the creation of the reservoir, which might require that their land allotments and trapping practices be changed.

Some of the jobs created by the project will be available to them, thus introducing a new factor into their socio-economic environment and requiring that they make a choice with regard to their economic and cultural future.

6.8 Regional development

The project harnessing the Romaine will affect regional development on several levels. In the long term, it is without doubt the opening up of the interior which, if it indirectly helps speed up the development of mining, forestry and tourism, will have the greatest effect on reorganization of the region.

Along with the broadening of the North Shore coastal strip from Sept-Iles east, this development inland north from Havre-St-Pierre will be the only one as far as Blanc-Sablon. And if a line is drawn from the Middle North Shore to Anticosti it is seen that Havre-St-Pierre is located in the centre of a regional network now being formed.

We can talk of Havre-St-Pierre consolidating its functions as a regional centre of the formation of two centres, Sept-Iles and Havre-St-Pierre, and of a triangular sub-regional structure from the Rivière-St-Jean to Havre-St-Pierre to Anticosti. But it should not be forgotten that the road into the country to the North is going to make the area more easily accessible. The new roads are therefore likely to increase use of the area all the more.

Finally, on the social level, the "harnessing" of Havre-St-Pierre and its hinterland does not seem to have had the bad effects on the groups already living there which have often resulted from such development. At least not in matters pertaining to the Hydro-Quebec project.

The bulk of the labour from outside the region will leave at the end of the project, so that most of the workers likely to settle in the built-up area will be of North Shore origin. On the other hand, given that the various activities which are going to determine the regional development of the North Shore over the next decade will occur at different times, it can be expected that the local population will act as the controlling and directing agent of this development. While the design of the Hydro-Quebec project is just right for the region, in the course of the development the region will have to acquire the flexibility needed to control and gauge future projects.

The potentially important impact of the access road on regional development will be, for all practical purposes, negligible if it is a winter trail or a temporary road. If, in the extreme case, the road is built along the northern route starting from the Sept-Iles to Schefferville railway line, it will have no impact at all.

The final choice of the route and type of road will have to involve all the parties who have an interest in developing the area's resources, so that a decision which is best for everyone will be made and so that the expense can be divided equitably. It is the responsibility of the first developer to see that the interests of all parties come together on this matter.

APPENDIX 1

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GENERAL

PHYSICAL ASPECTS

- Geology
- Climatology

BIOLOGICAL ASPECTS

- Land vegetation
- Land fauna
- Birds
- Limnology
- Ichthyology

HUMAN ASPECTS

- Archeology and history
- Land use
- Infrastructures

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