

THE UNIVERSITY OF MANITOBA

THE EVOLUTION OF THE ECHIMAMISH RIVER:  
NORTHERN MANITOBA

by

SHELDON L. McLEOD

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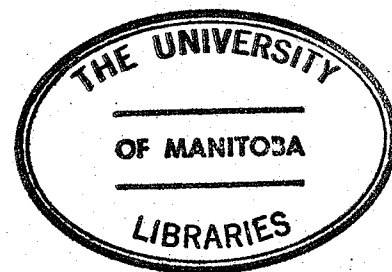
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of the degree of

MASTER OF SCIENCE

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## Abstract

The contemporary Echimamish Basin is an extremely interesting and beautiful landscape. It is exciting from a geological, hydrological, geomorphological, archaeological, historical, mythological, and natural history point of view. Few watersheds can lay claim to being so diverse. Its unique form can be attributed to three things; a varying precambrian structure, and a multitude of processes working over an exceedingly long period of time. This thesis investigates the structure, process and form relationships and attempts to describe the contemporary Echimamish.





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## Introduction

I was first introduced to the Echimamish by Professor R. W. Newbury. Anybody who loves the land has their own "magic place", a sanctuary where the heart and soul will always rest though the body may be removed by hundreds of miles. The Echimamish is Professor Newbury's magic place.

It was in the autumn of 1973 that I was offered the opportunity of accompanying Bob Newbury on a canoe passage of that unique river. It was then that I began to feel a bit of its magic. We only passed quickly over the river that fall and it was obvious that the Echimamish demanded and deserved far more attention. Plans were made to return the following year.

This river is fascinating. Its name, Echimamish, is a Cree word which translated into English means "water which flows both ways" or "both ways downstream". Though unobserved by early European and Canadian "explorers", it is indeed true that the water in this stream flows both ways. The headwaters of the two flows is a long, narrow pond. It drains to the east (to the Hayes River) and to the west (to the Nelson River) and is navigable throughout its length, but for a short distance at the eastern outlet of the headwater pond. Here a short portage of 30 paces leads over a low, smooth rock. This portage is known as the Painted Stone Portage, thus named for a rock formerly placed near the centre of the portage upon which the Indians made offerings and traced figures in reverence of the beautiful and simple passage from one watershed into another.

How did such a stream come to be? It did not.

appear to adhere to Playfair's Law, which states essentially that a valley form is a result of the work done by the stream that flows in it. How could the evolution of this landscape be explained by Davis' factors - structure, process and time?

These questions have resulted in my writing the ensuing pages. I had the benefit of only two brief, personal encounters with the Echimamish. Thus, I was unable to investigate as fully as would be desirable the many facets of this river. However, a quantity of literature exists on the basin, mostly in the form of geological reports or the journals of the early explorers. These then, were the sources of my background data.

The thesis attempts at first to be an accurate description of the basin; its geology, its hydrology, the history and mythology that surrounds Echimamish. It also presents a brief summary of the natural history of the area. Finally, the thesis suggests a process sequence to describe the evolution of the basin into its contemporary unique form. The speculation upon which the process sequence was based was enjoyable but resulted in what I believe to be, some reasonable suggestions.

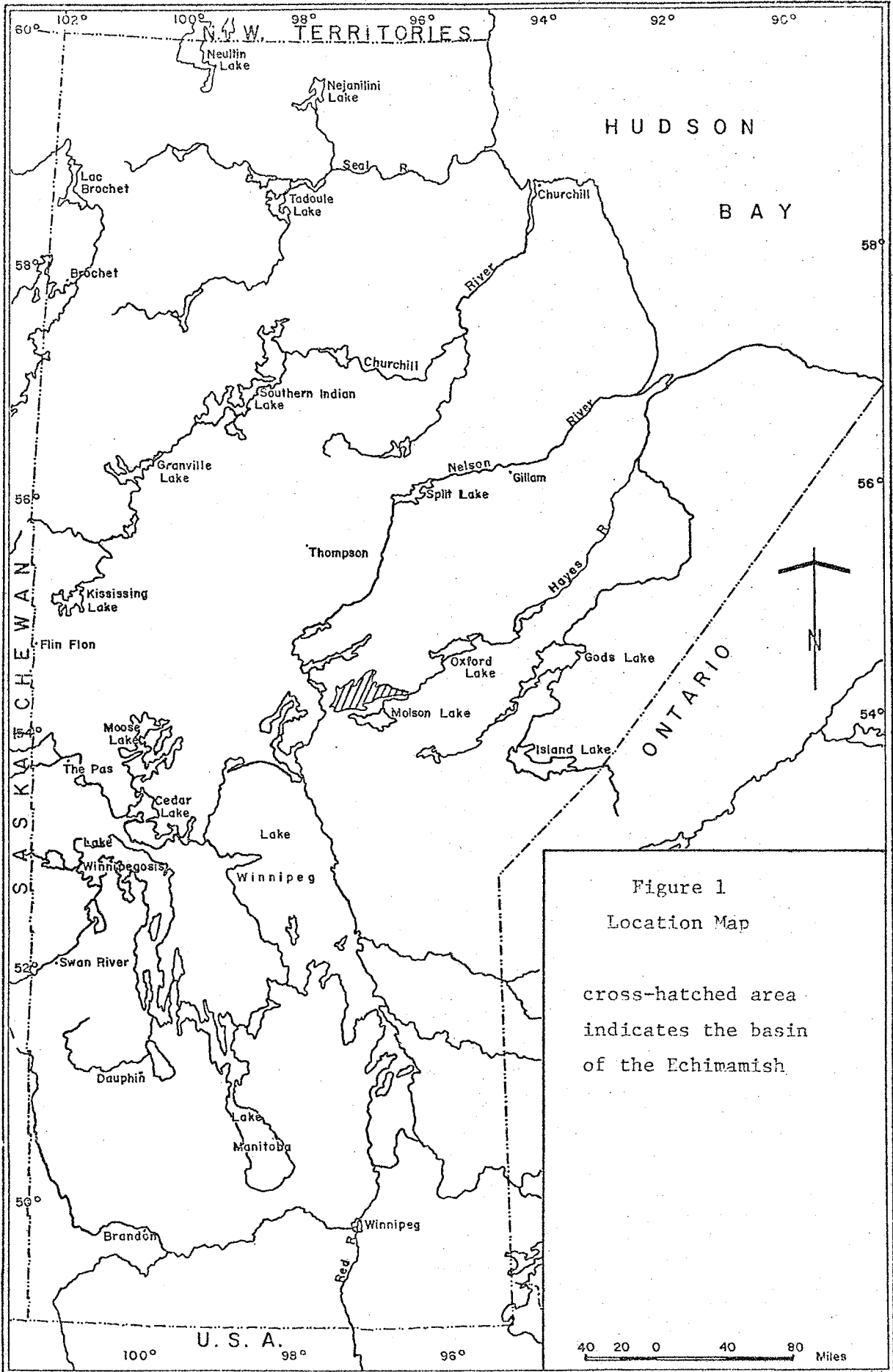
In short, I hope that from this thesis the reader can gain just a small appreciation for this river, its unique form, its mystery and its beauty.

### Acknowledgements

I am very grateful to Professor R. W. Newbury for his role as my advisor, for his direction, criticism, and assistance, of both a financial and a conceptual nature, in the preparation of this thesis. I am also indebted to him for the use of some of the photographs appearing on these pages.

Thanks also go to Mr. R. V. Oleson of Winnipeg for his constructive criticism of the historical aspects given in Appendix B, to Dr. Jennifer Walker-Shay of the University of Manitoba for her assistance in plant identification and appreciation and for her criticism of the description of Echimamish vegetation in Appendix E, to Professor A. Rattray, Head of the Department of Landscape Architecture, University of Manitoba, and Mr. Hugh McKay of the Manitoba Water Resources Branch, both of whom read the entire thesis and provided me with their helpful comments and criticism, to Mr. Greg McCullough of Winnipeg who donated some of the photographs appearing herein, and to Miss Bonnie Davidson of Fredericton who assisted in the typing and preparation of the final document.

Special thanks are expressed to my wife, Janice, as well as to other members of my family who have been a source of encouragement throughout the preparation of this thesis.



## 1. The Geology of the Echimamish Basin

### 1.1 The Bedrock Geology

The Echimamish Basin lies within that most extensive of all Canadian landforms, the Canadian Shield. A minute portion of the 2,000,000 square mile shield, the 388 square mile Echimamish watershed lies within a broad declivity through which flow the Hayes, Nelson, and in part the Churchill Rivers. This depression represents the boundary zone between the Superior and Churchill orogenic provinces and has become known as the Nelson River Gneissic Zone. The predominantly sedimentary rocks of the Churchill block, (some 1735 million years old), meet the mixed volcanic and sedimentary rocks of the Superior block (some 2450 million years old) in this Nelson - Churchill Trough.

The Echimamish area is underlain by an assemblage of consolidated rocks of Archean and Proterozoic age. The Archean rocks consist chiefly of altered sediments and lavas, while the younger rocks are batholithic intrusives composed mainly of granites.

The older rocks are known as the Hayes River Group and consist essentially of schistose and highly metamorphosed strata. Throughout the area underlain by these rocks are numerous small masses of hybrid rocks and intrusives. The rocks of the Hayes River Group are lithologically similar to the Keewatin rocks in Ontario. They run in a narrow belt along the Echimamish from just east of the Painted Stone to a point about 8 miles upstream of Hairy Lake from whence they continue in a northwesterly direction through Butterfly Lake towards Cross Lake. This forms part of a single, almost continuous, belt of such rocks extending from Knee and Ox-



ford Lakes to Cross Lake, and which Robert Bell, in 1879, referred to as the Huronian Trough.

Adjoining the long, narrow zone of the Hayes River Group, on the north and south, are extensive batholithic areas of granites and granite-gneisses.

The following is a description of the map units found on Figure 2. The description is taken from C. K. Bell (1961).

#### 1.1.1 The Hayes River Group (1 - 3)

##### Volcanic Rocks (1)

The most widespread volcanic rocks are massive andesites, biotite-hornblend-plagioclase schist, and chlorite schist.

A belt of well-banded basic to intermediate volcanic rock crosses the Echimamish at Painted Stone Portage and continues west to form a narrow ridge paralleling the river (1b). Beds are of dacitic composition and narrow, pink aplite sills occur in the andesite, amphibolite and hornblend-biotite gneiss.

The largest continuous band of volcanic rocks parallels the Echimamish from the uppermost dam, west to Butterfly Lake where it veers northwest through Pipestone Lake to Cross Lake (1b). The rocks are again largely andesites with accompanying biotite-hornblend schist, amphibolite, porphyritic amphibolite, and hornblendite.

The volcanic rocks contain leucocratic sills and dykes, milky-white to colourless quartz veins and minor epidote patches and bands. Massive quartz diorite, diorite, and fine-grained gabbro are interbanded with these rocks. They intrude the volcanic rocks as sills and irregular tabular dykes.

At Butterfly Lake the volcanic rocks are less deformed and are predominantly massive andesites.

#### Sedimentary Rocks (2)

A narrow, 20-mile interformational belt of sediments (2a), lies in volcanic rocks and parallels the Echimamish from just west of Painted Stone to south of Butterfly Lake. The eastern members are grey, impure quartzite with interbedded conglomerate, dacite and greywacke.

A lens of sediments (2a), outcrops north of this band at the third dam. The basal member is a 200-foot thick conglomerate zone. It is separated from the underlying andesites by a 10-foot layer of chlorite schist.

Stretched, water-worked agglomerate (2b), lies within andesitic lavas on Butterfly Lake. The conglomerate is intraformational and contains fragments of rock from the adjoining beds.

#### Transition Rocks (3)

Adjacent to, within, and replacing Hayes River Group volcanic rocks are rocks that form a zone gradational to the granodiorite-tonalite-gneiss complex. Three phases are recognizable. They are, rocks containing still-recognizable volcanic rocks, rocks in which the original volcanic features are preserved as scattered relics, and a layered gneiss of intermediate composition.

The first phase is a layered rock composed of recrystallized volcanic material (chlorite and biotite schist, amphibolite) and secondary lit-par-lit layers and veins of quartz, epidote, pegmatite, aplite and leucogranite. The resulting rocks are the injection, lit-par-lit composite or mixed gneisses and migmatite. The second phase is a layered gneiss in which the struc-

tural features of the original volcanic rocks are still preserved as insitu relics and amphibolite bands. It may be considered as a banded paragneiss. The final phase is a rock with granitic texture, preserved gneissosity, and relic mafic lenses. It is considered to be a banded or a hybrid gneiss.

#### 1.1.2 Intrusive and Granitized Rocks (4 - 6)

##### Basic and Ultrabasic Rocks (4)

Peridotite (4c), serpenite (4c), gabbro and diorite (4b), labradorite porphyry and anorthosite (4a), intrude volcanic rocks of the Hayes River Group as sills.

Anorthosite outcrops on Hairy Lake, Little Hairy Lake, and on the south side of Butterfly Lake.

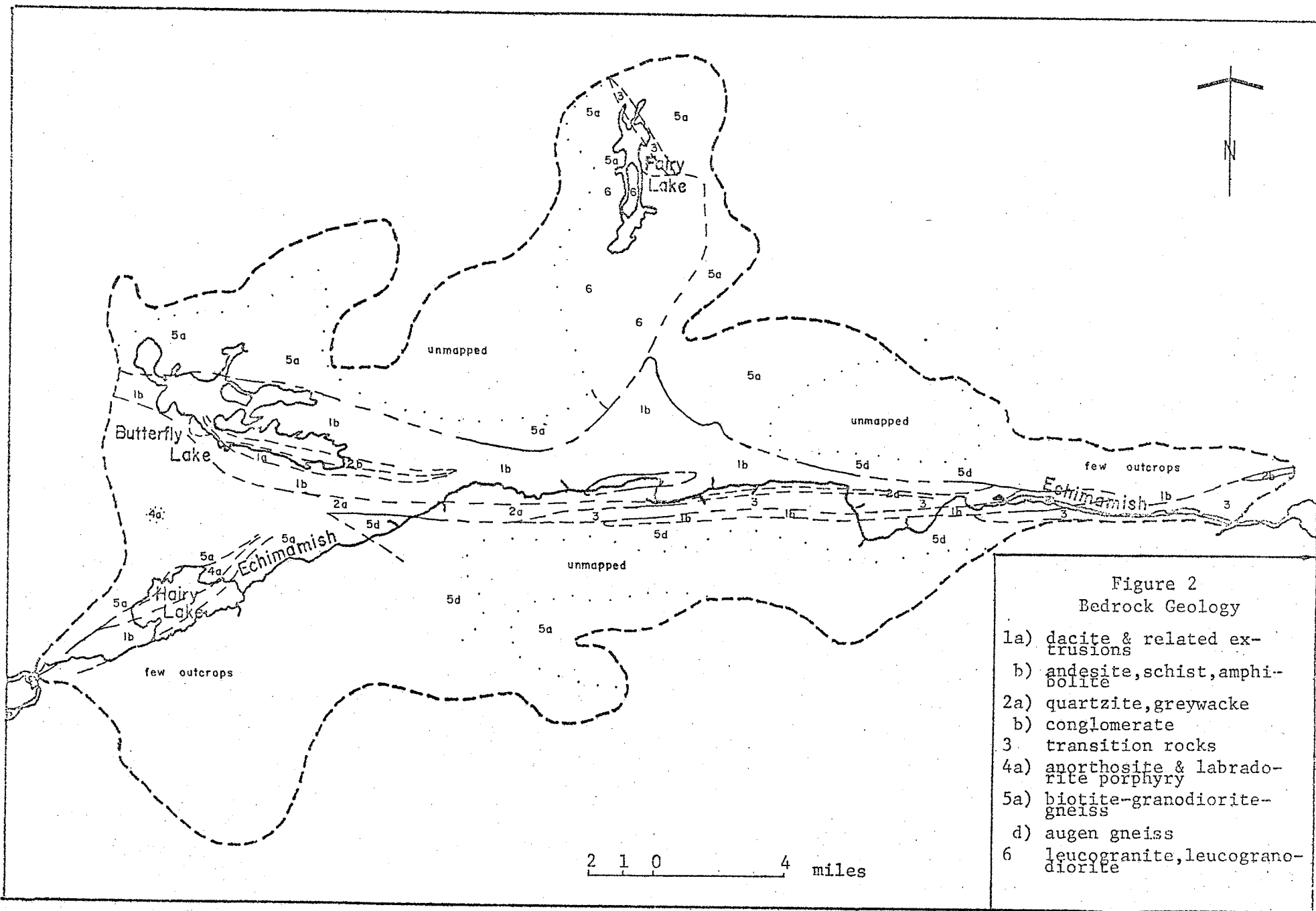
##### Granodiorite-tonalite-gneiss Complex (5)

Much of the map area is underlain by rocks, the composition of which ranges from tonalite through granodiorite granite.

The most common rock in the area is biotite granodiorite-gneiss (5a). Although in most cases the gneissosity is preserved by an alignment of the quartz into lenticular masses and a rude parallelism of platy minerals, occasionally the gneiss loses its directional components and the rock becomes massive-looking. Coarse red biotite granite outcrops south of the inlet of Hairy Lake.

Biotite granodiorite-gneiss with inclusions and relic fragments of mafic material is ubiquitous in certain regions.

The augen gneiss is grey, medium to coarse-grained and invariably gneissic (5d). These rocks are all biotite-rich and are all cut by leucocratic granite.



Leucogranite, Leucogranodiorite, Aplite and Pegmatite (6)

Locally, massive pink to grey leucogranite or leucogranodiorite outcrops as stocks or small batholiths. In places they form the only rock type; elsewhere they occur as stock-works intruding all the aforementioned rocks. Sixty percent of the outcrops on the south half of Fairy Lake is late leucogranite.

### 1.2 The Structural Geology

South and for a very short distance north of the Echimamish - Hayes River lineament, the regional strike of the gneisses is east - west with up to 20 degree variations to the north or south. The dip of the rocks appears to be vertical. In the Fairy Lake area the gneisses strike northwest. Elsewhere they trend north-easterly.

The major geological structural feature is the fold structure formed by the Hayes River Group. The structure is a truncated, abnormal anticlinorium.

A longitudinal fault lies within the gneiss and parallels the western contact of the northward peak in the andesite band near Taylor Lake and Fairy Creek.

Structural features are indicated on Figure 3.

### 1.3 The Economic Geology

The first suggestion that the rocks of the Echimamish Basin might contain minerals of economic importance, came from R. W. Brock, who in 1910, likened some of the rocks of the Hayes River Group to the Kee-watin iron formation rocks of Ontario.

In 1926, some pyrite-bearing rock was staked in the Painted Stone Portage area. This led to the

staking, by several parties, of claims that extended for a short distance east and a few miles west along the belt of schistose rocks. No discoveries of interest resulted and the claims were allowed to lapse.

Prospecting, however, continued in the belt of altered sedimentary and volcanic rocks extending westerly from the stakings. Knowledge of a block of 25 claims known as Echimamish Gold Property- drew several prospectors to the area in the late summer of 1936. In the next few months 200 mining claims had been staked in an area extending 20 miles east - west along the Echimamish with a maximum width of 5 miles.

Two of the larger properties were the O'Day (1934), and Echimamish Gold (1935) stakings. O'Day is 200 yards northeast of Birch (Taylor) Lake. A lenticular quartz vein is visibly mineralized with grains of gold. A sample was reported to have assayed 2.25 ounces of gold per ton. Echimamish Gold Property is 2,000 feet north-northwest of the second dam. The mineralized zones are in the order of a few feet in length and a few inches in width. Assays were said to have carried commercial quantities of silver and gold. The Conx Group is a third property (1958) located a mile northeast of Taylor Lake. The assays from here yielded 0.015 ounces of gold and 2.89 ounces of silver per ton, with 3.51 percent copper. There were some 22 other showings, but none of them yielded economically significant quantities of minerals.

Economic features are indicated on Figure 3.

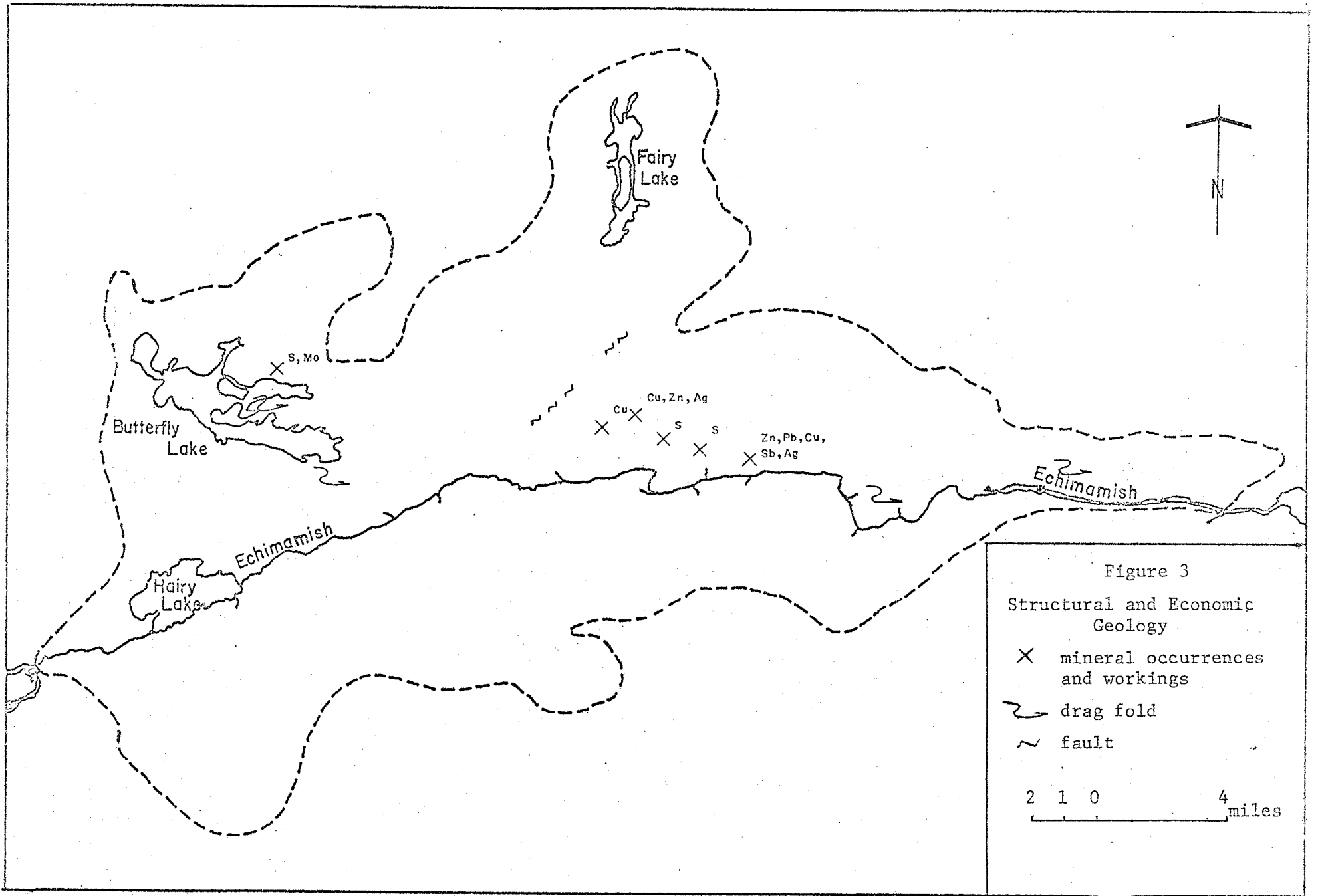


Figure 3  
 Structural and Economic  
 Geology

- X mineral occurrences and workings
- ~ drag fold
- fault

2 1 0 4 miles

- Bibliography -

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Use was made also of the field notes and diary compiled by Dr. R. Bell and his wife. These are on file at the Public Archives of Canada in Ottawa.



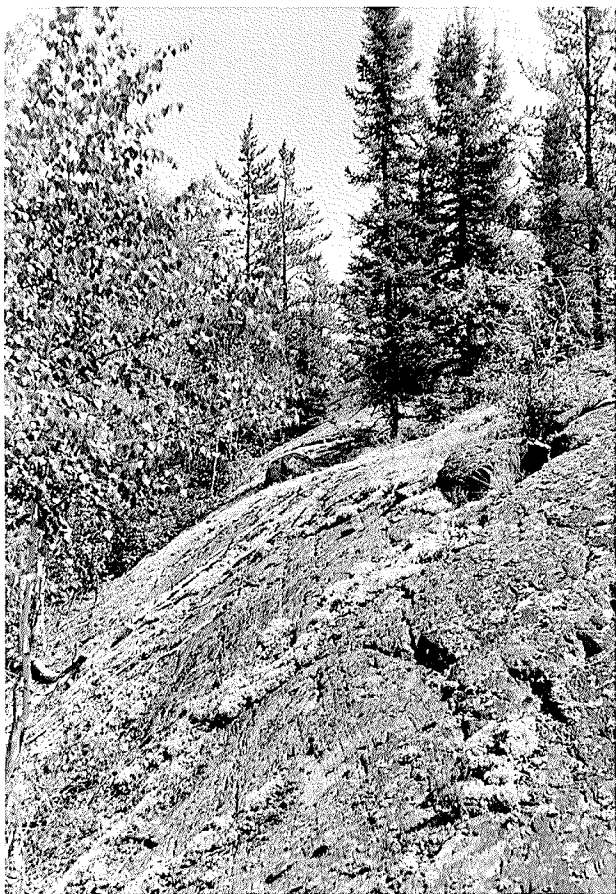
## 2. Pleistocene Geology

### 2.1 Surficial Materials

The shield areas of Canada are generally characterized by extensive and bold outcrops and exciting relief. Not so in the area of the Echimamish. Exceedingly long periods of glaciation have reduced the normally rough terrain to the relatively smooth condition of a peneplain. Erosional forms that can be attributed to the advance of glaciers are prominent. The exposed bedrock has been scoured to a fresh surface. The hills and ridges are characterized by smoothed, hummocky surfaces.

The direction of the most recent glacial advance is consistently indicated

by the striations throughout the area as being south 30-60 degrees west. This general southwesterly orientation is confirmed by the appearance of chatter marks at the third dam on the Echimamish. The bedrock of the Hayes River Group trends east - west. Inevitably, the northern faces of the outcrops of these rocks are smoothly rounded, while the southern faces frequently show the effects of plucking.



The northern faces of the ridges are smooth and rounded - moulded by the advancing ice.

Thin deposits of glacial till are found in irregularly-shaped areas on the uplands. It is probable that similar, though perhaps thicker deposits occur in low-lying areas. The till lies, in places, on top of consolidated bedrock, but in other areas it overlies varved lake clays.

In 1913, McInnes showed the eastern boundary of glacial Lake Agassiz as cutting through the Basin of the Echimamish about 6 or 8 miles west of the Painted Stone area. In 1936 though, Tanton found lake sediments somewhat east of that and established that the floor of the lake was some 30 feet higher than the elevation of the upper Echimamish. It therefore seems possible that Lake Agassiz extended at least as far eastward as the Painted Stone. Varved lake clays lie in deep deposits on the lowlands adjacent to the river and on small, isolated plains within a mile of it to the north and south and at elevations up to 30 feet above the upper part of the river. The river valley deposits are continuous for miles and are at least several feet in thickness. Pits, dug in the course of claims development, revealed that the varved clay undulated in a succession of folds indicating some post-deposition disturbance. Above the rhythmites in this area is a deposit of boulder clay. Glacial erratics also dot the area. Stratified clays appear to underlie vast sections of the basin to the north and south of Hairy Lake. This occurs in areas where the bedrock presence is somewhat depressed, and relief is minimal.

An esker, of a length of several miles, crosses Fairy Creek just south of Fairy Lake. The esker has a northeast - southwest orientation.

Large, crevasse-filling kames composed of unsorted sand and gravel, occur as 75-foot high, flat-topped, tree-covered ridges. They are found in three localities; in the southwest of the basin south of Hairy Lake, in the north of the basin east of Fairy Lake, and in the east of the basin a few miles east of the Painted Stone. All three examples have a northeast-southwest directional component.

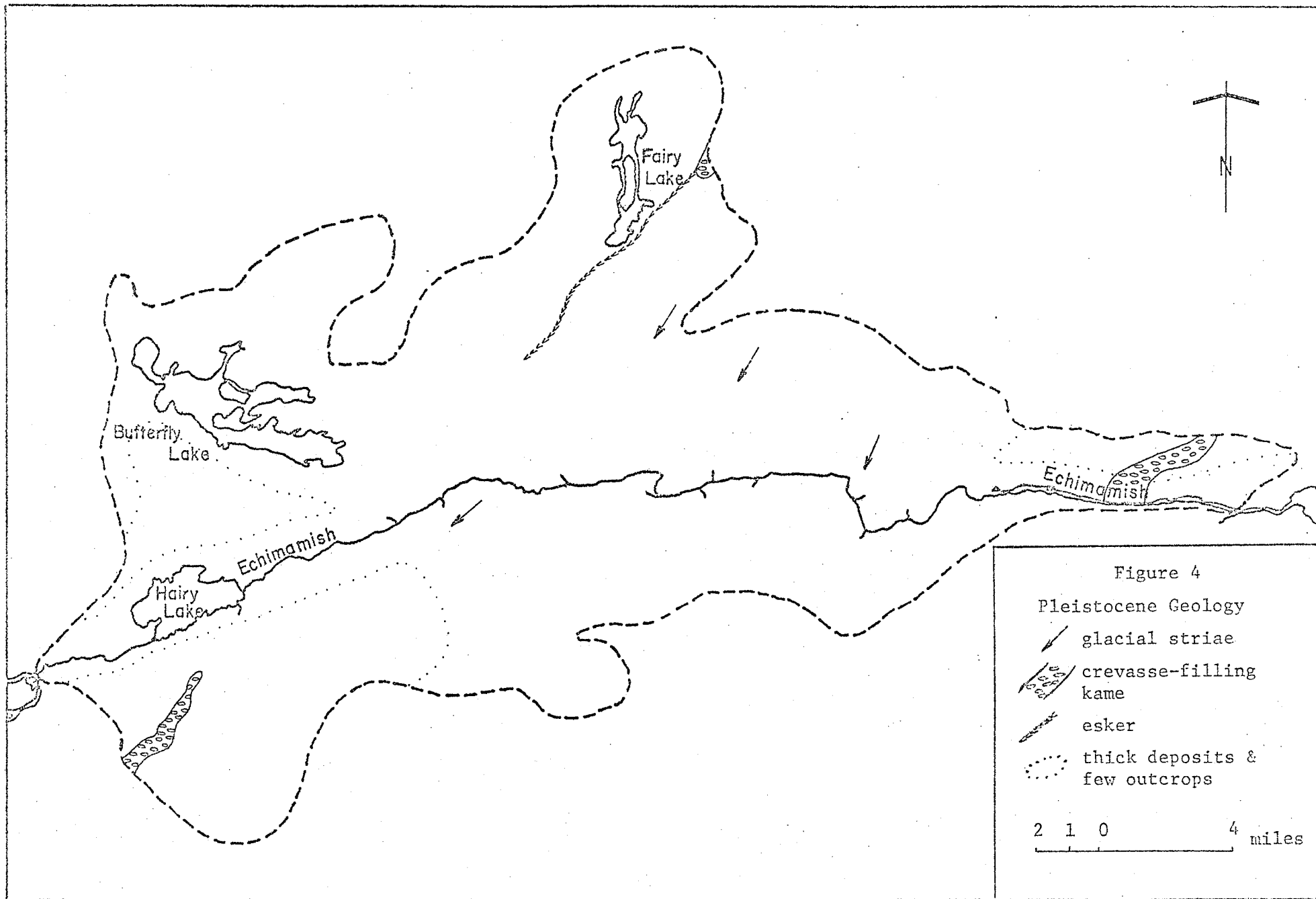


Figure 4

Pleistocene Geology

- ↙ glacial striae
- ▨ crevasse-filling kame
- ⋈ esker
- ⋯ thick deposits & few outcrops

2 1 0 4 miles

Drumlins with a similar orientation are frequent in the nearby Lawford River basin.

The distribution of surficial materials is indicated in Figure 4.

## 2.2 Glaciation in the Echimamish Basin

The Echimamish Basin has been subjected to several thousands of years of glacial erosional and depositional sequences during the Pleistocene. The glaciers made their assault on central Manitoba from two principal directions - north and east. In the initial ice advances, glaciers originating in the north appear to have been dominant. This northern ice had its centre of accumulation in the vicinity of Doobawnt and Yathkyed Lakes in the Northwest Territories, and has been referred to as the Keewatin Ice Sheet. Subsequent advances into the area seem to have been dominated by ice originating in a centre lying to the east. Apparently, two ice centres lay in this direction. They were the Laurentide or Labradorean Centre located in Labrador and northeastern Québec, and the Patrician Centre which could have been found lying atop the Precambrian to the southwest of Cape Henrietta Maria.

The action of the glaciers is primarily responsible for the reduction of the landscape to its present peneplain form. Throughout the Echimamish Basin, though particularly in the western portion, the terrain is comprised of low, rounded outcrops separated by large tracts of bog and shallow, sediment-masked valleys. The valley-forming process was simply the erosion and plucking of certain soft types of rocks, the schists and basalts, by the overriding glaciers. The valleys not subsequently filled with sediments are now to be found carrying the water of the Echimamish and its tributaries.

Although it seems certain that the Echimamish area was covered by the ice of the first three Pleistocene advances, there

is no visible evidence to support that contention. Only the last major advance, known as the Wisconsin Phase, has left the intimation of its presence. North-south striations and chatter marks characteristic of the first three Keewatin advances do not exist near the Echimamish. Directional indicators that are present support the concept of a northeast to southwest thrust. Further evidence of this is found in the outcrops which are smooth and rounded on their northeast faces but have low, plucked cliffs on their southwest faces.

A detailed surficial geological mapping has never been done for the basin of the Echimamish and hence a complete Pleistocene history cannot be recreated. The evidence is this:

- 1) Clay and silt rhythmites of considerable depth are found to the north and south of Hairy Lake and in the valley bottom adjacent to the river itself, within a very few miles of the Painted Stone.
- 2) These layered deposits are found also on the uplands nearby, but thirty feet above the water in the upper Echimamish.
- 3) To the east of the Fairy Creek junction the rhythmites undulate in a succession of folds.
- 4) Erratics overlie the stratified deposits in many places. To the east of the Fairy Creek junction the layered clays are covered with several feet of boulder clay.
- 5) A relatively thin deposit of glacial till lies directly on top of consolidated bedrock in some upland areas.
- 6) An esker and three kames form southwesterly-trending ridges in the basin. It is unknown whether these lie atop the lacustrine deposits or not.

A reconstruction of the probable sequence of the deposition of this material would assist in determining possible ice and water presence and movement in the area.

- 1) If one assumes that the glacio-fluvial deposits were laid down subsequent to the lacustrine deposits, then these lake sediments represent the oldest surficial material in the area.
- 2) The kame and esker occurrences represent a more recent deposit.
- 3) The youngest deposits would be the tills and the erratics.

The lacustrine clays must have been laid down during the existence of Lake Agassiz II. This version of Lake Agassiz was



A wide grassy meadow separates Fairy Creek and the Echinamish immediately above their juncture. This meadow has possibly emerged from a shallow lake.

thought to have been impounded against the retreating ice fronts in the northeast. The last southward assault of the ice had been a combined movement of the Keewatin ice from the north and the Patrician ice from the east. Combining in the Nelson - Churchill Trough, they moved southward together as far as the present state of Wisconsin. As the ice retreated back into the trough it again separated into two or more ice sheets. The Keewatin sheet retreated rapidly northward, allowing drainage of Lake Agassiz in

that direction. Meanwhile the eastern front stabilized. This stabilization occurred when the front lay astride the Echimamish in the vicinity of Painted Stone. The water of Lake Agassiz II lay to some depth upon the land, for as was stated earlier, stratified deposits are found some 30 feet higher than the present day level of the upper Echimamish. Thicker deposits in the vicinity of the western mouth of the Echimamish indicate the submergence of that area for a greater period of time and under a greater depth perhaps than experienced in the central part of the basin.

After some time a minor re-advance must have occurred, which, as it travelled over the lacustrine sediments served to fold them. As the ice began to decay, the esker would be laid down by an intraglacial river. Likewise the kame deposits would be released.

On the eventual and final retreat of this ice, the layer of till and the erratics, both of which occur rather sporadically, were left behind. The fact that except for the folds the lacustrine deposits are otherwise undisturbed, and the fact that the till layer is relatively thin, would support the concept of a minor re-advance, an advance of smaller vertical proportions than experienced under the major Wisconsin thrust and one which did not proceed far enough to the southwest to cut off the drainage of Lake Agassiz.

### 2.3 The Development of Drainage

Investigation of the watershed of the Echimamish reveals some characteristics which are not explainable or understandable if one believes that the present pattern of drainage has persisted since the last ice retreat. Many such observations in fact, point to a complete reversal of the direction of flow in the recent past.

- 1) Tributaries draining the northern watershed enter the Echimamish from the northwest. Those draining the southern watershed enter the river from the southwest. Both are characteristic of tributaries feeding an eastward-flowing

river. Interestingly enough, the upper reaches of these feeder streams are properly oriented for a westward-flowing river (see Figure 5).

- 2) Throughout its length, the Echimamish is an underfit stream in its wide valley. In the upper reaches it fills this valley, but at control sections only a trickle of water maintains a narrow channel.
- 3) The shorelines in the upper reaches are remarkably free of sediment except where tributaries enter. They bring with them large quantities of silt which the Echimamish cannot handle.
- 4) The Painted Stone Portage and the rocks which form the flow constriction there are free of any overburden to a height of 10 or 15 feet above the water level.
- 5) The uppermost section of the eastern Echimamish, adjacent to the portage at Painted Stone, is paved with water-worn boulders of considerable size.
- 6) On an outcrop immediately east and about 10 feet above the Painted Stone Portage is a collection of rounded and water-worn boulders.
- 7) The elevation change from the headwaters to the western mouth is no more than 10 feet.

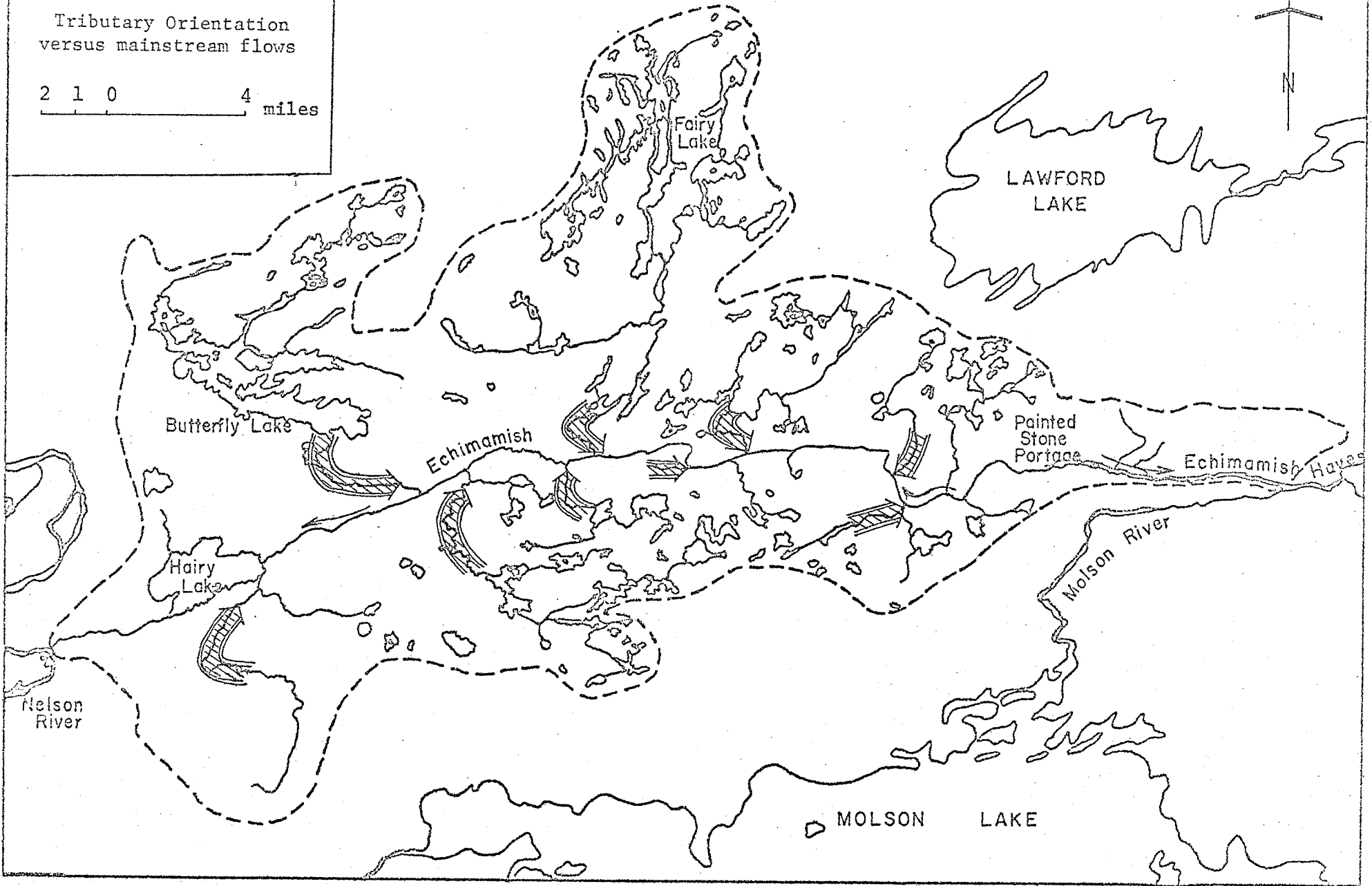
The most perplexing of the aforementioned characteristics is the direction or course of the tributaries. Tanton (1937) assumes that glacial rebound, or a slight differential in the rebound occurring along the Echimamish has resulted in the tipping of the basin towards the west. This suggestion has merit. The contributing streams would become incised in the deep lacustrine deposits and when the slope of the watershed began to change, the streams would be captured by their own former work. This suggestion does not account for the orientation of the headwaters of the tributaries. One can only make the speculation that the development of the upper drainage network took place subsequent to the tipping of the basin.



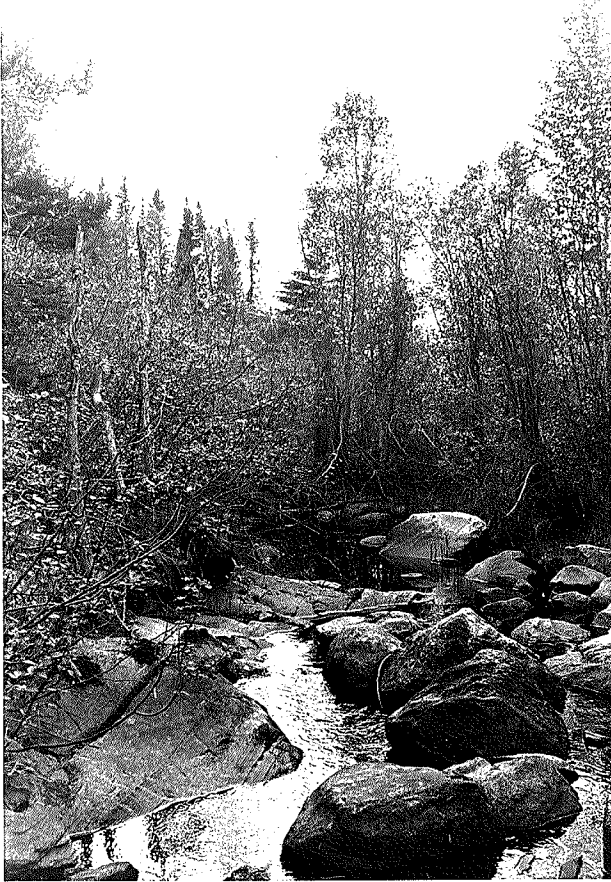
Figure 5

Tributary Orientation  
versus mainstream flows

2 1 0 4 miles



Indications are that the river carried much more water



The uppermost section of the eastern Echimamish is paved with water-worn boulders of considerable size.

at one time than it does now. The extra water could have had several sources. The channel could have been part of a peripheral drainage system which carried off some of the melt waters of the last retreating ice sheet. More likely, however, is the possibility that at a time when Lake Agassiz was larger than the present Lake Winnipeg, but when the channels of the Nelson River were carrying its outflow, the quantity and depth of water in those channels would have

been great enough to cause flow to occur eastward through the Echimamish River. One can see the likelihood of that happening when one realizes that if the level in the East Channel were to rise twenty feet today, it would be sufficient to submerge the Painted Stone Portage to a depth of at least 10 feet.

A depth of 10 to 15 feet or so would represent enough flow to maintain the channel in a relatively sediment-free state. This flow would account for the lack of overburden in the vicinity of the portage, which would have been a constriction, an area of

high velocities, a rapids or falls. Such a flow would also explain the boulder-paving of the eastern Echimamish and the occurrence of the water-worn boulders on the ledge above the eastern Echimamish. As the flow dropped off, the sediment contribution of the tributaries could no longer be handled by the current and it began to accumulate. These accumulations now are the basis for extensive marsh areas found at the mouths of the tributaries.

#### 2.4 A Summary of Glaciation and Drainage Development in the Watershed of the Echimamish.

- 1) Early Keewatin advances reduced the land by the process of erosion and left behind unknown and unobservable (from surface investigation) deposits.
- 2) A combined re-advance of the Keewatin and Patrician ice sheets scoured the Echimamish again. Upon retreat, the melt waters were ponded against the ice front and the clays of Lake Agassiz were deposited.
- 3) A minor re-advance left a legacy of kames, an esker, and a thin layer of till.
- 4) With the elevation of the western end of the basin exceeding that of the eastern end, an act of stream piracy occurred. The Echimamish stole a portion of the Nelson flow and re-routed it eastward. The main drainage channels were etched into the overburden - the northern tributaries flowing southeast and the southern tributaries flowing northeast.
- 5) Differential rebound occurred and the eastern end of the basin rose somewhat more than the west. The Echimamish, instead of being a pirate of the Nelson became chiefly a tributary of it, with less significant flows being contributed to the Hayes drainage basin.
- 6) The upper reaches of the tributaries then developed their drainage pattern and today's Echimamish mosaic was completed.

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### 3.0 The Contemporary Echimamish

#### 3.1 The Climate

The Echimamish area is under the influence of the weather borne by the prevailing westerlies. Local winds also aid in shaping the weather. Another influence on the weather results from a persistent low pressure vortex located to the northeast of Hudson Bay over Baffin Island. Although particularly prevalent in winter, the northwest winds caused by the counter-clockwise flow around that low, may be experienced at any time of year.

Climatic data are available for Norway House (Scoggan 1950), and although it is not contemporary, it is better for comparison purposes than the up-to-date data for the towns of The Pas or Churchill.

A comparison of data, up to 1950, for Norway House, Churchill, and Winnipeg follows in Tables 1 and 2. A climograph for Norway House is portrayed in Figure 6.

Table 1

Monthly and Annual Averages  
of Daily Mean Temperature (Fahr.)

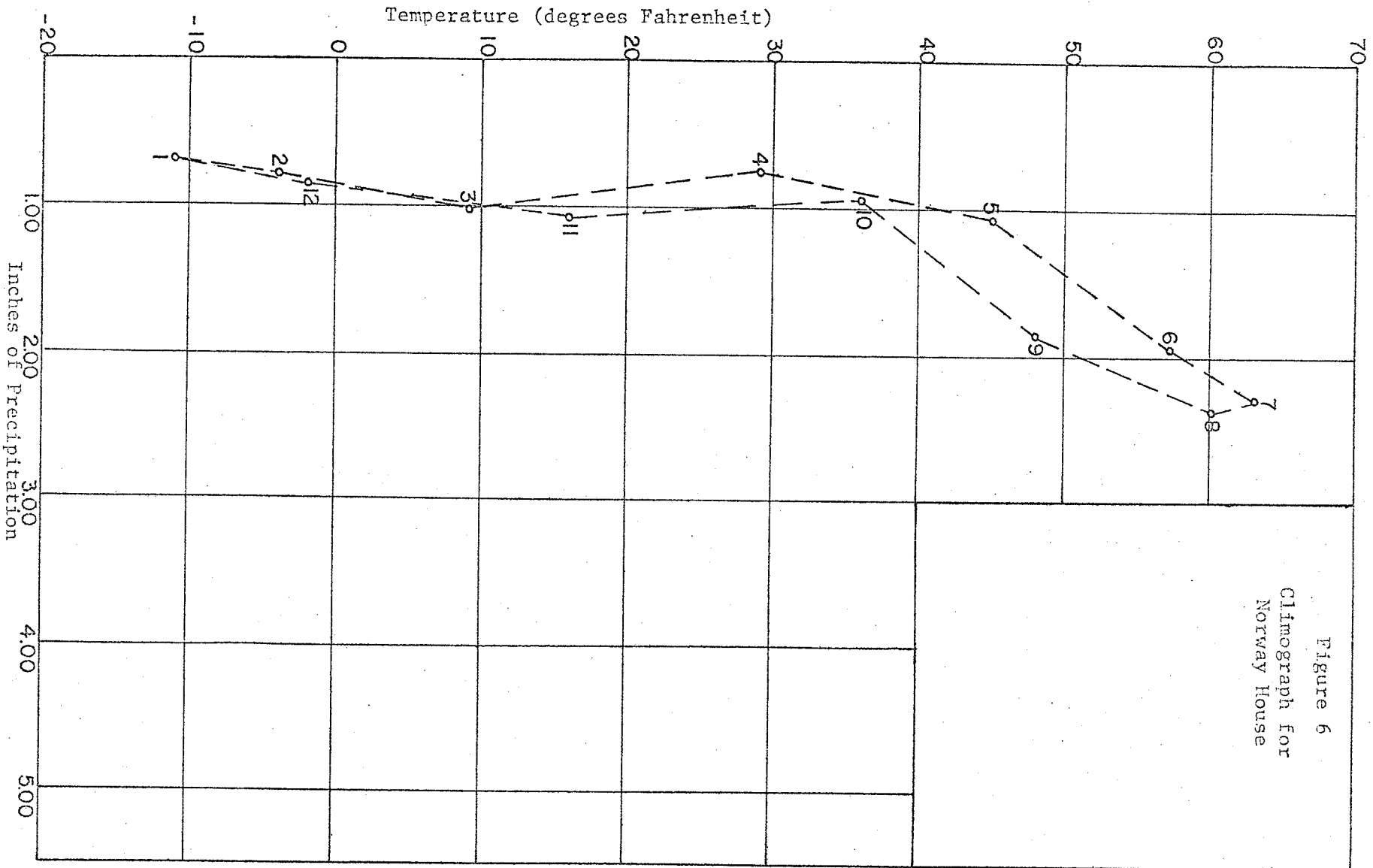
	Norway House	Churchill	Winnipeg
Years of data	40	30	66
January	-11	-19	- 3
February	- 4	-17	2
March	9	- 6	16
April	29	14	38
May	45	30	52
June	57	43	62
July	63	54	67
August	60	52	64
September	48	42	54
October	36	27	41
November	16	6	22
December	- 2	-11	6
Annual Average	29	18	35

Table 2

Average Monthly and Annual  
Precipitation (inches)

	Norway House	Churchill	Winnipeg
Years of data	40	30	66
January	0.69	0.48	0.92
February	0.78	0.61	0.86
March	1.01	0.87	1.19
April	0.74	0.89	1.37
May	1.08	0.93	2.26
June	1.93	1.85	3.15
July	2.29	2.19	3.08
August	2.38	2.69	2.45
September	1.85	2.33	2.35
October	0.93	1.43	1.49
November	1.07	1.03	1.12
December	0.83	0.66	0.95
Annual Average	15.58	15.96	21.19





### 3.2 The Hydrology

#### 3.2.1 Drainage Areas

The Echimamish drains a relatively small basin. The total area of the watershed is about 388 square miles and has been subdivided as shown in the accompanying map, Figure 7. Their respective areas are listed below in Table 3.

Table 3

#### Drainage Areas

Eastern basin (including direct run-off)	22.7	square	miles
Central basin	8.0	"	"
Southeast basin	29.5	"	"
Northeast basin	51.2	"	"
Fairy Creek basin	77.7	"	"
Northwest basin	86.9	"	"
Southern basin	102.5	"	"
Direct run-off on western Echimamish and Hairy Lake	9.5	"	"
Total Area	388.0	"	"

#### 3.2.2 Discharges and Basin Yields

Flow measurements and estimations were made at several places along Echimamish. However, the deepness of the channel and the extremely low velocities made it impossible to measure in its lower reaches. The area was moderately dry at the time with no appreciable precipitation for at least two weeks prior to the period of investigation.

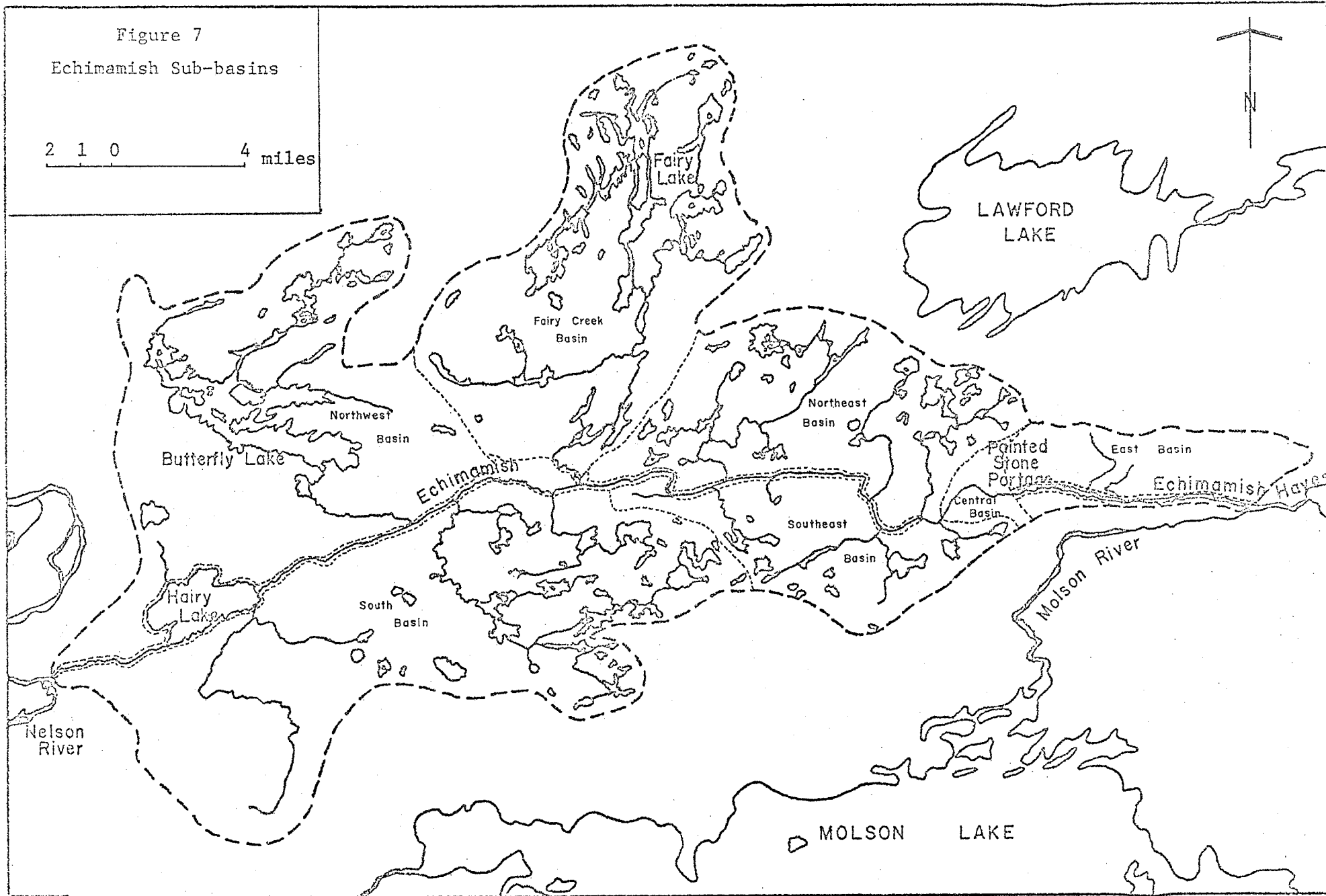
#### The Headwater Pond

The eastern Echimamish forms a small rapid immediately below the headwater pond. This offers good conditions for measuring the water velocity. A volume

Figure 7

Echimamish Sub-basins

2 1 0 4 miles



of 0.3 cubic feet per second was computed from data obtained here.

The western Echimamish, by virtue of its large cross-section-of-flow to volume-of-flow ratio, was impossible to measure. The flow immediately downstream of the headwater pond was estimated to be about 0.5 cfs.

#### The Western Echimamish and its Tributaries

The Echimamish was metered at the second dam, four miles above the junction with Fairy Creek. Here the constriction was small enough to provide a measureable velocity of flow. The measurements yielded a flow of 23 cfs.

Fairy Creek, as the largest tributary of the Echimamish was also metered. Fairy Creek yielded a flow of 39 cfs. to the Echimamish.



From a position on the combined flow of the two streams, one sees the flow of Fairy Creek entering from the left and that of the western Echimamish from the right.

The following table compares the yields of the measured basins. It must be borne in mind that these data are derived from only one instantaneous measurement at

each location.

Table 4

Basin Yields

Watershed	Flow (cfs.)	Area (sq.mi.)	Yield (cfs./sq.mi.)
Central	0.5 & <u>0.3</u> 0.8	8.0	0.10
Upstream of dam no. 3	23	51.2 & 29.5 & <u>5.0</u> 85.7	0.27
Fairy Creek	39	77.7	0.50

At first it may be rather striking that such a wide range of values would be noted in such a small basin. The basin yield though, depends on many things. It depends firstly, on the characteristics of the surface mantle, the active rooting zone of vegetation. Its infiltration characteristics determine the extent to which rainfall may be received for storage and transmission. The surface mantle is also the area subject to storage depletion by evapotranspiration. Subsurface materials, or those unconsolidated materials underlying the surface mantle, hold importance also. Their water transmission properties, derived mainly from their texture, structure, and density, indicate their potential to affect streamflows. Also demanding consideration in such basin studies is the comparative ratio of surface water storage to ground water

storage. No such information is available and in addition the data on streamflows run the risk of being unrepresentative.

A few suggestions may be made by way of explanation of the yield discrepancies found within the basin of the Echimamish.

- 1) In the central basin all the water is collected in a pond about four miles long and 200 yards wide. This pond is not deep and the water in it can become quite warm. The water surface is also easily disturbed by winds from any direction. It would seem reasonable to assume that evaporation would play a larger part in reducing outflows in this basin than in other basins.
- 2) An esker and a kame are found in the Fairy Creek basin. Their presence may belie deposits of other granular materials. Granular materials contribute to high dry-period basin yields due to their large permeabilities. A basin with sand and gravel subsurface materials only, would yield from 0.50 to 0.75 cfs./ sq.mi. while a basin with a glacial till overburden could be expected to yield approximately 0.30 cfs./ sq.mi. (Gray 1970). The Fairy Creek basin is not entirely underlain by granular materials, so possibly the value of 0.50 cfs./ sq.mi. as computed in Table 4 is acceptable for this basin. Lacustrine clay is characteristic of parts of the basin upstream of Dam No. 3, and it has a smaller hydraulic conductivity than glacial till. This would account for the yield of that basin being somewhat less than 0.30 cfs./ sq.mi.

- 3) Since the slope of the land and the amount of overburden present are significant factors in predicting dry-period yields, it is interesting to note that much of the bedrock adjacent to the headwater pond in the central basin, has been washed fairly clean of sediment and that the slope is relatively steep. Both of these characteristics favour an immediate response to rainfall events with little or no dry-period contributions. In other words, a low yield at the time of measurement could be expected. The fact that there was a yield at all would then be due to the storage properties of the flat, marshy, more remote parts of the basin and the headwater pond.
- 4) There is a strong possibility that precipitation events experienced in the weeks prior to the investigation were unequal from one part of the basin to another.
- 5) The Echimamish area is very flat. Groundwater flow regimes have not been identified and interchanges between basins may exist. In other words, the drainage basins may not be precisely defined and boundaries may shift depending on water table elevation. In any case, this would contribute in only a minor way to the yield discrepancies.

Is it possible to extrapolate the measurements and hence arrive at a figure representative of the flow at the eastern and western mouths of the Echimamish? In order to achieve this, a characteristic basin yield must be established for the unmeasured basins. These will be dealt with one by one.

The Northwest basin in part resembles the Northeast and Southwest basins in that in all three, the bedrock lies close to the surface and the outcrops are

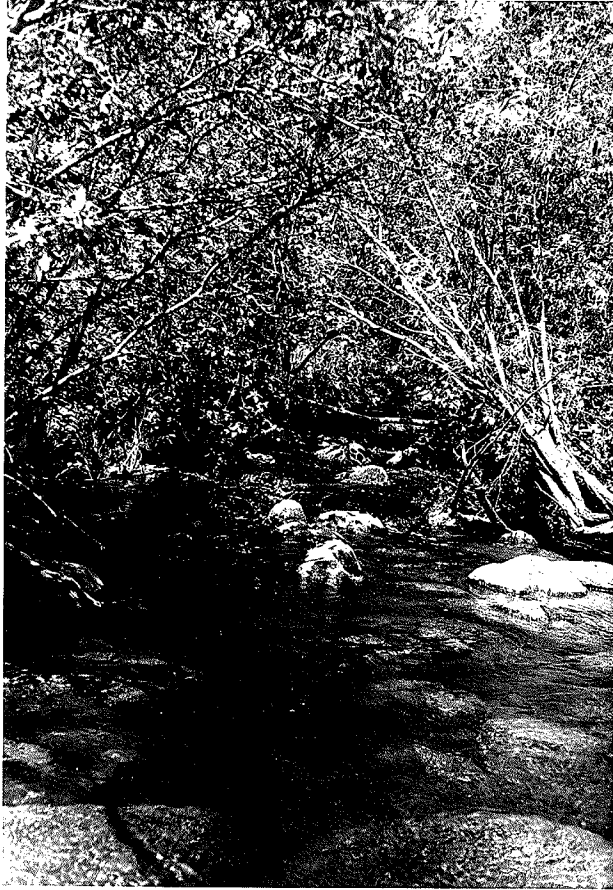
frequent. On the other hand, the western part of the basin is almost entirely overlain by lacustrine silts and clays. The granular deposits noted in the Fairy Creek basin are lacking in the Northwest basin. The surface mantle is frequently comprised of organic material which has great qualities of water storage. It would seem that a basin yield would have to lie substantially below that for Fairy Creek yet significantly above that registered for the Central basin. An estimate of 0.30 cfs./ sq.mi. will be employed for the calculations.

The Southern basin will be treated identically to the Northwest and a value of 0.30 cfs./ sq.mi. will be assigned.

The Eastern basin is a different situation. The valley walls are comprised of bedrock, unmasked by any surficial material. On the south side of the channel, virtually 100 percent of the contributed flow would make its way to the channel via the mechanism of direct runoff. Very little surface or groundwater storage is available. Dry-weather flow must come from the northern parts of the watershed. A granular deposit in the form of a kame covers part of the northern section. It is thought that the basin would yield somewhat more water than the Central basin, but slightly less than noted in the remainder of the watershed of the Echimamish. A value of 0.25 cfs./ sq.mi. will be used for computations on the Eastern basin.

Computations for the estimation of the total flow in the western Echimamish in June of 1974 follow. In this instance the areas of direct run-off were thought not to contribute and have been ignored in the calculations.





This is the major tributary to the eastward flow of the Echimamish. It approaches from the north and enters the channel at the base of the kame.

Table 5

Total Flow in the  
Western Echimamish

Flow measured at Dam No. 3	23 cfs.
Contributed by Fairy Creek	39 "
Contributed by the North- west basin @ 0.30 cfs./ sq.mi.	26 "
Contributed by the Southern basin @ 0.30 cfs./ sq.mi.	31 "
Approximate total flow	119 cfs.

which corresponds to areas of;

Upstream of Dam No. 3	85.7 sq.mi.
Fairy Creek basin	77.7 " "
Northwest basin	86.9 " "
Southern basin	102.5 " "
Total area	352.8 sq. mi.

the average basin yield for  
the western Echimamish is  
then

0.34 cfs./ sq.mi.

The flow in the eastern Echimamish is much smaller.

Table 6

Total Flow in the  
Eastern Echimamish

Flow emanating from the Central basin	0.3 cfs.
Contributed by the Eastern basin @ 0.25 cfs./ sq.mi.	5.7 "
Approximate total flow	6.0 cfs.

which corresponds to areas of;

Central basin	3.0 sq. mi.
Eastern basin	22.7 " "
Total area	25.7 sq. mi.

the average basin yield for the eastern Echimamish is then 0.23 cfs./ sq.mi.

### 3.3 Shoreline Characteristics of the Echimamish

A watershed of such small overall dimensions and found entirely within one physiographic region would rarely be thought to embrace such a variety of visual experiences. The Echimamish then, is identified as rare in this regard. In the following discussion the Echimamish is subdivided into several reaches, each embodying certain identifying features. Characteristics employed in differentiating one reach from another



The eastern mouth of the Echimamish: A small rocky hill, visible in the centre of the picture, marks the confluence of the Molson River to the left, and the Echimamish approaching from the right rear of the photograph. The flow from here on unites as the Hayes River.

include;

- 1) Amount of bedrock control on the shoreline
- 2) The slope of the shoreline
- 3) The shoreline vegetation
- 4) The channel configuration
- 5) The channel cross-section
- 6) The aspect or visual qualities

Figure 8 defines the extent of the characteristic reaches.

### 3.3.1 Reach 1

Reach 1 stretches from the mouth of the western Echimamish to a point about 4 miles downstream of the mouth of Fairy Creek. This distance is approximately 11 miles. Although Hairy Lake is found within this section, a description of the lake has been prepared separately and follows the description of Reach 1.

The river channel in Reach 1 is almost rectangular in cross-section. The depth almost everywhere, even adjacent to the low banks, exceeds 12 feet. The channel averages about 80 feet in width. The river bottom, and presumably the lower portions of the banks are of clay. Infrequently, bedrock outcrops along the way. The visible upper portions of the banks are comprised of organic materials and clays. In plan view, the river is best described as being sinuous.

Nowhere in Reach 1 is the velocity of the water discernable. This entire stretch of river is under the influence of backwater from the Nelson River. Though not at record levels, the water was high on the Nelson in June 1974, and this situation was reflected in increased depths in the Echimamish channel and in Hairy Lake. September 1973 levels were exceeded by about 3 feet in June 1974. This rise can be attributed entirely to the backwater effects of a swollen Nelson River.

The flow in the Echimamish is great enough, however, to

prevent the invasion of the muddy waters of the Nelson River. The



The western mouth of the Echimamish as seen from the waters of the East Channel Nelson River. The banks are low and outcrops infrequent.

dark water of "Blackwater Creek" is dominant and an incredible contrast is noted between Nelson and Echimamish flows at the mouth of the latter. This blackness of the water is maintained throughout this reach and is due to a peculiar combination of humic acids and various suspended sediments. All tributary creeks tend to be a source of this "black" water except for the stream emanating from Butterfly Lake. The large quantities of silt held captive by this creek are likely obtained by wave-inspired erosion of the shores of Butterfly Lake.

The channel slips snake-like through a broad valley which varies in width from one-half mile, at the upper end, to one and one-half miles near the mouth. The maximum relief is 75 feet. The valley floor is flat, even where not occupied by the river, and lies at very nearly the same elevation as the water. The clay

channel-bottom indicates that the bedrock valley section has been infilled with sediments which are probably quite deep in places. The consistent elevation of the "flood plain" and its closeness to the water-surface elevation could imply a gradual vegetational encroachment from the valley walls.

A typical sequence of vegetation would begin at the river with a very narrow band where pondweed could root. A second zone, only a foot or two wide, supports a sparse growth of bulrushes. This in turn fronts a broader zone of sedge. Willows dominate a band 20 or 30 feet in width but are accompanied by a few alder. The willows and alders are continuous into the backshore and form a sparse understory for a forest dominated by black spruce. The black spruce dominance may locally be rivalled by balsam poplar or tamarack. Also present are white birch and trembling aspen. On the slopes and on outcrops, jackpine or trembling aspen will dominate. Whereas the forest will normally remain some distance back from the water, it does sometimes approach the river edge where outcrops and the attendant better drainage allow.

### 3.3.2 Hairy Lake

The river channel in Reach 2 meanders through what appears to be an old lake bed. In Hairy Lake is seen the ancestral form of Reach 2. Hairy Lake is a shallow widening of the river. It is about 2.5 miles in length and 1.5 miles in width. Its depth is very much dependent on water levels in the East Channel of the Nelson River. During June of 1974, a particularly wet year, the lake in its central portion varied in depth from 8 - 10 feet. A 1943 reference to the lake indicated that in that dry year it was little more than 2 feet deep. During low or medium stages, the entire lake bottom supports a dense growth of bulrushes which rise 3 - 4 feet above the water. The appearance given the lake by these plants explains its naming. The lake seems destined to fill up with sediment and become a broad, boggy area which will then proceed through the normal

bog successional stages. That is some time off, however. Fully 50 percent of the shoreline is bedrock now, and little sediment has accumulated along these sections. Sediment is injected by three major sources of inflow and it is in these and surrounding areas that significant vegetational encroachments can be observed. An adequate survey of the shoreline was not made. However, the dominant upland vegetation consists of a closed black spruce forest. To the south, the area has been burned to the waters edge and here the hillsides have been reclaimed by a young forest of trembling aspen or jackpine.

### 3.3.3 Reach 2

Reach 2 includes the channel from the upper end of Reach 1, four miles upstream, to the confluence of the Echimamish and Fairy Creek.

The river channel here maintains its rectangular cross-section. The depth is still for the most part, greater than 12 feet, although the width is reduced by about half its former value to 40 feet. The banks have emerged noticeably here and extend 2 - 3 feet above the water. They take the form of levees. Behind the levees is a sedge and willow bog, elevated very little above the water in the channel. Outcrops are virtually non-existent in this reach. The river now takes a meandering course, the bends being much more frequent and abrupt than in Reach 1.

As in Reach 1, the velocities are undiscernable. The river is still stifled by the backwater of the Nelson.

The dark appearance of the water is maintained throughout this stretch. Much of the colour seems to be due to the depth of the channel though, for immediately upstream of the junction of the Echimamish and Fairy Creek, both streams, being now shallower, have a lighter appearance. The several tributaries entering this section bring the same dark-coloured bog run-off to the Echimamish.

The valley through which the river meanders, maintains



its former broad cross-section through Reach 2. The valley walls are invisible from the water surface but remain about 2000 feet distant on either side. The depth of the valley is about 50 feet.

The condition of this reach suggests that, once a long narrow lake, it has been encroached upon, first by sedge and then by small shrubs until only the small channel remained in an open-water state.

A narrow zone of pondweed, bulrushes and sedge separates the open water from a 20 or 30-foot wide band of willows and alders. Behind this the land drops off again and a mat of sedge and willows carries through to the base of the valley wall. On the slopes are found the trembling aspen and jackpine. These two species grade back into a closed coniferous forest dominated by black spruce.



This shoreline vegetation is typical of segments of Reaches 1 and 2. Sedge and willow frame the water surface and are backed by black spruce, balsam poplar and some tamarack.

#### 3.3.4 Reach 3

Reach 3 extends upstream from Fairy Creek a distance of about 4 miles to Dam No. 3.

The dimensions of the river are substantially reduced from those of Reach 2. The channel is frequently no more than 5 feet deep and is always less than 30 feet broad. The shorelines are here formed exclusively by floating sedge mats. The channel form is nearly straight, perhaps slightly sinuous. Bedrock occasionally outcrops on the shoreline.

Although the water itself can barely be seen to be moving, the westward bent of the various aquatic flora reveals the presence of a subtle current. The mild slope seems to be constant. The effect of high water on the Nelson River is not totally lost even here.

The water in Reach 3 is of a clarity that allows one to discern bottom vegetation through depths of about 5 feet. There are no sizeable tributaries in this section of the river.

The valley is considerably narrower, with the bedrock walls being nowhere further removed from the water than a scant 500 feet. The depth of the valley is 50 - 60 feet. Although the valley has a floor of sediment overlying the basement rock, the process responsible for its present aspect is the encroachments on the water by sedge mats on each side.

The vegetation begins at the shoreline with various aquatic flora giving way to a dense growth of sedge. The sedge mat extends back from the water for up to 100 feet, until the slope leading to the valley walls is reached. Where the slope is gradual, balsam poplar, trembling aspen and black spruce will populate it. On steep outcrops jackpine dominates. The uplands are densely

forested with black spruce except where burns have occurred.

Here dominance is shared by jack-pine and trembling aspen. Burn areas are prevalent at the upper end of this reach.



This is the broad, straight valley of Reach 3. The sedge mats are very apparent on each side of the water.

#### 3.3.5 Reach 4

Reach 4 stretches from Dam No. 3 to a point just upstream of Dam No. 2. This is a length of approximately 5 miles.

The Echimanish flows through a more irregular channel in this reach. The width varies from 20 to 40 feet and the depth from 3 to 10 feet. A section of it is sinuous as in the third reach while a central section

meanders as in the second reach. The river for a distance of nearly a mile at its lower end, cuts across the structural lineations of the country rock, but then follows them for the remainder of the distance. Outcrops, though never continuous, are much more frequent in this stretch than on any of the previous three.

The current is again indicated by the leaning of

the submerged

grasses. The water

velocity is not

really apparent

except where ob-

structions such as

Dams 2 and 3 and a

couple of beaver

dams actually con-

strict the flow.

The drop in level

across these ob-

structions is no

more than a couple

of inches, except

at Dam No. 2 which

holds back nearly

2 feet of water.

No longer is the

effect of the

Nelson's high

water felt.



The central section of Reach 4. As Sir John Franklin stated, "the stream has its course through a morass."

Below Pine Creek the water quality is consistent with that of the lower reaches. Pine Creek though, appears

to be a major source of the dark-coloured humic acids, for the water in Echimamish above Pine Creek is exceedingly clear.

The valley aspect of the Echimamish is essentially lost in this reach. For a mile on each end of the reach, low bedrock ridges approach the water's edge with there being no sign of valley walls in the backshore. The bedrock is schist or conglomerate. The central three miles leaves one with a feeling of openness as experienced on the second reach. A rock ridge parallels the channel at some distance to the south (central section), but a vast area of bog separates the channel from any outcrops to the north.



One of the occasional outcrops found in Reach 4. Jackpine and black spruce forest approach the water's edge from the right, while sedge and willow encroach from the north side.

Outcrop vegetation approaches the river in the upper and lower one-mile sections. This forest is neither

dense nor tall but may include such species as jackpine, black spruce and trembling aspen. In between the bedrock outcrops, a sequence of sedge, willow and alder through to balsam poplar and black spruce occurs. Along the central section, the vegetation consists of a broad zone of willow that may or may not be fronted by a sedge mat. The willows are backed by bog vegetation - sedge, willow, black spruce and tamarack.

### 3.3.6 Reach 5

This stretch of the river has its lower end above Dam No. 2, and its upper end at the Painted Stone Portage. The intervening distance is roughly 10 miles.

The channel here is comprised of a series of long, narrow lakes joined by small streams. There are five lake-like expanses, and each of them is approximately 200 yards wide. The lengths vary between half-a-mile and 4 miles. A common depth is 5 - 6 feet, with the maximum being 12 feet in the middle, and the minimum towards the ends, being 2 - 3 feet. The river sections are normally about 10 feet wide although that dimension may approach 20 feet. The depths in these channels varies from a few inches to 6 feet. The lakes nearly fill their bedrock troughs. Where the lakes have an east - west orientation, bedrock forms the southern shoreline while a sedge mat guards the clay banks on the north shore. Bedrock occasionally arises out of the north shore but it is most frequently removed from the water by a few yards. Where the channel trends north - south, outcrops will occur equally frequently on both sides. These outcrops will be alternated with sedge and willow-vegetated clay shorelines.

The velocity of the water in the lake sections is virtually zero. In the river sections, the velocity may

vary from the mundane where the drop is controlled by a well-placed beaver dam, to very rapid where the water flows freely from one pond to another. Flow occurs in both directions from the headwater pond. This pond is dealt with more fully elsewhere (Appendix C).

The water is fairly clear, although some dissolved organic materials do give it a slight brownish colour. These organic materials could be traced, for the most part, to the local tributaries which have their sources in bogs and fens.

The valley is slightly wider than the lakes themselves, but never exceeds a quarter mile in that dimension. On east - west trending sections the slope is markedly steeper on the south side than on the north side. The maximum relief on these sections would be 70 to 80 feet, but the average would be somewhat less than 50 feet. On north - south trending sections the relief decreases to a maximum of 50 feet and an average substantially below that. On these stretches the valley is less well defined. The proportion of country rock visible on the shoreline tends generally, to decrease in the easterly direction.

Two different shoreline conditions exist then; those with bedrock present on the foreshore and those without. In the prior case the vegetation begins with black spruce and jackpine in a sparse stand becoming denser towards the top of the slope. Alder forms a sparse understory. On the uplands, black spruce is dominant. The clay shorelines, on the other hand, begin with a floating mat of sedge. On the actual mineral shoreline, willows have taken root. Immediately behind this are stands of tall balsam poplar, trembling aspen and paper birch. This then grades into a closed coniferous forest

dominated by black spruce. In Reach 5 the river channel sections occur where contributing streams have been able to release their sediment load. This sediment accumulation has provided a satisfactory niche for the establishment of various marsh grasses and sedges. Behind this vegetation, one of the previously mentioned backshore conditions would apply.



Shoreline vegetation along the headwater pond near the Painted Stone Portage.

### 3.3.7 Reach 6

Reach 6 includes the entire eastern flow of the Echimamish, from the Painted Stone Portage to its confluence with the Molson River. This is a distance of about 7 miles.

At its upper end, the eastern Echimamish flows along 200 feet of bouldery channel dropping 2.6 feet in the interim. It drops into a broad, rock-bound trough that from thence downstream, is continuous. The trough



is many times larger than what is required by the minute flow and therefore takes on the appearance and the characteristics of a lake. The depth is frequently greater than could be measured with a 12-foot surveyors' rod. Shorelines are predominantly bedrock with small bays that have overburden and organic shorelines.

The velocity is apparent only in that uppermost 200 feet of stream channel.



From the north-facing shore of the eastern Echimamish, or Reach 6. The far bank is more than a quarter mile distant.

The water may be slightly more opaque than on the western side of Painted Stone, but this appears to be due mainly to the presence of countless numbers of zooplankton and algae.

The lake fills its bedrock container and is in some places a quarter mile wide. The relief is more exciting than on any other reach. The most dramatic examples are reserved for the south shore. However, differences between the two sides are not as marked as

on the western Echimamish. Slopes vary from the near

vertical to the very mild.

Vegetation must again be considered as occurring in two separate sequences. What is common to all sequences



This photo is taken from the eastern extremity of the Painted Stone peninsula. The eastern Echimamish enters from the right of the photo.

is the black spruce-dominated upland. Small, pure stands of jackpine replace the spruce occasionally. The uplands are reached either directly via a bedrock slope or more indirectly by a zone of poorly-drained ground and thence to the bedrock outcrop. The slopes are relatively free of

overburden and offer little opportunity for trees to root. The trees that survive best on the rock are the jackpine and the black spruce. The very sparse understory is made up primarily of alder. The pine relinquishes its position at the top of the slope where there is enough soil to allow the growth of paper birch, white spruce and trembling aspen. This mixed zone then grades into the coniferous upland forest. Where unconsolidated sediments overlie the bedrock on the shorelines, the offshore zone will



Bedrock shorelines highlight this narrow section of the eastern Echimamish, about 3 miles east of the Painted Stone Portage.

be populated with a sedge growth of varying density. This will give way on the shoreline itself to willow. The band of willow continues back into a deciduous forest consisting primarily of balsam poplar. Alder join the willow in the understory. Particularly poorly-drained areas will not support even balsam poplar but will instead be identified by the presence of black spruce and tamarack growing on a

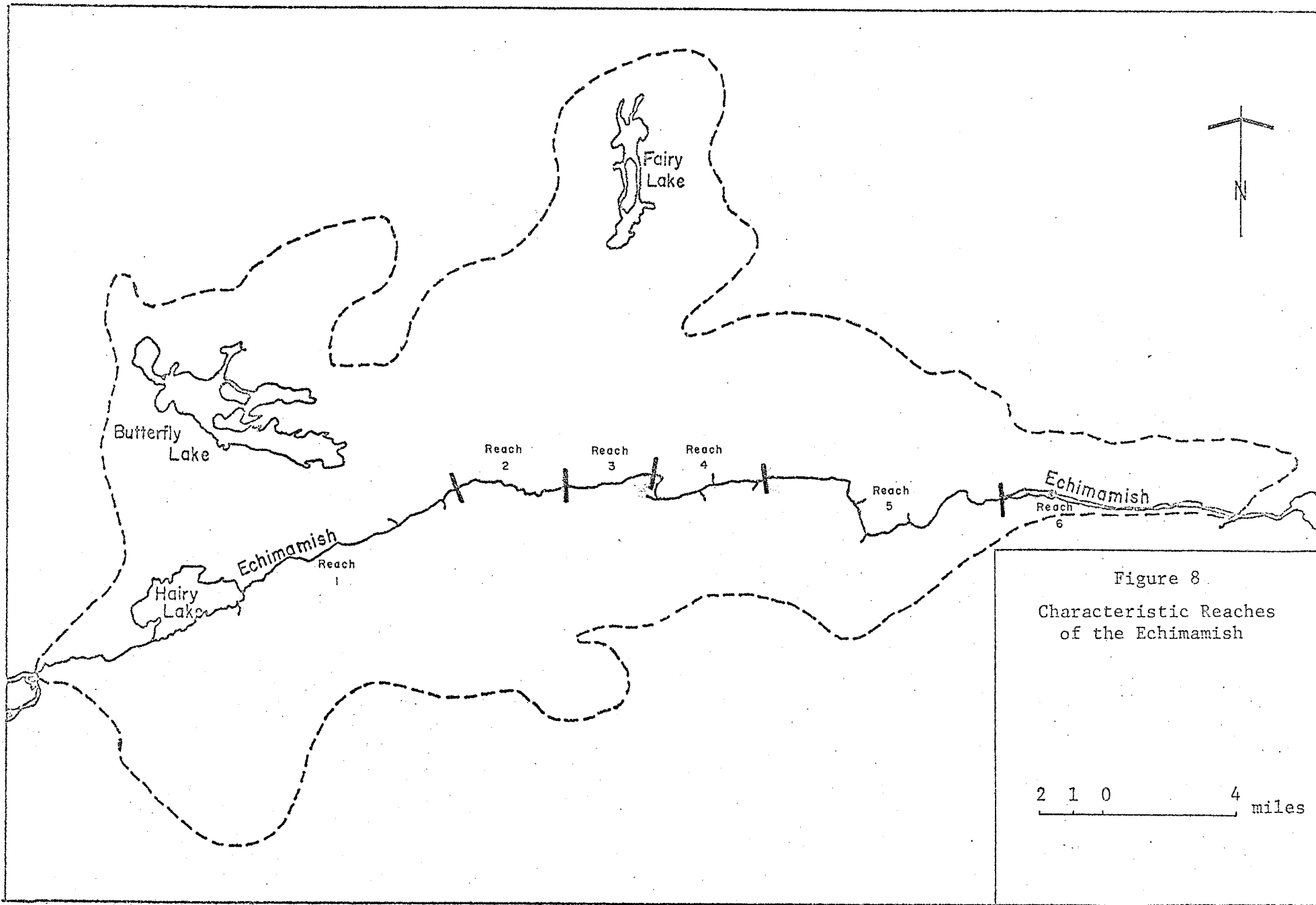


Figure 8  
Characteristic Reaches  
of the Echimamish

2 1 0 4 miles

spongy floor of sphagnum. Continuing on to the base of the slope, balsam poplar, trembling aspen, and occasionally paper birch can be found. The slope itself repeats the former sequence of jackpine, etc., through to the black spruce forest.

### 3.4 Summary

"Every river appears to consist of a main trunk, fed from a variety of branches, each running in a valley proportioned to its size, and all of them together forming a system of valleys, communicating with one another, and having such a nice adjustment of their declivities, that none of them join the principal valley, either on too high or too low a level; a circumstance which would be infinitely improbable if each of these valleys were not the work of the stream that flows in it."

So said John Playfair in his "Illustrations of Huttonian Theory" published in 1802.

My first contact with the Echimamish was along the central channel. My initial reaction was that the Echimamish did not follow the above statement by Playfair. It could not have been the result of normal erosional processes for the main channel is far larger than that demanded by the associated flow. As my familiarity with the basin grew, I became convinced that while the central channel was an anomaly with glacial origins, the basin as a whole showed characteristics of being a "typical" erosional basin.

In referring to Playfair's 1802 statement, Bloom (1969) says:

".....We can recognize that Playfair's statement is not the rigorous proof of a natural law, but only an observation of a highly probable condition. If valleys did not evolve by the work of the streams that flow in them, then the 'nice adjustment of their declivities' would be a highly improbable state.....", etc.

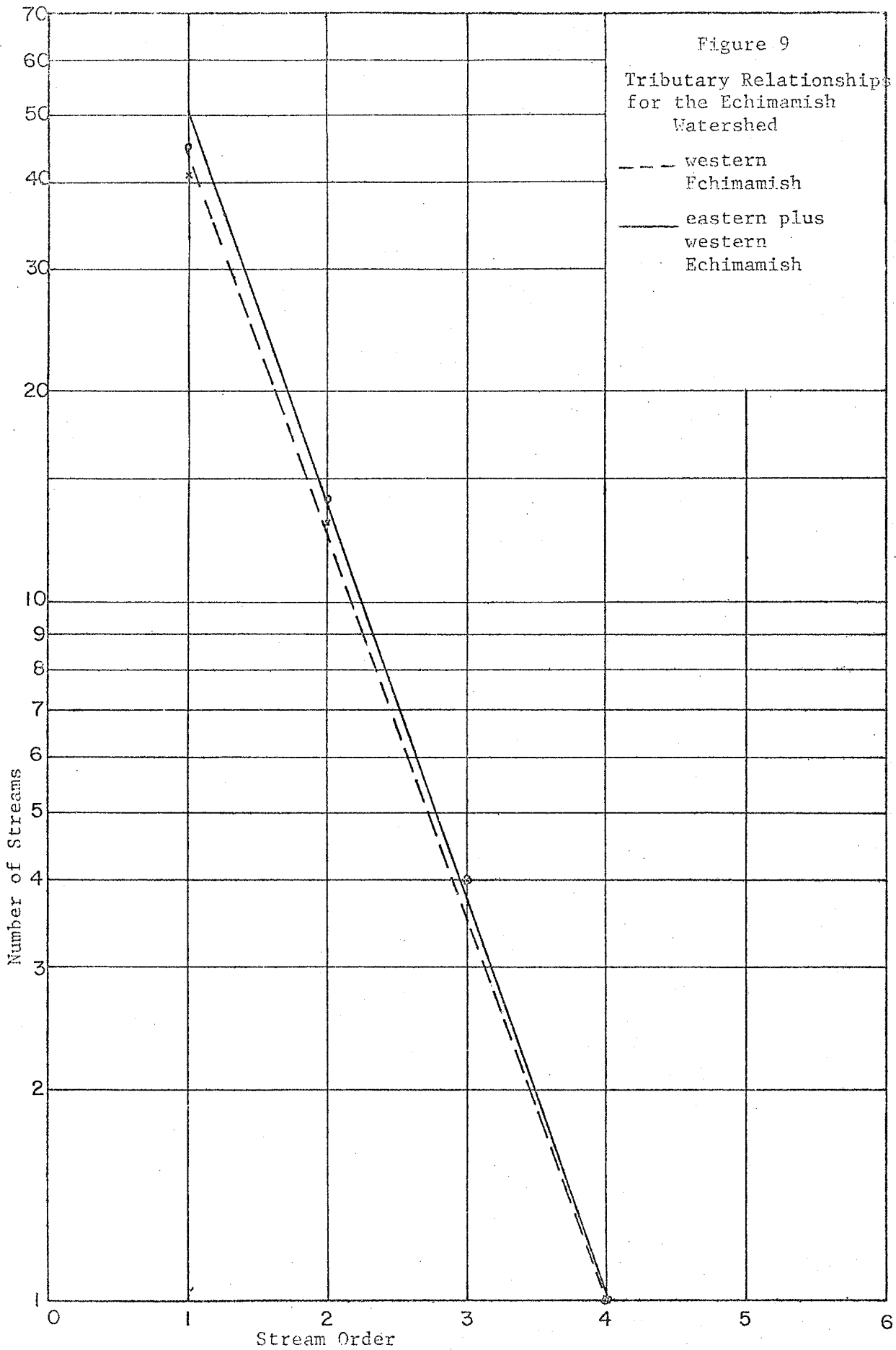
Bloom thus equates certain characteristics of erosional basins with high probability. Leopold and Langbein (1962) discussed Horton's work comparing stream order and number. Horton had noted that from data on actual erosional basins, there was in each case a logarithmic relationship between orders and numbers of streams.

Leopold and Langbein went on to say:

".....The essential point of these demonstrations is that the logarithmic increase, both of stream length and number of streams with order number as found in natural stream networks, accords with the geometrical properties and the probabilities involved. The logarithmic relationship is thus one of optimum probability....."

Thus a geometric relationship between stream orders and stream numbers is equated with probability in erosional basins. An assessment of stream order and number relationships in the Echimamish Basin gives the logarithmic relationship demonstrated in Figure 9. The result of the plot in Figure 9 is very much dependent on the quality of mapping or data available. In spite of the fact that the stream mapping is only available at the scale of 1:250,000, the resulting relationship is good and demonstrates adequately that the basin as a whole responds in a "most probable" manner, or as an erosional watershed would. The conviction that the basin is "typical" while the central channel alone is a glacially-produced anomaly is thus confirmed.

A summary of the Structure, Process, Time and Form relationships of the Echimamish is set down in Figure 10. The exact history of the orogenic ages is not known. However, volcanic activity and ocean floor sedimentation provided the materials. Uplift of both a



continental and a mountain-building nature followed. Heat and pressure subsequently altered some of the rocks. The mountain ranges of the precambrian suffered through millions of years of mechanical and chemical weathering, some of the products of which would be borne away by erosional processes. Glaciation began with the Pleistocene, 2 - 3 million years ago. The country rock was eroded and water-worked over several glaciation - melt sequences, the last ice age ending 8 - 10 thousand years ago. During these times the soft schistose rocks were attacked and gouges were left on the landscape. Post-glacial activity included the deposition of Lake Agassiz clays on the west of the basin. Meanwhile, a large easterly flow of water kept the upper Echimamish valley free of sediment. With the melting and removal of the burden of the glaciers began the rebound of the landscape. Differential isostasy resulted in a partial reversal of flow in the Echimamish. Flow gradually dropped off to that which could be yielded continuously by the present-day basin. Silt brought to the upper Echimamish by the tributaries was no longer borne away by the stream. Its accumulation resulted in the separation of the channel into a series of long, narrow lakes. Vegetation then consolidated this form with marshes growing on the silt accumulations. A moderate flow was maintained in a westerly direction; a small flow was yielded to the east.

Today the Echimamish basin is virtually flat. On a peneplain landform, degradation processes advance at a crawling pace. Little work remains for the erosional processes to perform. However, when small changes do occur, the results can be drastic. For example, if for some reason the level of the confluence of the Molson and eastern Echimamish should rise by only 3 feet, the Echimamish



Structure	Process	Time (B.P.)	Form
Ocean Floor	Volcanism	2.5 billion yr.	
	Sedimentation		
	Epeirogeny		Precambrian
	Orogeny		Mountain
	Metamorphosis	2.0 billion yr.	Ranges
Precambrian Mountain Ranges	Weathering*		
	Glacial erosion*	2.0 million yr.	
	Glacial deposition*		
	Post-glacial erosion*		Precambrian
	Post-glacial deposition*	8.0 thousand yr.	Penepplain
Precambrian Penepplain	Isostatic rebound		
	Weathering		
	Erosion		
	Deposition		Contemporary
	Vegetational Encroachment	0 years	Echimamish
*several sequences			

Figure 10: Process and Form Summary

would steal a portion of the upper Hayes River and divert it into the east channel of the Nelson River. Because the basin has a low tolerance for change, it is difficult to predict future forms that the Echimamish might take. This little river has surprised observers in the past and is likely to do so again in the future.

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APPENDIX "A"

### A. North American Pre-history

When Europeans first became familiar with the land lying to the south and west of Hudson Bay, they found it inhabited by three distinctive groups of peoples. To the northwest lived the Innuits. Then in a narrow geographic band immediately to the south of the Innuits were found a group of Indians called by the British, the Chipewyans. To the south and west of the Bay lay the land of the Nahathaways (English), or Kristenaux (French), soon to be known as Crees.

It is generally accepted that all these peoples along with countless other North American tribes, made their way from Asia across the Bering Strait, entered this continent through what is now Alaska, and spread out in a south-easterly direction from there. In central Manitoba the settlement of these bands followed closely the retreat of the glaciers and the subsidence of Lake Agassiz. No doubt the late Palaeo-Indian invaded this land when it had been made hospitable again by the colonizing flora and fauna. Though archaeologists have uncovered little material in the boreal forest that relates to the Palaeo-Indian Stage, it is a reasonable assumption that such people were present here 7,000 or 8,000 years ago.

Evolving out of the late Palaeo-Indian Stage was the Shield Archaic. The culture of the Archaic Stage is apparent between about 4,000 B.C. and 900 B.C. It was widespread and homogeneous. It was marked by the use of stone tools, including some projectile points.

The next distinct cultural group in evidence in the boreal forest is referred to as the Laurel tradition - a part of the Woodland Stage. Associated with the Woodland Stage is the appearance of pottery. A cultural continuity

seems to exist between the earlier Shield Archaic and the Laurel tradition, particularly in the development of Stone tools. The Laurel tradition continued in the boreal region for about 2,000 years, ending around A.D. 1,000.

New ceramic traditions marked the beginning of the Late Woodland Stage. These traditions are known as the Manitoba or Blackduck focus (A.D. 1,000 - A.D. 1,350) and the Selkirk focus (A.D. 1,150 - A.D. 1,750).

The Manitoba Focus Indians relied upon chipped and ground stone, worked bone and ceramics to fulfill their needs for tools and vessels. Projectile points indicate the use of the bow and arrow. Bone was used for barbed fish-spears, and as handles for various other stone tools such as scrapers. Ground and polished steatite tubes were probably used for smoking pipes. The ceramics were primarily cooking vessels and liquid storage containers. The environment was similar to that of today. Emphasis seems to have been placed on fishing as the major food-gathering activity. A nomadic way of life was necessary to make more efficient use of the yield of the land, particularly in winter. Summer, on the other hand, probably brought the wanderers together in macro-band groupings. Little is known of their spiritual life except that grave goods were offered to their dead. It is possible that the steatite tubes were used in a Shaman's curing procedures.

Further development of already-acquired technologies marks the Selkirk Focus culture. Along with more elaborate stone and bone work are found fabrics and nets made of babiche (leather thongs). Artistic abilities were displayed in birchbark paintings and in ceramic decoration. The environment was probably not markedly different from that of today. There is more evidence of plantstuffs being

consumed and there are more mammal remains as well as those of the former staple, fish. Food preparation included the roasting and boiling of meat. The food was stored in bell-shaped cache pits. The people maintained small winter bands and large summer congregations. The religion of the Selkirk people must have developed rapidly, for a belief in the hereafter was prevalent even in the early years of the focus. By the end of this time period, the concepts of religion and spiritualism in their way of life were very strongly entrenched.

The era of continuous contact with the whiteman began, for the Indians west of Hudson Bay, in the late 17th century. On their arrival at the estuary of the Hayes River, the English found the Muskegons, while inland were Indians that called themselves the Nahathaways. These two tribes bore the same ancestry and were lumped together by the French who called them the Kristenaux. This was shortened eventually to "Krees". As David Thompson (1971) stated, it was typically a "name which none of them can pronounce". Today, the Muskegons are known as the Swampy Crees and the Nahathaways are known as the Woodland Crees.

It is very likely that at the time of first European contact, the basin of Echimamish supported both Swampy and Woodland Cree people. The life of the people inland from the Bay was easier than the life of those who spent their days beside the Frozen Sea. The supply of game was sufficient to support a thin population in balance with its environment. Hunting was done primarily with the use of the bow and arrow, supplemented with lances and clubs. Fish constituted a considerable portion of their diet and in obtaining them hooks and lines and nets were employed. The woodland caribou would have been

a particularly important frequenter of the area, providing the residents with hides for clothing and shelter, and meat for food. Other mammals on which the Indians would have been dependent would include moose, deer, bear, rabbit or hare, and possibly muskrat and beaver since they were so easily obtained. Animal skins or bark would be used to cover the conical frames of their summer dwellings. A "permanent" winter camp might employ logs and moss to render a more weather-tight abode.

Summer transportation vehicles were mainly waterborne. The small canoes were covered with either birch or spruce bark, depending on local availability. In the winter toboggans and snowshoes were used for moving about on the soft snow.

As in the case of earlier cultures, the Crees remained together in small family groups for a winter subsistence and then in preparation for a more bountiful summer season, moved towards a rendezvous where once again the entire tribe would be reunited. The organization of the micro-bands was not particularly tight. Three or four closely-related families would comprise such a group. The macro-band was also loosely organized and would frequently be without any designated leader. The people were held together by a strong sense of allegiance and identification.

The religion of these Indians or of most any other North American culture was an intensely personal one. Every individual would associate a particular location with his religious practice - that is, a place where he would feel in closest communication with his Great Spirit. The religion was one of one god though that god was thought to have several lieutenants or messengers. Fasting was practised as a method of inducing dreams and visions which



would give strength and guidance to the individual in his worldly and spiritual affairs. The dreamer had several vehicles at his disposal for making the people aware of the importance of his visions. The visions would be publicized by a dancing ceremony, or by the dreamer transcribing the vision on a rock painting, some examples of which exist on



Looking downstream on Fairy Creek a short distance below Taylor or Birch Lake. The water is deep and quiet and tall spruce stand guard.

a tributary to the Echimamish, Fairy Creek. A belief in the hereafter was subscribed to. Those in the community thought to have the closest associations with the Great Spirit were deeply respected and their help was frequently sought in times of sickness and crisis. There were inevitably places that held deep spiritual significance for the entire tribe. Such a place would be the Painted Stone Portage. It drew its importance from the fact that the water adjacent to it flowed in not one but

in two directions. The Echimamish provided the people with an easy passage from one watershed to another, a passage

that typically could be expected to be arduous at best. The Painted Stone is dealt with more fully in Appendix C.

We are required to glean our information of the original North Americans from those Europeans who first contacted them. Our meager understanding of these people must come from their expressed beliefs and their stories. A few enlightening examples;

on their religion                      David Thompson (1971)

"The earth is a divinity, and is alive, but they cannot define what kind of life it is but say, if it was not alive it could not give and continue life to other things and to animated creatures. The forests, the ledges and hills of rock, the lakes and rivers have all something of the manito in them, especially the falls in the rivers, and those to which the fish come to spawn ...."

on Wee-sauk-e-jauk                      David Thompson (1971)

"There is an important being, with whom the natives appear better acquainted ... than the others, whom they call Wee-sauk-e-jauk ( the Flatterer ); he is the hero of all their stories, always promising them some good, or inciting them to some pleasure, and always deceiving them."

John Franklin (1970)

"The Indians ascribe the muddiness of these lakes to an adventure of one of their dieties, a mischievous fellow, a sort of Robin Puck, whom they hold in very little esteem. This diety, who is named Weesakootchaht, possesses considerable power, but makes capricious use of it and delights in tormenting the poor Indians. He is not, however, invincible, and was foiled in one of his attempts by the artifice of an old woman, who succeeded in taking him captive. She called in all the women of the tribe to aid in his punishment, and he escaped from their hands in a condition so filthy that it required all the

waters of the Great Lake to wash him clean; and ever since that period it has been entitled to the appellation of Winipeg, or Muddy Water."

The Cree people were quiet, religious, and fun-loving. They knew and understood their land and without their assistance the Europeans could not have set foot or lived in the country west of Hudson Bay. Praise was sung to them by many well-known "explorers" of the Northwest, but how quickly this was forgotten. The People were relegated to reserves and their right to make use of their lands has been steadily eroded. The dignity has gone, too. So has the religion. The people have been forgotten.

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APPENDIX "B"

B. A History of Europeans  
in the Echimamish Area

The written history of the Echimamish area is very closely tied to the discovery and subsequent use of the Hudson Bay itself.

Early explorers, in their quest for a northwest passage to the Orient, had become aware by 1509, that a strait lay westwards into a great bay which dropped into the heart of the land. This knowledge was not made use of for nearly a century. Indications are, however, that the Portuguese, probably fishermen on their annual voyage, had reached the Bay in 1570. Frobisher was aware of the strait and referred to it as the "Narrow Sea" or "Streiete of the three Brethern" (c. 1578).

The first well-documented sailing of the strait was accomplished by George Weymouth in 1602. His voyage was the first of a series which was to number seventeen, (sixteen by the British, and one by the Danish) by the end of 1631.

The first to expand on Weymouth's lead was Henry Hudson, who entered the Bay in 1610. After wintering in the "bottom of the Bay", his crew mutinied and returned to England, leaving him to die on the frigid waters of the Bay. 1612 witnessed the return of the English, this time in a ship commanded by Thomas Button. His ship entered the estuary of the Nelson River (named for a member of Button's crew who lost his life there) and then proceeded northward as far as Roe's Welcome, before returning to England. The western shore of Hudson Bay was given much attention subsequently by Bylot and Baffin in 1616, Hawkrige in 1617, and then the Danish expedition of 1619-20 led by Jens

Munck. Munck and his crew wintered in the estuary of the Churchill River where all but three of them succumbed to various maladies during the course of the winter. Munck and his two remaining companions returned alone in one of their ships.

Thomas James and Luke Foxe were the next notables to explore the Bay, embarking on separate voyages in 1631. Foxe returned to England that same year while James wintered on Charlton Island near the bottom of the Bay. Both explored the coast from the Churchill River as far south as Cape Henrietta Maria, then parted company.

The driving force behind these ventures had been the search for a northwest passage. The fur trade had never been thought valuable enough to warrant much attention. However, there seems little doubt that trading was carried out when possible, and that the profits realized therefrom subsidized these voyages to some degree.

The North American fur trade had its origin in the Breton and Norman fishing ports on the eastern coast of the continent. By the end of the 16th century, a lucrative trade had developed - the furs going for sale to Paris. The preponderance of beaver among the pelts served to revolutionize the world fur scene. A good quality beaver pelt yielded two marketable materials. Felt could be made from the under-fur or duvet, while a good fur remained comprised of the guard hairs. France became the old world merchandiser of these furs.

With the advent of the French colony on the banks of the St. Lawrence River, there was an increase in the base from which the fur trade could be conducted. Soon the governments in France were suggesting that the colony support itself through the fur trade. The policy in New

France had required that the furs be brought to the settlements by the natives, while personal initiative and travel in quest of furs was discouraged. Nonetheless, the profits and experience to be gained by the penetration of the interior were sufficient encouragement for many young men to ignore the law and strike out on their own. Two of these were Médard Chouart, Sieur des Groseilliers and Pierre Esprit Radisson, brothers-in-law.

In 1659, Radisson and Groseilliers headed northwest into the region of the upper Great Lakes. By the time of their return to Québec in 1660, they had accumulated a rich store of furs. They also brought with them stories of an overland journey which they had taken to the shores of Hudson Bay. There a wealth of furs awaited the trader. The story of how these two men obtained support for a sea voyage for the purpose of reaping this rich harvest is one that takes them from Québec to France to New England, to Spain and finally to the court of Charles II of England in Oxford. A group of Englishmen organized a venture to Hudson Bay which finally got underway in 1668. Essentially acting as guides, Radisson and Groseilliers went along in the two ketches. Radisson's ship, the Eaglet, was soon forced to return to port but the Nonsuch, under the command of Zachariah Gillam, with Groseilliers on board, continued on. The Nonsuch wintered in the bottom of the Bay. After filling its hold with prime furs in the spring of 1669, it returned to England.

The venture was considered to be a success, and the eighteen financial backers asked for and received a charter granting exclusive rights to the land drained by the rivers flowing into Hudson Bay. The Charter of the "Governor and Company of Adventurers of England trading



into Hudson's Bay" was signed and sealed on 2nd May, 1670. Named as the principal recipient was Prince Rupert. The lands would henceforward be known as Rupert's Land.

The summer of 1670 saw the return of the Company's ships to Hudson Bay. Groseilliers and Gillam returned to James Bay to build a fort, while Radisson and Charles Bayly, the first governor, headed to the west shore. The voyages of the following few years concentrated on the trade at the south end of the Bay, and little attention was paid to the estuaries of the Hayes and Nelson Rivers.

In 1682 Radisson, now in the employ of the French, entered the Hayes River and established a post which he called Fort Bourbon. Arriving that same year were Zachariah Gillam with the new Company governor John Bridgar, and a private expedition from New England commanded by Benjamin Gillam, Zachariah's son. A war of nerves between the rivaling groups ensued but by the spring of 1683 Radisson was victorious; the French had been established on the west coast of the Bay.

Over the next century or so the fort at the mouth of the Hayes suffered from a number of captures and recaptures. The French turned the post over to the English in 1684, who then rebuilt it and subsequently renamed it York Fort. Although the battle for control of the Bay raged on on other coasts of the Bay, York went unmolested until d'Iberville attacked and captured it in the fall of 1694. It was recaptured for the English by Allen in 1696. In 1697, d'Iberville in his ship, the Pelican, emerged victorious over the English Hampshire, Hudson's Bay, and Dering in a great naval battle and onlookers in York Fort quickly surrendered to him. The fort was to remain in French hands until 1713 when the Treaty of Utrecht

returned it to the Hudson's Bay Company. One more time the Factory at York was to fall and this time to the French commander La Perouse, who destroyed it and Fort Prince of Wales in 1782. Subsequently the British rebuilt York Factory and henceforth it was to remain in relative peace.

The first exploration of the Hayes River was conducted by Radisson and his nephew Jean Baptiste Chouart in the early fall of 1684. A short travel time of perhaps four or five days took them about 200 miles up the Hayes system. This would not have brought them as far as the Echimamish but this was to be the deepest penetration of the interior for a period of six years. Prior to 1690 Chouart followed a similar route with a companion by the name of Grimard, again penetrating 200 miles inland.

Clerks and traders assigned to York Factory were not anxious to leave the relative security of the fort to fulfill the exploration interests of the factor. There was also no pressure on them from London to undertake an exploring expedition. The directors did however, favour a mission that would result in a greater number of inland natives bringing their furs to the posts at the Bay.

A young recruit by the name of Henry Kelsey immediately impressed his superiors as one who could undertake a journey inland with the Indians. He was to go inland with the Assiniboines who were returning to their homelands for the winter. Kelsey was to make observations of the country and induce more of the people to bring their furs to the coast to trade. He left York Fort on 12th June, 1690 and reached a place he called "deerings point" (presently believed by some to be The Pas, Manitoba) on 10th July. In his journal he spoke of this part of his

trip in the following manner;

"....Sett from ye house ye twealth of June  
Then up ye River I with heavy heart  
Did take my way and from all English part  
To live amongst ye Natives of this place  
If god permits me for one two years space  
The inland Country of Good report hath been  
By Indians but by English yet not seen  
Therefore I on my Journey did not stay  
But making all ye hast I could upon our way  
Gott on ye borders of ye stone Indian Country  
I took possession on ye tenth Instant July  
And for my masters I speaking for ym all  
This neck of land I deerings point did call  
Distance from hence by Judgement at ye lest  
From ye house six hundred miles southwest  
Through Rivers wch run strong with falls  
thirty-three Carriages five lakes in all..."

This is the only record of that inland journey but it is thought that the five lakes and thirty-three carriages occurred along the Hayes, Carrot, Minago and Saskatchewan Rivers. It is likely that his return to the Bay in 1692 followed the same path. Though Henry Kelsey did not use the Echimamish route, he perhaps contributed to its eventual discovery by lessening the fears of inland travel, prevalent among the British at that time.

At the governmental level, the French in New France were as reluctant as the English to explore the west. However, young "coureurs des bois" moved about living and trading with the Indians, and in the early years of the 18th century they had penetrated to the Lake Winnipeg region. By 1716, the Assiniboine Indians who came to York Fort reported that they were able to take their trade to Lake Winnipeg, where there were several settlements (of coureurs). By the time La Vérendrye had reached the Lake of the Woods in 1732, the coureurs des bois had brought about a notable decline in the trade of York Fort. The

establishment of Fort La Reine at Portage la Prairie further aggravated the situation at the Bay.

The first of these adventurers to reach York via an inland water route from Montréal and the first to make notes of his journey was a French-Indian, Joseph LaFrance. He was the first man of European extraction to use the Echimamish route. Moving from Lake Winnipeg to the Bay LaFrance describes the East Channel of the Nelson, the High Rock, and the Echimamish in 1742;

"...The River was small where it came out of the Lake, for about six leagues it spreading through several little passages through the marshes, but farther down when collected together formed a large River. The banks were low, until they got to the great Fork, where the River is divided by a Rock upon which a convenient Fort might be built, which might be cut off by bringing the Water around it...."

From the High Rock LaFrance descended by;

"...the East Branch...it being the shortest Passage; at the same time another Fleet of 100 canoes went down the Western Branch...."

LaFrance's trip begins to show the preference for routes chosen by the travellers of the time. Transportation between the Bay and the Saskatchewan would intentionally avoid Lake Winnipeg and would involve instead the Fox or Carrot Rivers and the Minago River. Travel between the Assiniboine country and the Bay utilized Lake Winnipeg, the Echimamish and the Hayes Rivers.

The journal of LaFrance caught the attention of an Irishman, Arthur Dobbs, who had long been pressing the Hudson's Bay Company to actively search for a northern maritime passage to the Orient. Joseph LaFrance's journal turned Dobbs' attentions to the possibility of an inland passage to the Pacific and now he used his influence in

England to force the Company to undertake inland explorations. Although Dobbs had dropped out of the picture by the time the Company made another venture into the southwest, there is little doubt that his influences had brought the date of that journey forward.

It was 1754 before Antony Henday left York Factory and headed to the Saskatchewan. He used the Hayes and Fox Rivers and Cross Lake in going inland. In 1756, however, Joseph Smith of the Company went to Lake Winnipeg and Swan River via the Echimamish. Other trips followed in 1756 and 1757 by Joseph Waggoner and Isaac Batt, who also made use of the "river that flows both ways".

By the 1760's the pedlars, fur traders from Montreal, had penetrated the Saskatchewan Country and were offering considerable competition to the HBC. To combat these traders, who were acquiring the best furs right in the home of the Indians, the HBC obtained the services of a former member of the rival faction, Louis Primeau. In 1766 he led the first group of six Hudson's Bay Company "pedlars" inland. This represented the first real effort of the Company to take the trade inland. Men like Matthew Cocking, James Allen, Edward Deering and William Pink headed inland in the ensuing 7 years. Some of these men most certainly made use of the Echimamish River. By 1774, 60 journeys had been made to the North Saskatchewan from York Factory. While most of these journeys were made with the express purpose of enticing the Indians to the Bay, certain gains in exploration resulted. All plausible routes were investigated and compared with those already in use during these and subsequent years. Preferences in the usage of the known routes developed.

The establishment of the Company's first inland

post at Cumberland House occurred in 1774. Samuel Hearne was charged with accomplishing this task with the assistance of Matthew Cocking. Hearne used the Grass River track in his upward journey, but Cocking used the Echimamish and Lake Winnipeg route. From 1774 on, the use of the Echimamish intensified as communication requirements with the interior grew.

Although the Hudson's Bay Company had begun now to carry out explorations with more interest and frequency than had been shown in the past, they had yet to hire individuals who could be helpful in that specific role. The first of a series of surveyors hired by the Company was Philip Turnor. He arrived at York Factory from England in late August of 1778. He prepared a plan of the Factory and then departed quickly for Cumberland House, travelling via the Grass River. After a winter of observations on the Saskatchewan, he returned to York via the Echimamish - Hayes Route. He observed quite a difference in the relative qualities of the Nelson and Echimamish flows.

June 30, 1779

"...Wednesday at 4 A. M. got underway leaving the Saskashawan Water (East Channel) all to Northward and went up a small River light current and black water, that of the Saskashawan being a white thick water, went from NE to E about 4 Miles and came to a Lake about 3 Miles wide and about 5 feet water Land bold & Rocky,..."

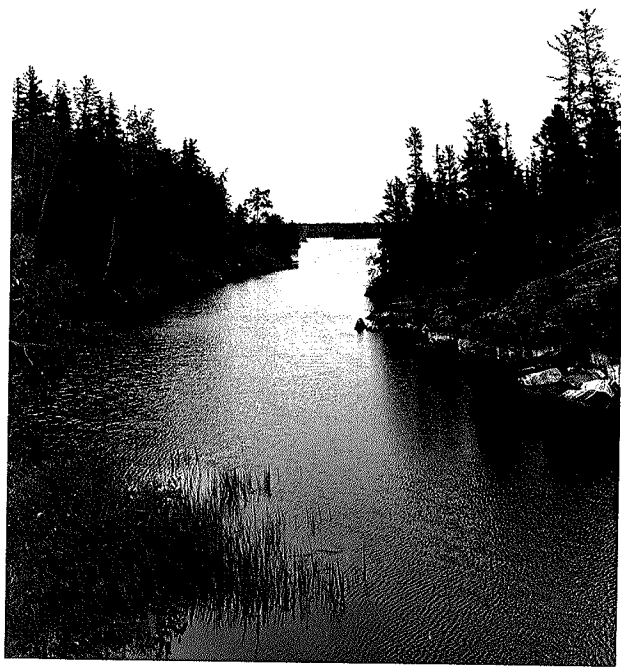
Turnor goes on to speak of the upper end of the channel and the headwater pond. He seems aware not at all of the name of the river or its peculiarities.

July 1, 1779

"...Thursday at 2 A. M. got underway in a narrow river and very black water easy current against ua, went about 30 Miles mostly E to NE, the river in some places not above 4 yards wide but good depth of water, came to the end of the River which is a small Bay the sides bold rocks

which the water is supposed to spring out of, Carried over a low Rock (Painted Stone Portage) at the end of the Bay 50 yards into another bay of the same kind on the other side of the Rock. Latitude by Observation 54 26' No. went 8 Miles E by N, in the Bay which in some places is  $\frac{1}{2}$  Mile wide on both sides bold and Rocky, a branch of a large River (Molson River) joined us falling from the south...."

This was the first description of the Echimamish after that of Joseph LaFrance nearly 40 years previous.



An eastward view down the eastern Echimamish. The Portage is out of sight to the lower right of the photo.

Philip Turnor was to return to Cumberland House in 1789 where he was joined by Peter Fidler and David Thompson. These two men succeeded Mr. Turnor, who shortly after returned to England, and they became very well-known for exploratory work. David Thompson was the first to actually survey the Echimamish and he accomplished this on a journey from Cumberland to York in the spring of 1790. Though this survey was not available to the author,

Thompson's "Narrative" does include a description of his eastern approach to the Echimamish in 1786.

"...The river now formed Lakes and small streams with several carrying places over which we passed to a low winding ridge of land which separates the waters that flow eastward into Hudson's Bay, and those that run westward into Lake Winepeg..."

He went on to describe the Painted Stone which had sat upon this ridge of land and given its name to the portage.

"...On the short carrying place by which we crossed this ridge, the Indians, time out of mind had placed a manito stone in shape like a cobblers lap stone (a stone like a doughnut or dish), but of three times its size, painted red with ochre, to which they make some trifling offerings;...."

By 1792, when Philip Turnor once more passed along Echimamish on his way to the Bay, he had become familiar with some of the local nomenclature. The "small River with light current and black water" had become "E-cha-ma-mish River". A "lake about 3 Miles wide and about 5 feet water.." was now "Me-tha-cha-wan Lake". He also now referred to "a low Rock at the end of the Bay" as "the painted stone carrying place". The Echimamish was becoming a better and better known water route.

The North West Company had been formed in Montreal in 1784. With better organization and renewed vigour, the pedlars had become the Nor'westers and were united against the HBC.

In the 1790's the Hayes - Echimamish Route began to receive administrative attention and work was begun to make it as efficient for the fur trade as possible. Earlier the Painted Stone itself had been forcibly removed. The Indians had been inclined to spend some time in reverence at each crossing of this portage. When they were taken into the employ of the Company as guides and paddlers,



little tolerance was shown for their religion and the delays caused by its practice. The return trip inland had to be completed in time for the annual ship to sail through the dangerous Hudson Strait before freeze-up.

In 1786 Thompson had spoken of the departure from York Factory of the inland trade, saying;

"...The inland trade was carried by twelve large indian canoes, each carrying three men and six packages of goods, iron ware, etc...."

These boats were far too small for the big lakes and were very much at the mercy of the weather. Larger and more rugged boats were required. Wooden boats had been in use at Henley House, south of the Bay, for some years. Their design was expanded upon and building operations began on the Saskatchewan in 1795. They were about 40 feet long, 3 feet in depth, and 9 feet in the beam. They could carry 3½ tons of goods and on the water they were not noticeably slower than freighter canoes. They were rowed or sailed by 8 - 10 Orkneymen. By the year 1800 they were in regular and systematic use along the Saskatchewan River and Lake Winnipeg portions of the Route.

At the head of a very fast section of the Hayes River, about 110 miles upstream from York Factory, Gordon House or Rock Depot was constructed in 1794. By taking from York the packages destined for the Saskatchewan to the Depot in late spring, and there meeting the downstream-travelling inland crews with their loads of furs, an exchange could be made and thus the inland crews could shave by a week their normal travelling time for the round trip. This was particularly beneficial when one bears in mind that at this time both major fur companies were expanding northwestward into the Athabaska. It also came at a time

when the HBC had its back to the wall - the North West Company was controlling 11/14 of the fur trade - and badly needed a morale-booster.

Other depots were built. Jack River House, north of Lake Winnipeg was first erected in the late 1790's. Oxford House was built in 1798.

Competition continued between the two companies and the Echimamish was utilized heavily throughout the first decade of the 19th century. The use of the larger wooden boats spread throughout the north, even to York Factory. They were soon to become associated with the Factory and would be known as York boats.

The next significant development in the establishment of the Hayes - Echimamish as a major route of commerce came with the beginnings of the Red River Settlement. Lord Selkirk, who by 1808 owned 40 percent of the shares of the HBC, was granted 116,000 acres on the southern edge of Rupert's Land in 1811. Settlers were recruited from the Highlands of Scotland and from Ireland, and the first of them arrived at York Factory in the fall of 1811. They wintered on the Bay and came inland in 1812. Mr. Abel Edwards accompanied the group as surgeon. He kept some sketchy notes of their passage through the Echimamish area.

"Ecchemamis, or Little River. Very narrow and winding, and extremely shallow, containing many Beaver dams. Shores flat, resembling water meadows. The bed muddy."

"Henry Lake (Hairy Lake). Length four miles, breadth one mile, water blackish and very shallow Bottom muddy."

Many more expeditions of settlers came in subsequent years. The York boats, and hence the Echimamish no longer carried only men and furs, but also the machinery of farming and the other material needs of the settler's families. The

settlement was supplied entirely via Hudson Bay and the inland trade routes. Along the Echimamish came such things as wheeled carriages, six and nine-pounder cannons, pianos, and of course, the domestic livestock. In the other direction were shipped such oddities as would entertain the gentry back home - for example bison calves.

Apart from the apparent value of the Hayes - Echimamish route as a supply and communication link with Great Britain, it had another more subtle value that was never really tested. It protected the hinterland of Canada from encroachment by the Americans.

As British interest grew in the colony so also did their interest in the Arctic. Captain John Franklin was sent on an overland mission to the shores of the Arctic Ocean. York Factory was his port of arrival in North America in the year 1819. From there he was to proceed inland, first to the Athabaska and then north to the Ocean. He reached the Painted Stone Portage in September of 1819.

"...The Painted Stone is a low rock, ten or twelve yards across, remarkable for the marshy streams which arise on each side of it, taking different courses...."

"...It is said that there was formerly a stone placed near the centre of this portage on which figures were annually traced, and offerings deposited by the Indians; but the stone has been removed many years and the spot has ceased to be held in veneration...."

Launching their boats over the portage, his party began the descent of the western Echimamish.

"...This small stream has its course through a morass, and in dry seasons its channel contains, instead of water, merely a foot or two of thin mud. On these occasions it is customary to build dams that it may be rendered navigable by the accumulation of its waters. On the present occasion there was no want of water, the principal

impediment we experienced being from the narrowness of the channel, which permitted the willows of each bank to meet over our heads and obstruct the men at the oars...."

This is the first reference to man-made dams along the Echimamish. Possibly the building of these dams was initiated during the settlement of the Red River Colony. Franklin goes on to write of the lower Echimamish.

"...In many parts the morass by which the river is nourished, and through which it flows is intersected by ridges which cross the channel, and require the boat to be lifted over them. In the afternoon we passed through a shallow piece of water overgrown with bulrushes, and hence named Hairy Lake; and in the evening, encamped on the banks of Blackwater Creek, by which this lake empties itself into Sea River...."

The year 1820 marked the beginning of George Simpson's intimacy with the commerce of Rupert's Land. His first winter with the Hudson's Bay Company was spent in the Athabaska Region, but he moved east to Red River in 1821 to become the governor of the Northern Department. The merger with the North West Company also became a reality that year. The united company was run very much as the HBC had been run prior to 1821. The burden of supplying the interior now fell entirely on the Hayes - Echimamish Route. Always trying to improve efficiency, Simpson ordered that the Nelson be re-explored as an alternative route to York Factory from Lake Winnipeg. The Nelson again proved unsuitable and things on the Echimamish remained much as they had always been.

Depots spotted along the way could be immensely helpful in lessening the brigades' travel time in spring and autumn. This was the rationale for the construction of the Rock Depot back in the late 1790's. The same reasoning was employed to justify the building of Norway

House near the outlet of Lake Winnipeg in 1815. It proved very valuable to the Company in the late years of the fur trade rivalry. Although it burned to the ground a few short years later, it was quickly rebuilt on an even grander scale and soon challenged York Factory as the centre of the northern activities of the HBC. To take the pressure off the river route in summer, it was thought that a winter road would be of immense value. The road was to parallel the Hayes River for most of the way and could therefore serve as portage trails around the rapids in the summer season. The extent to which this project was completed is in question. Rich (1967) states that it was completed up to Lake Winnipeg in 1827-28, but Cowie (1913) speaking of the section between Rock Depot and Oxford House says;

"...this project, which at first appeared to promise a great reduction in freight charges and a general benefit to the country was abandoned...."

Whatever the outcome of that effort, Norway House rose to some prominence among the posts of the Company and this spelled the demise of the Rock Depot on the lower Hayes. The importance of Oxford House suffered, also because of the increased use of Norway House as a forwarding depot.

These were the days of George Simpson's express journeys across Canada and in both 1827 and 1828 he literally flew along the Echimamish. In 1828 he arrived at the Painted Stone one afternoon at 3 o'clock, encamped that night "below the upper beaver dam" and reached Sea River by 9 o'clock the following morning in time for breakfast. Governor Simpson spent little time admiring the landscape.

It was in the following few decades that the Echimamish - Hayes attained its zenith. The entire fur

trade, as well as the growing colony at Red River, required the support provided by this route. Further improvements were made to the route - primarily the cutting out of the portages, an important example of which was the portage which avoided the White Fall. The White Fall occurs on the Hayes River about 17 miles east of the Painted Stone and is succeeded immediately downstream by three more falls, the total drop being 56 feet. When Franklin ascended this part of the river, the falls were attacked separately; the boats were dragged up and the loads carried around each one individually. During the early years of George Simpson's reign as a governor, a single portage of a length of 1300 yards was cut out of the bush. It circumvented the entire series of falls. This was then the longest portage between Lake Winnipeg and the Bay but, inspite of this, it was a



Robinson Falls or the White Fall is found 17 miles to the east of Painted Stone on the Hayes River. It was near here where John Franklin nearly drowned in 1819.

benefit to the voyageurs. Other portages were also suitably improved.

All of these improvements demonstrated their value in the mid 1840's. The Americans were threatening to extend their boundary northwards, particularly in the Oregon Territory. In response to this threat, the British Government sent in a number of troops under Colonel Crofton in the years 1846 to 1848. They were hurried to Red River over the Hayes and Echimamish Rivers. To assist them in getting their materials over the portage at White Fall, Red River carts were brought down from the settlement. The troops were able to fulfill their role as a deterrent force.

In 1858 the Palliser expedition was sent out on to the prairies. Blakiston was directed to follow the Hudson Bay Route and to comment on its effectiveness. He was unenthusiastic, but left an excellent description of travel on the Echimamish.

"...The end of a narrow lake is within a few yards of the source of the Echiamamis, a small stream whose waters flow to the westward; where sufficient water is kept for the passage of boats by two dams six miles apart, these were formerly the work of beavers, but are now kept up by the passing boats. At the passage of a boat a portion is pulled away, the boat run through and it is again shut securely. This stream, which on account of dams, has little or no current is for the most part through marsh, and so narrow that the willows meet overhead, and the boat sometimes touches the bank on each side. At a distance of 358 miles from Hudson's Bay, Sea River is entered."

This gentleman left one of the most concise descriptions of the boats in use at the time. It is of note that they had not yet assumed the name of "York Boats".

"...Each boat is of the following construction:-  
Length of keel 30 feet, over all 42 feet, which gives considerable shear equally to both stem

and stern-post; breadth of beam 9 feet, sharp at both ends, depth inside 3 feet, and when loaded with 70 "pieces" (about 56 cwt.) besides the crew, oars, sail, mast, etc., draws two feet of water...."

The boat-crew would have consisted of 8 oarsmen and a steersman who would have to assist him in his work, a rudder for the lakes and a long sweep for river work. For the most part, Métis voyageurs or Swampy Indian tripmen manned the boats. There were by this time over 200 of these craft in service across the northwest.

Blakiston's expressed pessimism for the future of the Hudson Bay Route did not prevent it from remaining the major artery linking Great Britain with the interior plains region of Canada until the coming of the railway.

Cowie on his journey inland in 1867 made an interesting point regarding the methods of freight movement along the rivers;

"...An ordinary boat's crew are also unable to haul their own boat over land across a portage by themselves...."

Therefore boats travelled in brigades of four or five, so that they could be of mutual aid in traversing a portage. Log rollers were laid on the ground beneath the boats to expedite their overland movement.

By virtue of the Charter signed in 1670, the Hudson's Bay Company had assumed and maintained control of Rupert's Land. A Deed of Surrender, negotiated in 1869 and finalized in 1870 ceded the land to the Government of Canada. In fact, the Indians had been left out of all this, but the chance for them to give up their claim to the land came when the Winnipeg Treaty, Number Five was "negotiated" at Norway House in 1875. The



Minister of the Interior had stated;

"...that it was essential that the Indian title to all the territory in the vicinity of the lake (Winnipeg) should be extinguished so that settlers and traders might have undisturbed access to its waters, islands, inlets and tributary streams...."

Thus by 1876, 100,000 square miles were surrendered to the government and the people were established on reserves.

Meanwhile, the commerce conducted between the inland and York Factory on the Bay suffered a setback. By the early 1860's, the railway had pushed its way westward in the United States, and that, coupled with steamship navigation between the States and Winnipeg, proved formidable competition to the boats on the old Hayes River Route. Delivery of goods to the Saskatchewan and Athabaska regions was cheaper and faster if the American railway was used. A smaller and smaller area was supported from York Factory.

Practical interest in the resources of the Echimamish area was first shown by the Geological Survey of Canada in 1878. In that year Dr. Robert Bell was sent to investigate the country between Lake Winnipeg and Hudson Bay. Dr. Bell's description of the Echimamish Route was excellent.

"...The distance between these posts (Norway House and York Factory) in a straight line is 301 miles by my map. Lake Winnipeg has been ascertained by the engineers of the Canadian Pacific Railway to be 710 feet above the sea. Notwithstanding this considerable amount of fall, in going from Norway House to York Factory, the difficulties of boat-navigation in descending are not great, but are more serious in

returning. In the downward journey it is necessary to haul the boat over dry ground only three times, namely, at the watershed of the Echimamish, the Robinson Portage and the Trout Fall. These portages measure 28, 1315 and 24 yards respectively. All the other rapids are run by York boats, and mostly with a full cargo, but at some of them, more or less of the load requires to be carried past by land. In the upward journey there are in all about twenty demi-charges, or hauling places, and in addition to the three complete portages which require to be made in going down, there is a fourth, the Island Portage, about forty yards in length.

"The boat-route leaves the east channel of the Nelson River twenty-five miles below Norway House, and turns up a small, swampy and marshy stream called Echimamish. In the interval the river is full of islands, and would average about a mile in width, including them. The shores are rather low, but not often swampy. The banks consist of a rather light-coloured clay, with gneiss frequently appearing underneath it and forming the points and smaller islands. The timber consists of spruce, tamarack, Banksian pine, white birch, aspen, balm of Gilead and willows, with a little balsam fir.

"A chute, with a descent of about four feet, called Sea-river Fall, occurs in the east channel at seventeen miles below Norway House, or thirty-seven from Lake Winnipeg. Loaded boats run down this chute, but it is necessary to unload and track them up the current.

"The Cree word "Echimamish" signifies a channel in which the water flows each way. Its course is eastward, and at twenty-eight miles in a straight line from the east channel, we come to an abrupt termination of the western part, at a low rock called the Painted Stone, 28 yards in width, which forms the watershed of the channel. Hairy Lake and two dams, with a rise of about one foot at each, are passed in the above interval. The boats are unloaded and hauled over the little watershed, and launched into what is regarded as a continuation of the same channel. The White-water River, which discharges Little Lake Winnipeg, joins the eastern Echimamish on the south side, at seven miles from the watershed. From this point to Oxford Lake, the stream



#### Sea River Fall

having no recognized name, I propose to call it Franklin's River, after the late Sir John Franklin, who had a narrow escape from drowning in it near the White-water, in 1819.

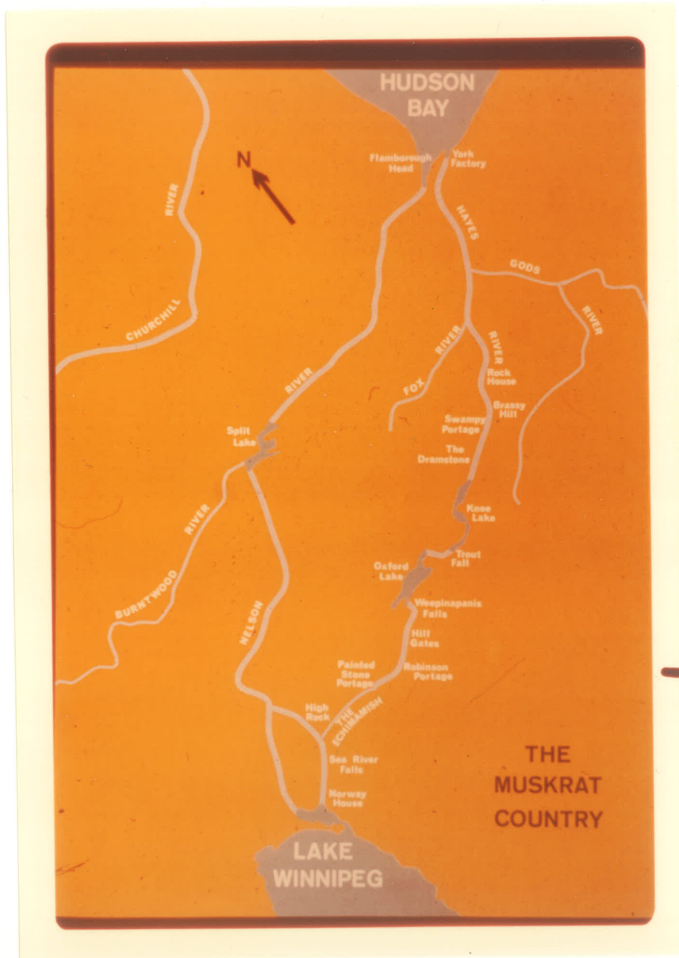
"Around Rainy Lake, and on either side of the valley of the Echimamish, low domes of rock occur occasionally near the route, and ridges which appear to rise to a height of seventy or eighty feet are seen in some places at a distance of two to three miles back. The Echimamish cuts off a small border along the southern edge of the Huronian Trough, which will be described further on; but from the confluence of the White-water, gneiss was the only rock observed along Franklin's River all the way to Oxford Lake. Franklin's River flows successively through Robinson's, Pine and Windy Lakes. Robinson Portage, the most formidable one on the whole route, occurs at the foot of the lake of the same name. The carrying-trail, which is as wide and smooth as a good waggon road, passes over the light grey clay soil

which prevails everywhere in this part of the country. The descent in Franklin's River between the extremities of the trail, was ascertained by the aneroid barometer to be 45 feet...."

The route went on through Pine and Windy Lakes, by the Angling Place (Wapinaipinis) to Oxford Lake and Oxford House. From Oxford House the voyageurs proceeded through Back Lake and along the Trout River to the Trout Fall and hence to Knee Lake. The Jack River drained Knee Lake into Swampy Lake. Hill River led out of Swampy Lake to the junction with Fox River at Brassy Hill. The channel was called the Steel River from there to the confluence

with the Shamattawa, about 50 miles above York Factory. From that point on the river was known as the Hayes.

The area received some attention from other geologists such as A. S. Cochrane, J. B. Tyrrell, W. McInnes, R. W. Brock, and F. J. Alcock between 1890 and 1920. For the most part the Echimamish was not the subject of their investigations but was considered as an aside. Mr. Brock's report of



1910 was the first to mention the existence of a third dam on the Echimamish and to mention the tramway on Robinson Portage. This tramway was built by Charlie Sinclair of the HBC in 1905 to assist the men in getting their loads across the 3/4 mile portage. The size and frequency of the brigades travelling on this river had decreased to a point where the moving of the boats overland was prohibited by a lack of manpower. The tramway alleviated this problem.

The reign of the York boats came to an end in the 1920's when the development of an outboard motor suitable for canoes gave the smaller craft the edge in efficiency. Trains of six or seven 19 foot freighters towed by one motorized canoe carried all the cargo over the Echimamish. In 1937 the last boat sailed from York Factory and York was afterward supplied by boat from the new port of Churchill or from the inland post at Norway House. Canoe trains continued to ply the Hayes Route until they were replaced in the early 'fifties by winter tractor trains and the aeroplane. York Factory was finally abandoned in 1957 for many reasons, the major one probably being the lack of profit in its operation.

Today the Echimamish is a quiet river. Its only traffic is the occasional Indian trapper or fisherman and the people from the south who come to sample the history, the legends and the landscape of the River which flows both ways.

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Robert Bell of the Geological Survey of Canada were also  
employed. They are on deposit at the Public Archives of  
Canada in Ottawa.

APPENDIX "C"

### C. The Story of the Painted Stone

The Echimamish commanded the respect and awe of generations of the areas inhabitants. How was this attitude to the river developed? Unfortunately, we do not know and can only speculate but perhaps we have in our hands some knowledge which will assist us in our speculations.

We are fairly confident that the glaciers had exposed the entire Echimamish basin by about 8,000 years before present. We can be sure that here, as in other better documented regions of the country, nomadic Indian tribes invaded the area on the heels of the glacier. These people would have been very dependent on the water resources of their land, as a food source, as a transportation "highway", etc. Let us not lose sight of another background consideration. The indications are almost overwhelming that the upper Echimamish was a reasonably large river that flowed eastward towards the Tyrrell Sea, the predecessor of Hudson Bay.

The people originally populating the area were, like those of most cultures, very dependent on water. They were subsistence fishermen and as such used the rivers and lakes as food sources. Of course, the water was also a necessity for consumption itself, for transportation and for basic health. A reasonable assumption considering these facts, therefore, is that the tribes lived near and became intimately associated with, the familiar surface water bodies. If the Echimamish was a large river at the time, it would have been a well-used and well-known region, for it would have supplied many of the peoples' needs. Over a period of several generations the slow reduction in the flows and water levels would be noticed and remembered with interest. A continued decrease in flow would have soon



An aerial photo of the area surrounding the Painted Stone Portage (centre). The photograph is taken from the east. (Photo courtesy of R. W. Newbury)

allowed the rocks which form the Painted Stone Portage today, to emerge. This would mark the demise of what to the people had been a magnificent, albeit a dangerous, rapids. Few places were associated more closely with the spiritual world than a rapids or falls, for inevitably they claimed the lives of many people and bore those lives away to another world. Would not a story whereby a raging torrent was over time reduced to a creek and then to virtually nothing be a story to which some spiritual significance would be attached?

By this point in time, the Echimamish would likely have assumed characteristics similar to what one finds today. One's initial suspicion is that the Indian's romance with this river would hence end, for no longer would it support large numbers of them. But such a suspicion would be wrong. Not only had the rapids "emerged", but now the water flowed in both directions from a small pond behind the former rapids. Instead of the water originating in the west and flowing east, the water originated in the centre of the watershed and flowed both to the east and to the west. A pair of innocuous rivulets fed a common headwater pond. Although the water-landscape had been modified so that a divide now occurred between the Nelson and Hayes Rivers, the Echimamish offered an easy way across for the traveller. He knew all too well the trials and tribulations associated with crossing from one watershed to another. The easy way across was in the form of a divide composed of water only. No portages were necessary, though one would be required to lift his canoe over a small beaver dam at either end of the pond. This truly was a gift.

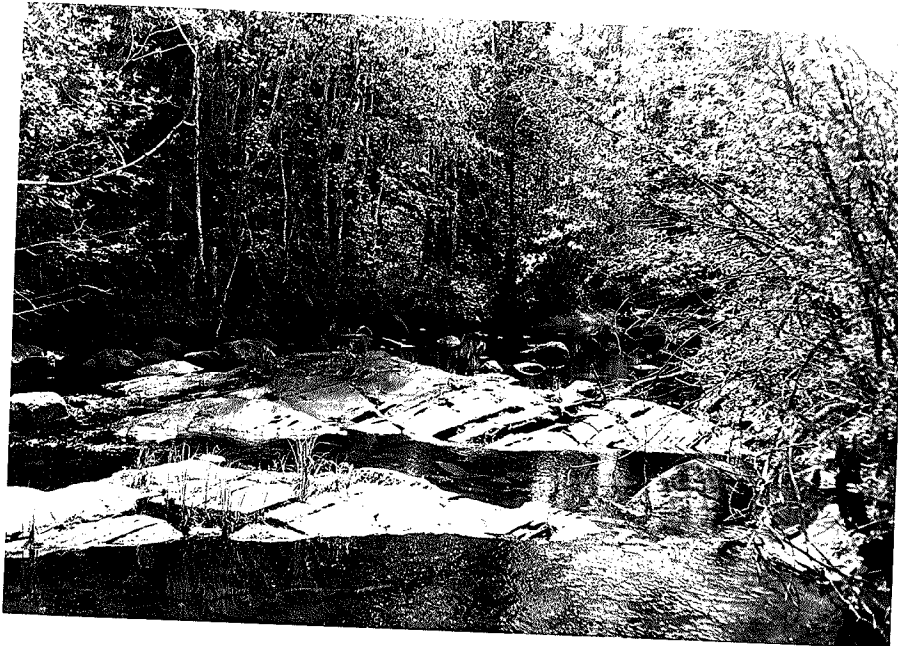
Notably, the headwater pond was located adjacent to the emerged rocks of the former rapids. These smooth,

bare rocks had become used as a portage to avoid some boulder obstructions in the small eastern Echimamish. It is little wonder then, that this rock was chosen as a sacred place, where offerings could be made to the Manitou for the miraculous watershed crossing he had provided. It appears that a period of perhaps one day was reserved for spiritual activities on each crossing. The close proximity of the headwater pond to the portage made it easy to mistake the portage for a divide and for the early European travellers to completely miss the meaning of the term "Echimamish". The significance of the Painted Stone would be easily misunderstood. However, it is upon the explorers and fur-traders that we must rely for a description of the Painted Stone and the Echimamish. Below are quotations from many of the noted "voyageurs". It is interesting to follow their slowly developing comprehension of the area.

Philip Turnor July 1, 1779

"...Thursday at 2 AM got underway in a narrow river and very black water easy current against us, went about 30 miles mostly from E to NE (the river in some places not above 4 yards wide but good depth of water) came to the end of the River which is a small Bay the sides bold Rocks which the water is supposed to spring out of, Carried over a low Rock at the end of the Bay 50 yards into an other bay of the same kind on the other side of the Rock...."

Mr. Turnor believes that the portage marks the upper end of the westward-flowing river and does not see that it also flows eastward. The legend that the water springs out of the rocks is interesting. It must refer to a situation that saw the headwater pond so small (the size would be determined by the positioning of the beaver dams) that there were no apparent tributaries feeding it, for only then would the rocks be looked upon as a source of water.



Mr. Turnor did not see this stream flowing eastward out of the headwater pond.

David Thompson

1786

"...The River now formed Lakes and small streams with several carrying places over which we passed to a low winding ridge of land which separates the waters that flow eastward into Hudson's Bay, and those that run westward into Lake Winepeg. This ridge continues all along the east side of this Lake to the River Winepeg, which it crosses and forms one of its falls. On the short carrying place by which we crossed this ridge, the Indians, time out of mind had placed a manito stone in shape like a cobblers lap stone (a stone like a doughnut or dish), but of three times its size, painted red with ochre, to which they make trifling offerings; but the Stone and offerings were all kicked about by our tolerant people...."

David Thompson, that great surveyor, also believes that the portage at the Painted Stone is a divide. He is the

only person to give a description of the actual Painted Stone. Although he seems not to grasp the significance of the Stone to the people, he exhibits, at least, some human understanding of its importance to them. He shows no little disgust for the attitudes of the men who caused the removal of the Stone. The removal seems to have resulted from a desire for efficiency on the part of the Hudson's Bay Company. The worship time spent by the native guides and paddlers at the portage could be little afforded by those people who were in charge of the inland operations. It is not clear from Thompson's remarks the exact date of the Stone's demise, but it was probably subsequent to the establishment of Cumberland House as an inland post in 1774.

Philip Turnor July 8, 1792  
"...at 3/4 PM came to the black water which takes its rise at the E-cha-ma-mish Carrying place...."

On this trip through Turnor is aware of the name of the river but he still refers to the portage as being the boundary of the watershed.

John Franklin September 1819  
"...The Painted Stone is a low rock ten or twelve yards across, remarkable for the marshy streams which arise on each side of it, taking different courses.  
"...It is said that there was formerly a stone placed near the centre of this portage on which figures were annually traced and offerings deposited by the Indians; but the stone has been removed many years and the spot has ceased to be held in veneration.  
"...Having launched the boats over the rock, we commenced the descent of the Echemamis...."

The truth eludes Captain Franklin just as it has the others up to this point in time. He says that the marshy streams





The Painted Stone Portage as viewed from its eastern approaches. The headwater pond is barely visible behind the portage (the light-coloured rock in the centre of the photograph).



The Painted Stone Portage - the headwater pond is in the foreground, a bay of the eastern Echimamish in the background. (Photo courtesy of G. K. McCullough)

arise on each side of the portage. On his westward journey he believes himself to be descending the moment he departs the Painted Stone. It is obvious from his remarks that the memory of the Painted Stone itself lingers, in spite of its physical removal.

Edward Ermatinger July 28, 1827  
"...Fine weather. Started at  $\frac{1}{2}$  past 1 a.m. arrived at the painted stone about 8. Found the upper end of the Itchenemanines rather shoal...."

Edward Ermatinger accompanied an express journey from York Factory to Fort Vancouver. Needless to say his fellow travellers took little time to look around and observe the landscape.

Archibald MacDonald July 18, 1828  
"...Left the upper end (of the White Fall) a little before noon, and arrived at the Painted Stone by three o'clock. The water was low at Aitchemanus...."

Another rather cursory glance at the land. Archibald MacDonald was accompanying George Simpson on a journey to the Pacific. Simpson was not noted for a tolerance of casual itineraries as indicated by their speed in traversing the distance between White Fall and Painted Stone. It is interesting to note that inspite of a consistency in the previous spellings of "Echiamamish", Ermatinger and MacDonald have independently arrived at two very different spellings.

Blakiston 1858  
"...The end of a narrow lake is within a few yards of the source of the Echiamamis, a small stream whose waters flow to the westward...."

Investigating the route for his superior, Mr. Palliser, Blakiston approached the Painted Stone from the east. The narrow lake referred to is the channel of the eastern



Rivers".

R. W. Brock August 10, 1910  
"...Ascending the Echimamish three dams, maintained to render the stream navigable for York boats, were passed and the head of the stream reached at Painted Stone portage. A lift over this rock transferred the canoes to Hayes River water, which is followed to the sea...."

R. W. Brock was a representative of the Geological Survey of Canada, who accompanied the Governor General, Earl Grey on his tour of the Hudson Bay Route. The myth that the portage was a divide continued. In fact, Mr. Brock was on Hayes River water before he transferred his canoes over the portage.

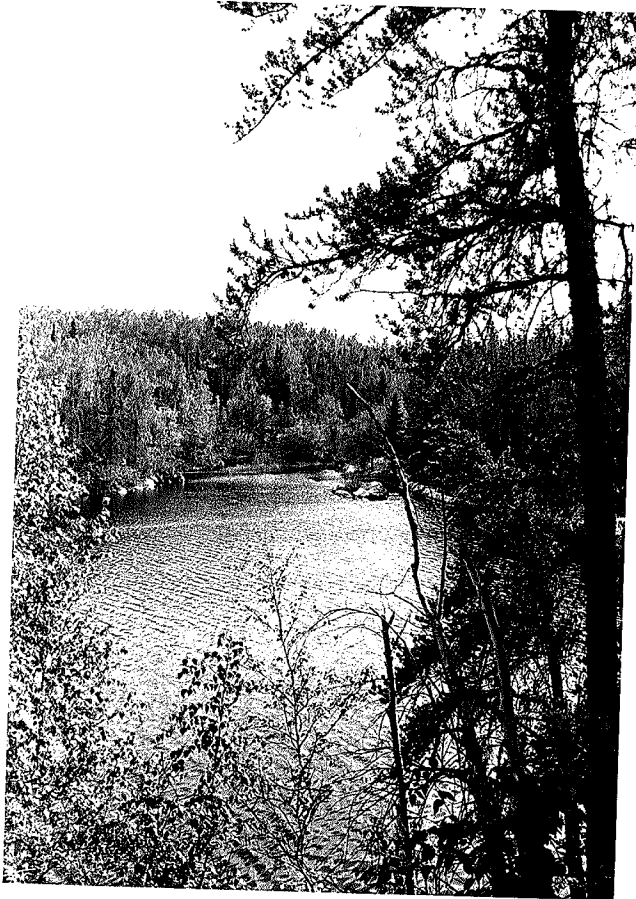
Frederick J. Alcock 1920  
"...Fifteen miles above Robinson Portage, the route leads up a narrow stream known as the Echimamish, a Cree name meaning a river which flows both ways ..... At what is known as the Painted Stone a short portage leads across the divide to the part of the Echimamish which flows westward to the Nelson River...."

F. J. Alcock was a geologist with an interest in history. It is unknown whether or not he actually travelled the route. Some of his text indicates that he may not have, relying on others for their descriptions. At any rate he does little to clear up the misunderstandings regarding the Echimamish.

T. L. Tanton 1936  
"...Subsequently the present drainage conditions were established due probably to continental warping, the eastern part rising somewhat higher than the west, and the upper stretches of both Hayes and Echimamish rivers assuming the character of lakes in the river channel that had been incised. Part of the water ponded west of Painted Stone portage still finds its way easterly into Hayes river, but the flow of the greater part has been reversed toward the west...."

Tanton was another geologist and in the above paragraph

he is speculating on recent changes in the drainage regime



of the basin. Finally, someone does define the two-directional flow of the Echimamish. However, he was prejudiced by the ideas of others and he labels the eastward flow of the Echimamish as the Hayes River.

All the above quotations give one no reason to doubt that the headwater pond was always adjacent to the Painted Stone Portage. The following excerpt by Eric Morse is the only reference to a different headwater pond.

At the end of this small bay on the eastern Echimamish enters the trickle of water which seconds earlier has left the headwater pond, 100 yards to the west.

Eric Morse

1956

"...Why the rowers of York Boats, when there is a direct and continuous flow of water from Lake Winnipeg to York Factory by way of the Nelson, preferred to lug their boats over a divide, and take to the Hayes River instead is partly explainable by the bad character of the Nelson, but also by the facility of movement over the divide. This is offered by a curious little river, the Echimamish (the-river-that-flows-both-ways).

The Echimamish, with barely detectable current for about forty miles, links the Hayes River with the Nelson. In totally flat, swampy country, the Echimamish boasts the unusual feature of rising, not at one end but in its "middle"; two streams from north and south, meet in a beaver pond which flows out west and east - respectively into the Nelson and the Hayes.

"At Painted Stone Portage, canoes and their cargo are carried for twenty paces, not over a divide - as is stated in the early journals - but between two parallel streams, both of which are flowing eastward. A contour line crosses the course here, and the Painted Stone offered the shortest, simplest way to take the drop.

"At the first beaver dam on the Echimamish the canoes are simply dragged up over the dam; and a long beaver-flooded section follows, still proceeding westward. Shortly after the two source streams enter, another beaver dam is encountered, where the water is now flowing down...."

Eric Morse, rather imprecisely, describes the divide on the Echimamish, as being located some distance west of Painted Stone. On questioning Mr. Morse, it is revealed that the headwater pond, the highest elevated pond, was located about 5 miles west of the Painted Stone portage. He said that as he paddled westward about 4 miles west of the Stone, he was required to ascend a beaver dam into a higher pond. This pond was slightly less than a mile in length. When he reached the west end of the pond, he had to descend another dam to contact the next pond.

This observation throws a whole new light on the interpretation of "Echimamish". Not only does the flow split in the Echimamish, but the point at which the flow splits also appears to be capable of movement. The two observed situations of the headwater pond are reproduced in Figure 11. They represent the conditions observed by the author in 1973 and 1974 and described in the early

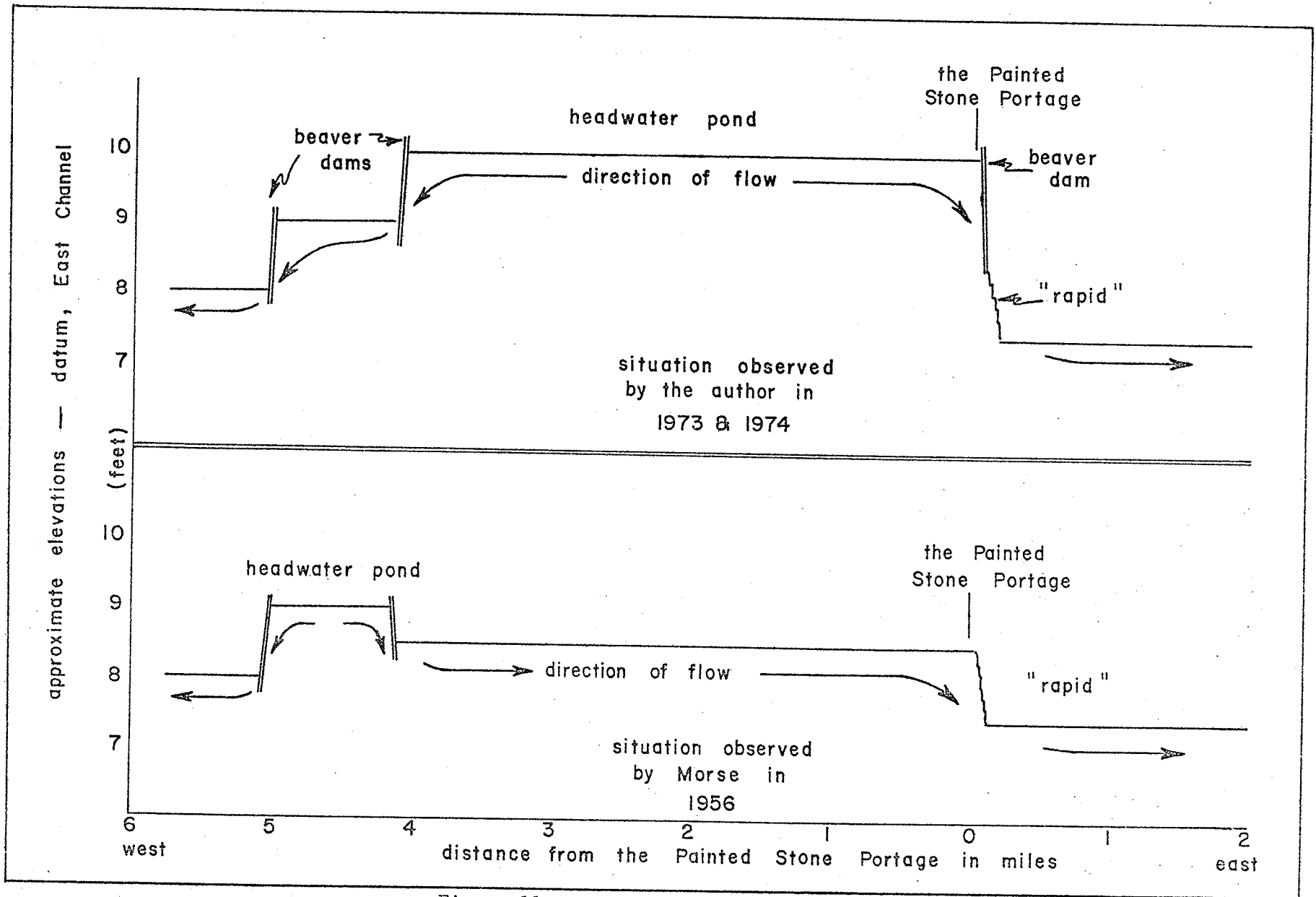


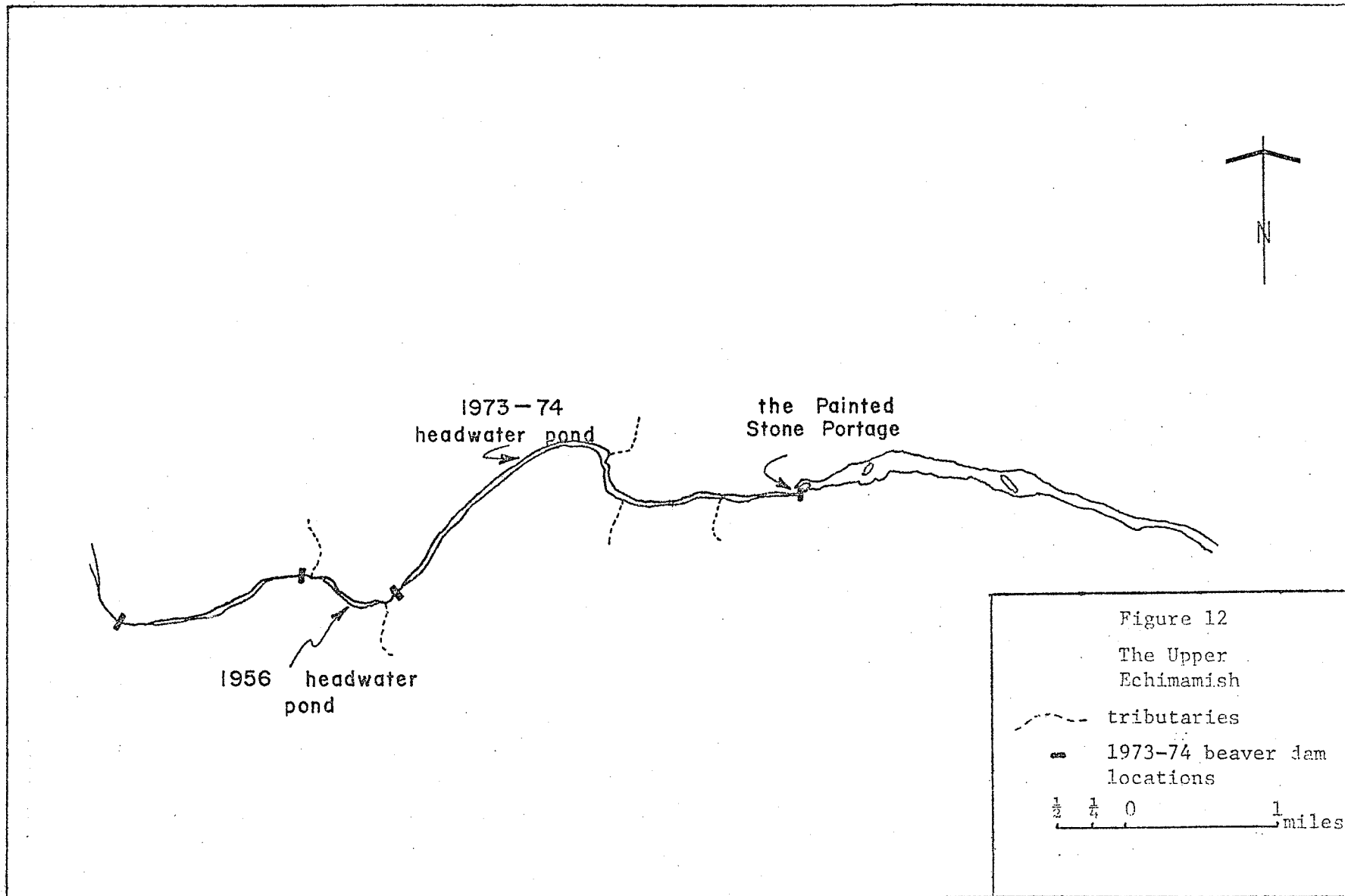
Figure 11: The Headwater Pond



journals, and those observed by Mr. Morse in 1956. The configuration and profile of the upper Echimamish would allow such a shift to take place. The plan view shown in Figure 12 helps to demonstrate this. One can see that the upper river consists of a number of long, lake-like sections joined by narrow channels. The lake sections may be up to 12 feet deep; the channel depth varies between 6 inches and 6 feet. When the beaver are plentiful, dams will separate and control each of the lake sections. The levels experienced behind them, then become dependent to a large degree on the design and the maintenance of the dam. When the beaver population is depleted, one or more of the dams would fall into disrepair. Both the first and second lake sections west of the Stone are fed by tributaries with measureable flow. With the proper configuration of the dams, either one or



The beaver dam in the foreground controls the eastern outflow of the headwater pond. The Painted Stone Portage is in the background.

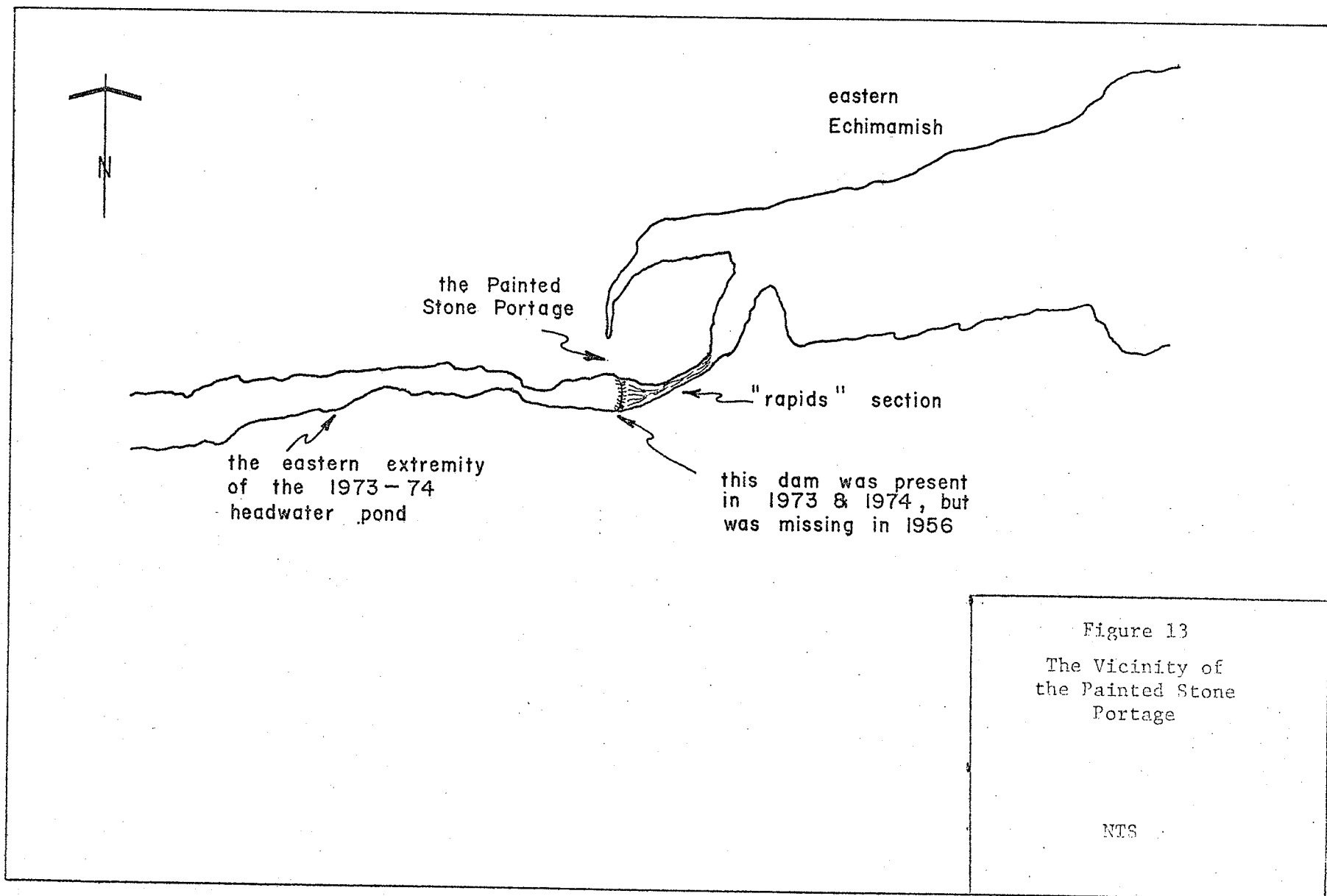


both together could act as the headwater pond. The involvement of the third lake section to the west is also a possibility though somewhat more remote. Due to the fact that the early journals always state that the descent of the western Echimamish began at the portage, it is unlikely that the 1956 condition existed during these journeys. Surely the ascent of a beaver dam on a westward jaunt from the Painted Stone would have been noted. Therefore, the author suggests that the 1973-74 condition is typical of the past and the headwater pond shifted but rarely, when the beaver were at a particularly low point in their cycle.

The elevations in Figure 11 are only relative and approximate. An elevation drop of no more than 10 feet is experienced from the uppermost Echimamish to the Nelson River. This drop would be slightly greater when the Nelson was carrying less water than it was in June 1974. The assumption has been that the water conditions in 1956 were the same as in 1974. This is not likely, but they would not vary enough to lessen the compatibility of the concept of a shifting headwater pond. Notice that it was the absence of the beaver dam at the portage that effected the situation noted in 1956. The location of this dam is more precisely noted in Figure 13.

What did the removal of the Stone by the Hudson's Bay Company really signify? To paraphrase David Thompson, it was an act typical of the intolerance shown by the whiteman for the religion of the redman. But the religion of the Indian was a religion of the land. Thompson writes of the Nahathaways;

"...The earth is also a divinity, and is alive,





The western control on the headwater pond is provided by this beaver dam. This is four miles west of the Painted Stone Portage.

but they cannot define what kind of life it is but say, if it was not alive it could not give and continue life to other things and to animated creatures. The forests, the ledges and hills of rock, the lakes and rivers have all something of the manito about them, especially the falls in the rivers, and those to which the fish come to spawn...."

Thus the European's intolerance of the religions of others and their exploitative attitude towards the land and all that lived therein were manifested in their disdain for and removal of the Painted Stone.

In the fall of 1973 a canoe journey was undertaken by R. W. Newbury, a Professor at the University of Manitoba, with the sole purpose of replacing the Painted Stone. With an understanding borne of several years of personal contact with the land, in particular this river and portage, he accomplished his desire. Is it too much to hope for, that with the return of the Painted Stone will return an understanding of other "Painted Stones" and a comprehension of what man's relationship to the land must be if he is to survive on this planet.

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APPENDIX "D"

D. Navigation and Transportation  
in the Echimamish Basin

The Echimamish was the key to an old and much-travelled boat route. The historical events leading to the development of this route belongs in another chapter, however, the highlights shall be reviewed here briefly.

For uncounted years prior to the whiteman's arrival on this continent, the Indians now known as the Cree tribe, inhabited the area. The direct dependence of these people on the flora and fauna of their lands implied that, particularly in times of great need, no part of their country went unharvested. Thus it is reasonable to conclude that the basin of the Echimamish was well known and travelled throughout.

Summer travel at that time was by birch or spruce bark canoe. The Echimamish itself and a few major tributaries such as Fairy or Halfway Creek would provide excellent ave-



Fairy Creek just upstream of its mouth

nues of travel. They allowed easy and safe passage to the most remote corners of the watershed. The creeks were the arteries of this most bountiful provider, the basin of the Echimamish. Because of the small size and the passive character of the Echimamish and its tributaries, it was a kind place for those people in their fragile craft.

In winter the travel by dogsled would be eased considerably by the hard wind-blown snow on the many lake expanses found within the basin. The river channel would provide relatively easy going for the snowshoer, being clear of entangling shrubs and bushes.

The kames and eskers with their exposed ridges and parkland vegetation, would assist the overland traveller in any season.

With the advent of the Hudson's Bay Company on the shores of the Frozen Sea, the Echimamish became more heavily used as it furnished exceedingly easy passage towards the Bay from the region of Sea (Winnipeg) Lake. Canoes were the vehicle of the fur trade at that time. Each carried two or three passengers and a couple of hundred pounds of furs at most. The canoes were light and drew little water. Even in dry years adequate water was available in the Echimamish to float the canoes. The beaver population maintained dams at critical points along the route that held back a sufficient quantity of water for the boats. For more than a century, from the 1670's to the 1770's, this was the system of trading that dominated.

The Hudson's Bay Company moved inland in 1774 with the construction by Samuel Hearne of a post on Cumberland Lake on the Saskatchewan. This was in truth the beginning of the annual fur brigades - the trip inland with trade goods and the trip to the Bay with furs - all

during the short ice-free season. Although many of the initial forays into the interior made use of the Fox River to the north rather than the Echimamish, by the late 1770's the Echimamish-Hayes was firmly established as the main artery connecting the inland operations with the headquarters at York Factory. Canoes continued their dominance until the beginning of the 19th century when there appeared on the scene the much heavier, larger and stronger "York" boats.

York boats were of board construction, about 40 feet long, 9 feet wide and when carrying a full load of 70 pieces, drew 2 feet of water. Their draught made the maintenance of the beaver dams on the Echimamish a necessity. However, being on a main fur trade highway, these valuable animals found survival to be difficult to say the least, and soon these dams were left without custodians. During the dry years it was necessary for the Company to construct its own dams. To quote John Franklin in 1819;

"...In dry years it is customary to build dams that it may be rendered navigable by the accumulation of its waters...."

Initially there were probably two dams, the ones noted as No's. 1 and 3 on the accompanying map, Figure 14. Their construction was basically a series of log cradles filled with rocks and earth. Canoes and their loads would be lifted over the dams but the large wooden boats were handled in a different manner. Blakiston reporting to Palliser in 1858 states that;

"...At the passage of a boat a portion is pulled away, the boat run through and it is again shut securely...."



The uppermost dam on the Echimamish. Its initial construction dates back to the early 19th century.



Dam No. 2. The water is forced over a rock ledge on the right of the photograph.

It appears that two dams sufficed until sometime early in the 20th century. R. W. Brock, a member of Earl Grey's entourage in 1910 was the first traveller to note the existence of three dams - the most recently constructed one being situated about halfway between the original two (No. 2 on Figure 14).

In the meantime, portages and winter trails were being developed. The diary of J. B. Tyrrell (December 1893) indicates that the winter trail between Oxford House and Norway House skirted the Echimamish basin to the south, turning up the Molson River from the Hayes, crossing Molson Lake and then over to the Nelson via Paimusk Creek. Portage trails were noted historically and they probably predated European presence. One ran from a point  $2\frac{1}{2}$  miles east of the Painted Stone south to Molson River. It was first noted by Robert Bell in 1878. Tanton remarked on a portage then in use (1936), that went north from the Echimamish towards Butterfly Lake. Another one went northeast from Dam No. 3 to some small lakes on the Pine Creek system. Of course, the best-documented of all the portages in the Echimamish area is the Painted Stone Portage. Its story begins long before we have any written record of it.

The depression in the 1930's placed a heavy emphasis on the value and hence the discovery of the precious metals. When some small gold finds were recorded along the Echimamish, the prospectors of Manitoba responded with several months of intense activity. The movement of men and light machinery into the area required the modification of water levels in the river so that it could carry the heavily loaded boats. A new dam was built in the fall of 1936 about 6 miles above Hairy Lake to alleviate the situation. By this time Dam No. 3 had fallen into disre-

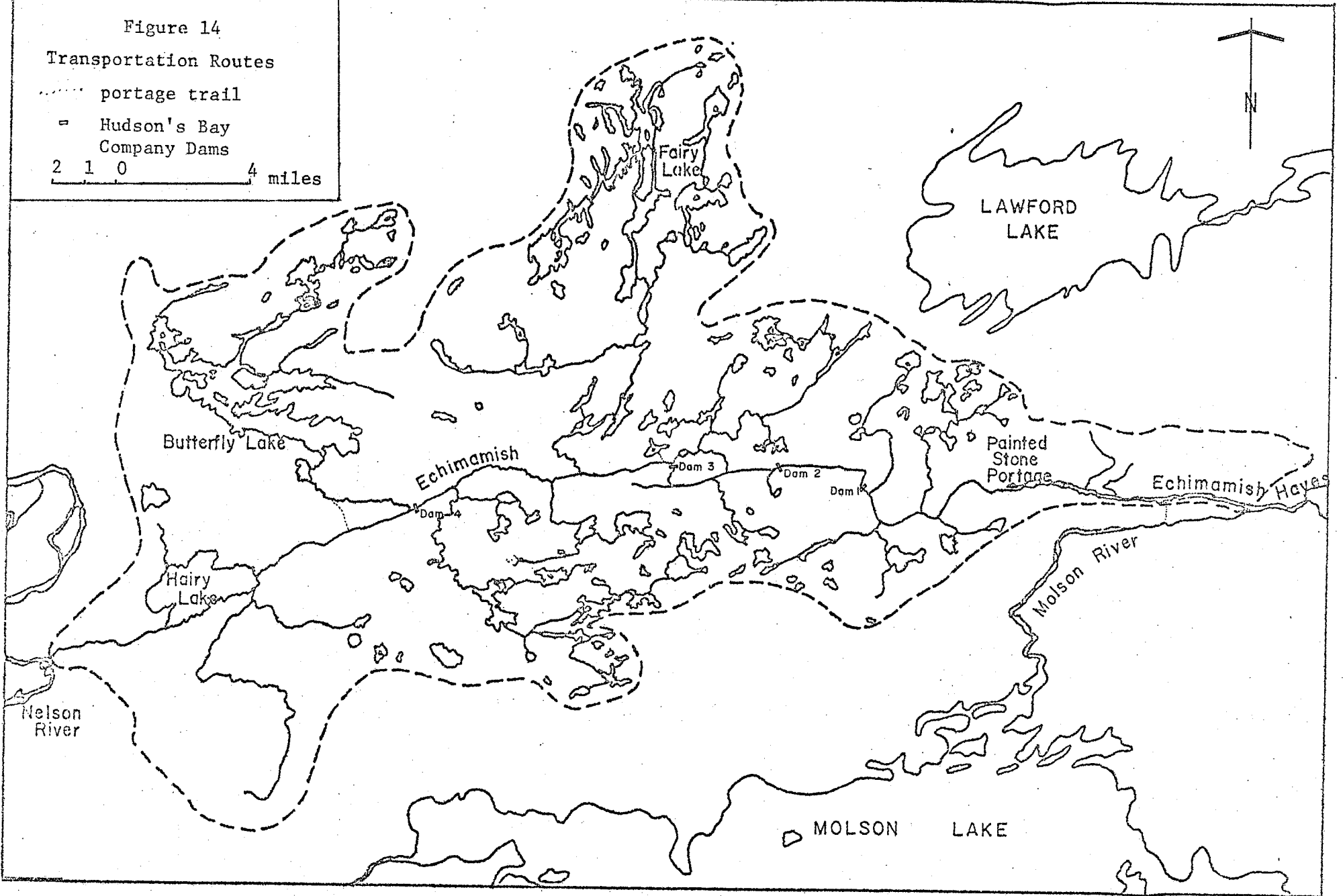
Figure 14

Transportation Routes

..... portage trail

— Hudson's Bay  
Company Dams

2 1 0 4 miles





Dam No. 4 was built in the fall of 1936 to assist in the transportation of mining exploration machinery. It is located about 6 miles upstream of Hairy Lake. (Photo courtesy of R. W. Newbury)

pair but as the centre of activity was below that point on the river, no effort was made to rebuild it. With the flurry of activity came a need for better access to the myriad of small lakes unapproachable by boat. The response to this was to cut several new portages into these areas.

The portages have suffered from disuse and are either difficult or impossible to find. Four rock-fill





Dam No. 3 is now submerged beneath about 2 feet of water. It stretches between the outcrops visible on each side of the photograph. The dam is oriented east-west at the point of a 90 degree bend in the river.

dams still exist although only two maintain a drop across them. These are the upper dams No's 1 and 2, having respectively heads of about  $\frac{1}{2}$  and  $1\frac{1}{2}$  feet. Dam No. 1 is a long structure set atop a ridge of gneiss. It is overgrown with willows except for a narrow chute through which the entire flow discharges. The second dam occurs at the bottom of the longest straight section on the Echimamish. The water spills over a chloritic schist outcrop on the south side of the structure. The third dam is yet submerged with about 2 feet of water flowing over it. It was built on the southern arm of a 90 degree bend in the river. The newest dam occurs lowest on the river. It has been ignored by the water and a channel or diversion has resulted on the north side of it (Dam No. 4). On the

westward journey beaver dams are common from the Painted Stone to a point some distance below the second dam. Below this there is sufficient depth of water to make dams unnecessary. Canoe travel is restricted to the Echimamish and to Fairy Creek as the other tributaries are likely to be just too shallow or too choked with weeds to carry any waterborne traffic.



A dusk-time photograph taken at Dam No. 2

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The field notes and diaries of Mr. J. B. Tyrrell and Mr. F. J. Alcock of the Geological Survey were consulted as well. These documents are on deposit in the Public Archives of Canada in Ottawa.

APPENDIX "E"

E. Vegetation in the  
Echimamish Basin

The Echimamish Basin is found within the Boreal Forest Region of Canada. J. S. Rowe (1972), in his "Forest Regions of Canada", has identified two subdivisions of the boreal forest in existence in the Echimamish Area; the Nelson River section and the Northern Coniferous section.

The Nelson River section describes the western two-thirds of the watershed. This area was covered by glacial Lake Agassiz and the consequent clay and sand lacustrine deposits have had the effect of levelling the formerly irregular precambrian surface. On well-drained slopes, podzolic profiles normally develop. Gleysols are typical of the imperfectly drained slopes. Moss and woody peat characterize the spruce and tamarack muskegs (Rowe 1972).

Stands of black spruce (Picea mariana) make up a large part of the forest cover, but proximity to the numerous and extensive swamps that lie back from the rivers and streams is reflected in a restriction of growth. Where drainage is better, as along the sides of rivers, on islands or on low ridges, good stands of white spruce (P. glauca) with some balsam poplar (Populus balsamifera), white birch (Betula papyrifera), trembling aspen (Populus tremuloides), and balsam fir (Abies balsamea) are customary. Extensive and repeated fires have, however, fragmented all the forest cover and large areas now support small growth trembling aspen, white birch, and scattered white and black spruce, or jackpine (Pinus banksiana) and trembling aspen. Tamarack (Larix laricina) is present with black spruce in swamps. Various species of willow (Salix spp.) and alder (Alnus spp.) form extensive shoreline

communities.

The eastern boundary of the Nelson River section lies on a north - south line which cuts through the Echimamish Basin a few miles west of the Painted Stone Portage. To the east of the boundary is Rowe's Northern Coniferous section. This area is within a region where glaciation was intense. The resulting relief is irregular with parallel rocky ridges separating poorly-drained depressions and long, narrow lakes. Drift deposits on the uplands are thin in some places and absent in others. The deeper drift of the slopes and valleys shows humo-ferric podzol profile development, while the poorly-drained areas are peat-filled.

Black spruce is the predominant tree on the thin soils of the uplands as well as on the poorly-drained lowlands, associated with jackpine and tamarack respectively. Frequent fires have favoured the spread of jackpine and are probably responsible also for the general though scattered representation of white birch over the majority of sites. In river and lake valleys where more favourable conditions of soil and local climate obtain, white spruce, balsam fir, trembling aspen, and balsam poplar form mixed stands of good growth.

Scoggan (1950) lists the following common forest associates in the Nelson River section;

Virginia grape-fern	<u>Botrychium virginianum</u>
Spiny shield-fern	<u>Dryopteris spinulosa</u>
Clubmosses	<u>Lycopodium complanatum</u>
	<u>L. clavatum</u>
	<u>L. annotinum</u>
	<u>L. obscurum</u>
Horsetails	<u>Equisetum pratense</u>
	<u>E. scirpoides</u>
	<u>E. sylvaticum</u>
Sedges	<u>Carex disperma</u>
	<u>C. tenuiflora</u>
	<u>C. deweyana</u>

Small round-leaved orchis	<u>Orchis rotundifolia</u>
Small northern bog orchis	<u>Habenaria obtusata</u>
Rattlesnake plantain	<u>Goodyera repens</u>
Bracted green orchis	<u>Habenaria viridis</u>
Northern green orchis	<u>H. hyperborea</u>
Coral roots	<u>Corallorhiza maculata</u>
	<u>C. trifida</u>
Lady's slipper	<u>Cypripedium passerinum</u>
	<u>C. calceolus</u>
Ladies' tresses	<u>Spiranthes romanzoffiana</u>
Wild lily-of-the-valley	<u>Maianthemum canadense</u>
Showy sandwort	<u>Arenaria lateriflora</u>
Northern stitchwort	<u>Stellaria calycantha</u>
Long-leaved stitchwort	<u>S. longifolia</u>
Anemones	<u>Anemone virginiana</u>
	<u>A. cylindrica</u>
	<u>A. canadensis</u>
Gold-thread	<u>Coptis trifolia</u>
Naked-stalked mitrewort	<u>Mitella nuda</u>
Dwarf raspberry	<u>Rubus pubescens</u>
Stemless raspberry	<u>R. acaulis</u>
Creamy sweet pea	<u>Lathyrus ochroleucus</u>
Canadian milk-vetch	<u>Astragalus canadensis</u>
Seneca snake-root	<u>Polygala senega</u>
Bunchberry	<u>Cornus canadensis</u>
Smooth sarsaparilla	<u>Aralia nudicaulis</u>
Black snake-root	<u>Sanicula marilandica</u>
Starflower	<u>Trientalis borealis</u>
Indian pipe	<u>Monotropa uniflora</u>
One-flowered pyrola	<u>Moneses uniflora</u>
False wintergreen	<u>Pyrola virens</u>
Liverleaf wintergreen	<u>P. asarifolia</u>
One-sided wintergreen	<u>P. secunda</u>
Cow-wheat	<u>Melampyrum lineare</u>
Tall lungwort	<u>Mertensia paniculata</u>
Sweet-scented bedstraw	<u>Galium triflorum</u>
Twinflower	<u>Linnaea borealis</u>
Snowberry	<u>Symphoricarpos albus</u>
Twining honeysuckle	<u>Lonicera glaucescens</u>
Cranberry-bush	<u>Viburnum edule</u>

According to Scoggan (1950), the general aquatic vegetation consists of;

Pondweed	<u>Potamogeton spp.</u>
Bur-reed	<u>Sparganium spp.</u>
Bladderworts	<u>Utricularia vulgaris</u>
	<u>U. intermedia</u>



Yellow water lily	<u>Nuphar variegatum</u>
Water smartweed	<u>Polygonum amphibium</u>
Water crowfoot	<u>Ranunculus aquatilis</u>
Water milfoil	<u>Myriophyllum exalbescens</u>
Mare's tail	<u>Hippuris vulgaris</u>
Lesser duckweed	<u>Lemna minor</u>
Ivy-leaved duckweed	<u>L. trisulca</u>

Shallow-water communities might include;

Swamp horsetail	<u>Equisetum fluviatile</u>
Common bulrush	<u>Scirpus validus</u>
Sedges	<u>Carex aquatilis</u>
	<u>C. rostrata</u>
Spangle-top grass	<u>Fluminia festucacea</u>
Tall reedgrass	<u>Phragmites communis</u>

In still shallower water and in mud are found;

Arrow-heads	<u>Sagittaria latifolia</u>
	<u>S. cuneata</u>
Spike-rush	<u>Eleocharis spp.</u>
Cat-tail	<u>Typha latifolia</u>
Creeping spearwort	<u>Ranunculus flammula</u>
Mudwort	<u>Limosella aquatica</u>
Tufted loosestrife	<u>Lysimachia thyrsoiflora</u>
Water parsnip	<u>Sium cicutaefolium</u>
Sweet-flag	<u>Acorus calamus</u>

Within the limited range allowed by the Echimamish basin the above communities vary only in minor ways, even from one section to another. Therefore, although Scoggan (1950) compiled the above lists for the Nelson River section, they are almost equally valid for the western boundary region of the Northern Coniferous section.

In the summer of 1974 an attempt was made to describe some of the individual communities of plants found in the Echimamish watershed. For the most part the investigations were carried out in the vicinity of the Painted Stone Portage, but it is felt that the results are applicable throughout the basin.

The most common tree community is closed black spruce forest. This is true of both the Nelson River and Northern Coniferous sections. The black spruce in imperfectly or well-drained sites may attain a height of 50 feet. The forest may be dotted with balsam poplar but their occurrence is rare. Associated with the black spruce are the following;



The closed canopy of the dense black spruce forest inhibits the development of the understory. This mossy forest floor is dotted with dwarf raspberry.

Red-osier dogwood  
Smooth sarsaparilla  
One-sided wintergreen  
Fireweed  
Sour-top blueberry  
Dwarf raspberry  
Early saxifrage  
Wild lily-of-the-valley  
Wild pea

Cornus stolonifera  
Aralia nudicaulis  
Pyrola secunda  
Epilobium angustifolium  
Vaccinium myrtilloides  
Rubus pubescens  
Saxifrage virginiensis  
Maianthemum canadense  
Lathyrus sp.

Lungwort  
Sweet coltsfoot  
Rock cranberry  
Twinflower  
Strawberry  
Bearberry  
Stiff clubmoss  
Mosses

Mertensia sp.  
Petasites palmatus  
Vaccinium vitis-idaea  
Linnaea borealis  
Fragaria sp.  
Arctostaphylos uva-ursi  
Lycopodium annotinum  
Polytrichum spp.  
Pleurozium sp.

Bog and muskeg areas comprise another distinct community. The only tree growth in these areas is manifested in 10 to 15 foot black spruce and tamarack with a few dwarf birch (Betula glandulosa). In association with these trees are found;

Woodsia  
Baked apple-berry  
Bog laurel  
Small cranberry  
Sweet gale  
Pitcher plant  
Alpine azalea  
Bogbean  
Sedges  
Orchids  
Violet  
Red baneberry  
Bedstraw  
Labrador tea  
Sphagnum  
Clubmosses  
Gold-thread  
Round-leaved sundew  
Marsh cinquefoil  
Cotton grass

Woodsia sp.  
Rubus chamaemorus  
Kalmia polifolia  
Oxycoccus microcarpus  
Myrica gale  
Sarracenia purpurea  
Loisleuria sp.  
Menyanthes sp.  
Carex spp.  
Habenaria spp.  
Viola adunca  
Actaea rubra  
Galium sp.  
Ledum groenlandica  
Sphagnum sp.  
Lycopodium spp.  
Coptis groenlandica  
Drosera rotundifolia  
Potentilla palustris  
Eriophorum spissum

Bedrock outcrops support jackpine and black spruce, and occasional white spruce, paper birch and trembling aspen. The trees are usually generously spaced, yielding an open canopy. Other plants comprising the out-crop flora include;

Three-toothed saxifrage  
Alumroot  
Glaucous spear grass

Saxifrage tricuspidata  
Heuchera spp.  
Poa glauca



This is an example of the mixed forest found behind the shoreline outcrops along the eastern Echimamish. Trembling aspen dominates but is kept company by the black spruce and the jack-pine.

Pink corydalis	<u>Corydalis sempervirens</u>
Rusty woodsia	<u>Woodsia ilvensis</u>
Cinquefoils	<u>Potentilla tridentata</u>
	<u>P. sp.</u>
Northern bedstraw	<u>Galium boreale</u>
Harebell	<u>Campanula rotundifolia</u>
Rock cranberry	<u>Vaccinium vitis-idaea</u>
Juniper	<u>Juniperus communis</u>
Bearberry	<u>Arctostaphylos uva-ursi</u>
Sedges	<u>Carex spp.</u>
Crowfoot	<u>Ranunculus sp.</u>
Alder	<u>Alnus crispa</u>
Red-osier dogwood	<u>Cornus stolonifera</u>
Cherry	<u>Prunus spp.</u>
Skunk currant	<u>Ribes glandulosum</u>
Clubmoss	<u>Lycopodium complanatum</u>
Starflower	<u>Trientalis borealis</u>
Calypso	<u>Calypso bulbosa</u>

Unfortunately, the esker - kame landforms were not investigated in 1974. For vegetative data pertaining to these areas I am dependent on the work done in 1950 by H. J. Scoggan. These landforms occur in both the Nelson River and Northern Coniferous sections of the watershed and once again the vegetation is assumed to be similar in the two sections. The dominant tree types are jackpine, black and white spruce, and trembling aspen. Some of the common associates are;

Red prairie lily	<u>Lilium philadelphicum</u>
Wild lily-of-the-valley	<u>Maianthemum canadense</u>
Rattlesnake plantain	<u>Goodyera repens</u>
Northern bastard toad-flax	<u>Geocaulon lividum</u>
Richardson's toad-flax	<u>Comandra richardsiana</u>
Prairie anemone	<u>Pulsatilla ludoviciana</u>
Red windflower	<u>Anemone multifida</u>
Strawberry	<u>Fragaria virginiana</u>
Dwarf raspberry	<u>Rubus pubescens</u>
Northern prickly rose	<u>Rosa acicularis</u>
Hooked violet	<u>Viola adunca</u>
Fireweed	<u>Epilobium angustifolium</u>
Smooth sarsaparilla	<u>Aralia nudicaulis</u>
Bunchberry	<u>Cornus canadensis</u>
Wintergreens	<u>Pyrola virens</u>
	<u>P. asarifolia</u>
	<u>P. secunda</u>

Labrador tea  
Canada blueberry  
Rock cranberry  
Northern bedstraw  
Twining honeysuckle  
Snowberry  
Twinflower  
Cranberry-bush  
Hairy goldenrod

Ledum groenlandicum  
Vaccinium canadense  
V. vitus-idaea  
Galium boreale  
Lonicera glaucescens  
Symphoricarpos albus  
Linnaea borealis  
Viburnum edule  
Solidago hispida



A rock "garden" just south of the  
Painted Stone Portage, in the Northern  
Coniferous section.

The Echimamish Basin warrants much further investigation from a botanical point of view, but even the above "glance" reveals that it holds many pleasant surprises for

those who take the time to observe.

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APPENDIX "F"



F. Wildlife in the  
Echimamish Basin

Mammals

In the Echimamish area there live about 38 species of terrestrial mammals. The list of species which follows has been constructed from data available for the precambrian shield and for the closed boreal forest zone and thus must ignore local peculiarities of distribution.

Common shrew	<u>Sorex cinerus</u>
Arctic shrew	<u>S. arcticus</u>
Water shrew	<u>S. palustris</u>
Pygmy shrew	<u>Microsorex hovi</u>
Short-tailed shrew	<u>Blarina brevicauda</u>
Star-nosed mole	<u>Condylura cristata</u>
Snowshoe hare	<u>Lepus americanus</u>
Red squirrel	<u>Tamiasciurus hudsonicus</u>
Woodchuck	<u>Marmota monax</u>
Eastern chipmunk	<u>Tamias striatus</u>
Least chipmunk	<u>Eutamias minimus</u>
Northern flying squirrel	<u>Glaucomys sabrinus</u>
Beaver	<u>Castor canadensis</u>
Deer mouse	<u>Peromyscus maniculatus</u>
Bog lemming	<u>Synaptomys cooperi</u>
Northern lemming mouse	<u>S. borealis</u>
Red-backed mouse	<u>Clethrionomys gapperi</u>
Meadow vole	<u>Microtus pennsylvanicus</u>
Heather vole	<u>Phenacomys intermedius</u>
Rock vole	<u>Microtus chrotorrhinus</u>
Yellow-cheeked vole	<u>M. xanthognathus</u>
Muskrat	<u>Ondatra zivethicus</u>
Meadow jumping mouse	<u>Zapus hudsonicus</u>
Porcupine	<u>Erithizon dorsatum</u>
Timber wolf	<u>Canis lupis</u>
Red fox	<u>Vulpes vulpes</u>
Black bear	<u>Ursus americanus</u>
River otter	<u>Lutra canadensis</u>
Ermine	<u>Mustela ermina</u>
Least weasel	<u>M. rixosa</u>
Mink	<u>M. vison</u>
Marten	<u>Martes americana</u>
Fisher	<u>M. pennanti</u>
Wolverine	<u>Gulo gulo</u>
Skunk	<u>Mephitis mephitis</u>
Canada lynx	<u>Lynx canadensis</u>
Moose	<u>Alces alces</u>
Caribou	<u>Rangifer tarandus</u>

Approximately 175 species of birds may visit or live in the Echimamish area in the course of a year. A few are permanent residents, a few are winter or summer transients but by far the most are those which come in the summer to breed and raise a family. The lists below are categorized according to their period of residency in the basin.

Permanent Residents

Goshawk	<u>Accipiter gentilis</u>
Spruce grouse	<u>Canackites canadensis</u>
Ruffed grouse	<u>Bonasa umbellus</u>
Sharp-tailed grouse	<u>Pediocetes phasianellus</u>
Great horned owl	<u>Bubo virginianus</u>
Hawk owl	<u>Surnia ulula</u>
Barred owl	<u>Strix varia</u>
Great grey owl	<u>S. nebulosa</u>
Boreal owl	<u>Aegolius funereus</u>
Downy woodpecker	<u>Dendrocopos pubescens</u>
Nor. three-toed woodpecker	<u>Picoides tridactylus</u>
Three-toed woodpecker	<u>P. arcticus</u>
Whisky jack	<u>Porisoreus canadensis</u>
Blue jay	<u>Cyanocitta cristata</u>
Common Raven	<u>Corvus corax</u>
Black-capped chickadee	<u>Parus atricapillus</u>
Boreal chickadee	<u>P. hudsonicus</u>
Pine grosbeak	<u>Pinicola enucleator</u>
Red crossbill	<u>Loxia curvirostra</u>
White-winged crossbill	<u>L. leucoptera</u>

Summer visitors

Great blue heron	<u>Ardea herodias</u>
Gadwall	<u>Anas strepera</u>
Common eider	<u>Somateria mollissima</u>
Ruddy duck	<u>Oxyura jamaicensis</u>
Sandhill crane	<u>Grus canadensis</u>
American coot	<u>Fulica americana</u>
Willet	<u>Catoptrophorus semipalmatus</u>
Franklin's gull	<u>Larus pipixcan</u>
Caspian tern	<u>Hydroprogne caspia</u>
Mourning dove	<u>Zenaidura macroura</u>
Red-breasted nuthatch	<u>Sitta canadensis</u>
Mountain bluebird	<u>Sialia currucoides</u>

Winter visitors

Willow ptarmigan  
Rock ptarmigan  
Snowy owl  
Black-billed magpie  
Hoary redpoll  
Common redpoll

Lagopus lagopus  
L. mutus  
Nyctea scandiaca  
Pica pica  
Acanthis hornemanni  
A. flammea

Scarce transients

Arctic loon  
Red-throated loon  
Brant  
Black-bellied plover  
Ross's goose  
Whimbrel  
Ruddy turnstone  
Buff-breasted sandpiper  
Northern phalarope  
Parasitic jaeger

Gavia arctica  
G. stellata  
Branta bernicla  
Squatorola squatorola  
Chen rossi  
Numenius phaeopus  
Arenaria interpres  
Tryngites subruficollis  
Lobipes lobatus  
Stercorarius parasiticus

Regular transients

Whistling swan  
White-fronted goose  
Snow goose  
Rough-legged hawk  
Semipalmated plover  
American golden plover  
Knot  
Pectoral sandpiper  
White-rumped sandpiper  
Baird's sandpiper  
Least sandpiper  
Dunlin  
Short-billed dowitcher  
Long-billed dowitcher  
Stilt sandpiper  
Semipalmated sandpiper  
Sanderling  
Grey-cheeked thrush  
Water pipit  
Tree sparrow  
Harris's sparrow  
White-crowned sparrow  
Fox sparrow  
Lapland longspur  
Smith's longspur  
Snow bunting

Olor columbianus  
Anser albifrons  
Chen caerulescens  
Buteo lagopus  
Charadrius semipalmatus  
Pluvialis dominica  
Calidris canutus  
Erolia melanotos  
E. fuscicollis  
E. bairdii  
E. minutilla  
E. alpina  
Limnodromus griseus  
L. scolopaceus  
Micropalama himantopus  
Ereunetes pusillus  
Crocethia alba  
Hylocichla minima  
Anthus spinoletta  
Spizella arborea  
Zonotrichia querula  
Z. leucophrys  
Passerella iliaca  
Calcarius lapponicus  
C. pictus  
Plectrophenax nivalis

Breeding visitors

Common loon	<u>Gavia immer</u>
Red-necked grebe	<u>Podiceps grisegena</u>
Horned grebe	<u>P. auritus</u>
Pied-billed grebe	<u>Podilymbus podiceps</u>
American bittern	<u>Botaurus lentiginosus</u>
Canada goose	<u>Branta canadensis</u>
Mallard	<u>Anas platyrhynchos</u>
Pintail	<u>A. acuta</u>
Green-winged teal	<u>A. carolinensis</u>
Blue-winged teal	<u>A. discors</u>
American widgeon	<u>Mareca americana</u>
Shoveler	<u>Spatula clypeata</u>
Ring-necked duck	<u>Aythya collaris</u>
Lesser scaup	<u>A. affinis</u>
Common goldeneye	<u>Bucephala clangula</u>
Bufflehead	<u>B. albeola</u>
White-winged scoter	<u>Melanitta deglandi</u>
Hooded merganser	<u>Lophodytes cucullatus</u>
Common merganser	<u>Mergus merganser</u>
Red-breasted merganser	<u>M. serrator</u>
Sharp-shinned hawk	<u>Accipiter striatus</u>
Red-tailed hawk	<u>Buteo jamaicensis</u>
Bald eagle	<u>Haliaeetus leucocephalus</u>
Marsh hawk	<u>Circus cyaneus</u>
Osprey	<u>Pandion haliaetus</u>
Pigeon hawk	<u>Falco columbarius</u>
Sparrow hawk	<u>F. sparverius</u>
Sora	<u>Porzana carolina</u>
Yellow rail	<u>Coturnicops noveboracensis</u>
Killdeer	<u>Charadrius vociferus</u>
Common snipe	<u>Capella gallinago</u>
Spotted sandpiper	<u>Actitis macularia</u>
Solitary sandpiper	<u>Tringa solitaria</u>
Greater yellowlegs	<u>Totanus melanoleucus</u>
Lesser yellowlegs	<u>T. flavipes</u>
Herring gull	<u>Larus argentatus</u>
Bonaparte's gull	<u>L. philadelphia</u>
Common tern	<u>Sterna hirundo</u>
Black tern	<u>Chlidonias niger</u>
Long-eared owl	<u>Asio otus</u>
Short-eared owl	<u>A. flammeus</u>
Common nighthawk	<u>Chordeiles minor</u>
Belted kingfisher	<u>Megasceryle alcyon</u>
Yellow-shafted flicker	<u>Colaptes auratus</u>
Pileated woodpecker	<u>Dryocopus pileatus</u>
Yellow-bellied sapsucker	<u>Sphyrapicus varius</u>
Hairy woodpecker	<u>Dendrocopos villosus</u>

Eastern kingbird	<u>Tyrannus tyrannus</u>
Eastern phoebe	<u>Sayornis phoebe</u>
Yellow-bellied flycatcher	<u>Empidonax flaviventris</u>
Traill's flycatcher	<u>E. traillii</u>
Least flycatcher	<u>E. minimus</u>
Olive-sided flycatcher	<u>Nuttallornis borealis</u>
Tree swallow	<u>Iridoprocne bicolor</u>
Bank swallow	<u>Riparia riparia</u>
Barn swallow (rare)	<u>Hirundo rustica</u>
Cliff swallow	<u>Petrochelidon pyrrhonota</u>
Common crow	<u>Corvus brachyrhynchos</u>
Short-billed marsh wren	<u>Cistothorus platensis</u>
American robin	<u>Turdus migratorius</u>
Hermit thrush	<u>Hylocichla guttata</u>
Swainson's thrush	<u>H. ustulata</u>
Golden-crowned kinglet	<u>Regulus satrapa</u>
Ruby-crowned kinglet	<u>R. calenula</u>
Cedar waxwing	<u>Bombycilla cedrorum</u>
Common starling	<u>Sturnus vulgaris</u>
Solitary vireo	<u>Vireo solitarius</u>
Red-eyed vireo	<u>V. olivaceus</u>
Philadelphia vireo	<u>V. philadelphicus</u>
Black and white warbler	<u>Mniotilta varia</u>
Tennessee warbler	<u>Vermivora peregrina</u>
Orange-crowned warbler	<u>V. celata</u>
Yellow warbler	<u>Dendroica petechia</u>
Magnolia warbler	<u>D. magnolia</u>
Cape may warbler	<u>D. tigrina</u>
Myrtle warbler	<u>D. coronata</u>
Bay-breasted warbler	<u>D. castanea</u>
Blackpoll warbler	<u>D. striata</u>
Palm warbler	<u>D. palmarum</u>
Ovenbird	<u>Seiurus aurocapillus</u>
Northern waterthrush	<u>S. noraboracensis</u>
Mourning warbler	<u>Oporornis philadelphia</u>
Common yellowthroat	<u>Geothlypis trichas</u>
Wilson's warbler	<u>Wilsonia pusilla</u>
Canada warbler	<u>W. canadensis</u>
American redstart	<u>Setophaga ruticilla</u>
Red-winged blackbird	<u>Agelaius phoeniceus</u>
Rusty blackbird	<u>Euphagus carolinus</u>
Common grackle	<u>Quiscalus quiscula</u>
Purple finch	<u>Carpodacus purpureus</u>
Savannah sparrow	<u>Passerculus sandwichensis</u>
LeConte's sparrow	<u>P. caucutus</u>
Slate-coloured junco	<u>Junco hyemalis</u>
Chipping sparrow	<u>Spizella passerina</u>

White-throated sparrow	<u>Zonotrichia albicollis</u>
Lincoln's sparrow	<u>Melospiza lincolni</u>
Swamp sparrow	<u>M. georgiana</u>
Song sparrow	<u>M. melodia</u>

### Fishes

There are a possible 33 species of fishes in the Echimamish basin. The Echimamish lies at the edge of the range of some of those listed below. Therefore, this reduces the possibility of the presence of some of the fishes, for example the rainbow trout. A few have been introduced to the north and here rainbow trout and carp can be cited. Observations made in the summer of 1974 indicated a preponderance of jackfish (Esox lucius), pickerel (Stizostedion vitreum) and whitefish (Coregonus clupeaformis).

Silver lamprey	<u>Ichthyomyzon unicuspis</u>
Lake sturgeon	<u>Acipenser fulvescens</u>
Rainbow trout	<u>Salmo gairdneri</u>
Lake trout	<u>Salvelinus namaycush</u>
Lake herring	<u>Coregonus artedii</u>
Lake whitefish	<u>Coregonus clupeaformis</u>
Goldeye	<u>Hiodon alosoides</u>
Mooneye	<u>H. tergisus</u>
Northern pike	<u>Esox lucius</u>
Lake chub	<u>Couesius plumbeus</u>
Carp	<u>Cyprinus carpio</u>
Emerald shiner	<u>Notropis atherinoides</u>
Blacknose shiner	<u>N. heterolepis</u>
Spotttail shiner	<u>N. hudsonius</u>
Fathead minnow	<u>Pimephales promelas</u>
Longnose dace	<u>Rhinichthys cataractae</u>
Pearl dace	<u>Semotilus margarita</u>
Quillback	<u>Carpiodes cyrinus</u>
Longnose sucker	<u>Catostomus catostomus</u>
White sucker	<u>C. commersoni</u>
Shorthead redhorse	<u>Moxostoma macrolepidotum</u>
Burbot	<u>Lota lota</u>
Brook stickleback	<u>Culaea inconstans</u>
Ninespine stickleback	<u>Pungitius pungitius</u>
Trout-perch	<u>Percopsis omiscomaycus</u>
Yellow perch	<u>Perca flavescens</u>
Pickerel	<u>Stizostedion vitreum</u>

Johnny darter	<u>Etheostoma nigrum</u>
Logperch	<u>Percina caprodes</u>
River darter	<u>P. shumardi</u>
Freshwater drum	<u>Aplodinotus grunniens</u>
Slimy sculpin	<u>Cottus cognatus</u>
Spoonhead sculpin	<u>C. ricei</u>

#### Reptiles and Amphibians

The number of different species of reptiles and amphibians found inhabiting the boreal forest greatly decreases in the northward direction. The most northerly occurring reptile, the red-sided garter snake, was confirmed in the Molson Lake area in 1974. However, neither the Canadian toad or the northern spring peeper have been confirmed in the area. The listing below represents the maximum possible variety of life in the Echimamish basin.

#### Reptiles

Red-sided garter snake	<u>Thamnophis sirtalis</u>
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#### Amphibians

Canadian toad	<u>Bufo hemiophrys</u>
Northern spring peeper	<u>Hyla crucifer</u>
Boreal chorus frog	<u>Pseudacris triseriata</u>
Wood frog	<u>Rana sylvatica</u>
Leopard frog	<u>R. pipiens</u>

#### Insects

In the south of the boreal zone there are nearly 20,000 species of insects. This declines to about 10,000 species at the northern boundary of the boreal forest. They are divided primarily among four different orders; the Coleoptera - the beetles, the Lepidoptera - the moths or butterflies, the Hymenoptera - the wasps and bees, and the Diptera - the two-winged flies. The families and species of these orders on the Shield have been weeded out to favour aquatic insects and those that are dependent one way or another on trees. Some well-known examples of the

four orders follow;

Coleoptera

Water beetle  
Flat-headed wood borer

Agabus moestus  
Melanophila acuminata

Lepidoptera

Spruce budworm  
Forest tent caterpillar

Choristoneura fumiferana  
Malacosoma disstria

Hymenoptera

Larch sawfly  
Bumble bee

Pristiphora erichsonii  
Bombus polaris

Diptera

Black fly

Prosimulum spp.  
Cnephia spp.  
Simulum spp.  
Aedes spp.

Mosquito

Other orders are present in the forest and these might include the Odonata - the dragonflies, the Hemiptera - the bugs, the Ephemeroptera - the mayflies, and the Plecoptera - the stoneflies.

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